Atlas

of Raw Materials for the Glass and Ceramic Industries

Europe and the Mediterranean area

Deposits, Production, Reserves, and Uses

Michele Dondi (editor), **Sonia Conte**, **Chiara Molinari**, **Chiara Zanelli**

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Deposits of glass and ceramic raw materials in the Euro-Mediterranean area.
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Table of contents

	page
Introduction	5
Glass and Ceramic Raw Materials	7
Country Profiles	8
Albania	9
Algeria	12
Armenia	16
Austria	18
Azerbaijan	24
Belarus	26
Belgium	28
Bosnia-Herzegovina	30
Bulgaria	33
Croatia	39
Cyprus	42
Czechia	44
Denmark	50
Egypt	52
Estonia	62
Finland	63
France	66
Georgia	78
Germany	80
Greece	91
Hungary	96
Ireland	100
Israel & Palestine	102
Italy	104
Jordan	119
Kosovo	122
Latvia	124
Lebanon	125
Libya	126
Lithuania	128
Moldova	130
Montenegro	132
Morocco	134
Netherlands	140
North Macedonia	142
Norway	144
Poland	148
Portugal	155
Romania	164
Russia (European)	169
Serbia	176
Slovakia	182
Slovenia	188
Spain	190
Sweden	203
Switzerland	210
Syria	212
Tunisia	213
Türkiye	216
Ukraine	238
United Kingdom	248
Raw Material Profiles	259
Barite	260
Celestine	262
Borates	263
Lithium minerals	264
Bauxite and alumina	266
Bentonite	268
Chromite	270
Olivine	272
Pyrophyllite	273
Wollastonite	274
Feldspar and nepheline syenite	276
Kaolin	278
Magnesite and huntite	280
Perlite	282
Quartzous materials	284
Red clays	286
Soda ash	288
Talc	290
White clays	292
Zeolites	294
Zirconium minerals	296
Kyanite-andalusite-sillimanite	298
Use in Modern Manufacturing	299
Wall and floor tiles	300
Clay bricks and roof tiles	302
Lightweight aggregates	303
Silicate glasses	304
Glazes, frits and engobes	306
Refractories	308
Clay drainage pipes	310
Sanitaryware and tableware	311
Appendices	312
Index of mineral deposits	316

Active mines of glass and ceramic raw materials in the Euro-Mediterranean area



Map by Google Earth
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Abstract

The *Atlas of Raw Materials for the Glass and Ceramic Industries* takes into consideration 52 countries, across Europe and the Mediterranean area, and a broad spectrum of applications (sanitaryware and tableware, wall and floor tiles, clay bricks and roof tiles, vitrified drainage pipes, lightweight aggregates, refractory and technical ceramics, container and flat glass, fiberglass, stone wool, specialty glasses, glazes and frits). A wide range of raw materials is examined, including alumina, ball clay, barite, bauxite, borates, chromite, expanded clay, feldspar, kaolin, kyanite group minerals, magnesite, nepheline syenite, olivine, perlite, pyrophyllite, quartz sand, quartzous materials, red clay, refractory clay, soda ash, strontium minerals, talc, wollastonite, zeolites, and zirconium minerals. This *Atlas* reports, through more than 170 maps, the location of over 5,000 deposits of glass and ceramic raw materials. In addition, *Country Profiles* provide information about the state of mining activity (active or inactive mine, occurrence) and a brief description of the deposits (type, origin, geological formation and age). For each country, the average output and production trend over the last decade (2015-2024) as well as declared reserves are indicated. Moreover, *Raw Material Profiles* provide, for each mineral, cumulative production in the Euro-Mediterranean area and its percentage on global production; shares of ceramics, glasses, and refractories in the applications of each raw material; number and geographic distribution of active and inactive deposits. Maps and profiles are complemented by a comprehensive, relevant and up-to-date bibliography.

Introduction

This Atlas represents the final step in a journey dedicated to collecting and processing data useful for strengthening the resource efficiency and supply chain resilience of the glass and ceramic industries. After having produced various reports on the raw materials for ceramic tiles and the supply chain of the Italian ceramic district as well as the *Inventory of the Italian Mineral Resources for the Ceramic Industry* (2023), it was decided to broaden the field from both a geographical and an application point of view. In addition to ceramics and refractories, in fact, the glass sector was taken into consideration.

The Atlas of Raw Materials for the Glass and Ceramic Industries extends the focus to Europe and the Mediterranean, taking into consideration 52 countries, of which 39 belong to the Council of Europe (Albania, Armenia, Austria, Azerbaijan, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Moldova, Montenegro, the Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye, Ukraine, and the United Kingdom) plus three others from Eastern Europe (Belarus, Kosovo and Russia-European part), five from North Africa (Algeria, Egypt, Libya, Morocco, and Tunisia) and five from the Near East (Israel, Jordan, Lebanon, Palestine, and Syria). In this way, Italy's central position in the raw material flows of the Euro-Mediterranean area is highlighted, as well as its possible strategic role for the production of glass and ceramics. Other European countries, for which there is no information of significant deposits of ceramic and glass raw materials, have not been considered (e.g. Iceland, Luxembourg, Malta).

A broad spectrum of applications has been examined, including: clay-based ceramics (sanitaryware, tableware and artware, wall and floor tiles, clay bricks and roof tiles, vitrified drainage pipes, lightweight aggregates); refractory and technical ceramics (acidic, basic and neutral refractories, electric insulators, advanced ceramics); glasses (container glass, flat glass, fiberglass, stone wool, specialty glasses, glazes and frits).

The Atlas examines a wide range of raw materials for the production of glass and ceramics, which can be distinguished based on the main applications:

Clay-based ceramics (ball clay, feldspar, kaolin, pyrophyllite, quartzous materials, red clay);

Lightweight aggregates (expanded clay, perlite, zeolites);

Refractory and technical ceramics (alumina, bauxite, chromite, kyanite group minerals, magnesite, olivine, refractory clay, talc, zirconium minerals);

Glasses and glazes (barium minerals, boron minerals, nepheline syenite, quartz sand, soda ash, strontium minerals, wollastonite).

Limestone and dolomite were not examined, due to the difficulties in collecting reliable data on deposits, production and reserves, connected to their many applications, beyond lime production, involving large-scale uses, such as Portland cement, ornamental stones, dimension stones, and aggregates.

This Atlas reports, through more than 170 maps, the location of over 5,000 deposits of glass and ceramic raw materials. The following information is provided, where available, in the Country Profiles: state of mining activity (active or inactive mine, occurrence) and a brief description of the deposits (type, origin, geological formation and age). For each country, the average output and production trend over the last decade (2015-2024) as well as declared reserves are indicated. Further information is provided for each mineral: cumulative production in the Euro-Mediterranean area and its percentage on global production; shares of ceramics, glasses, and refractories in the applications of each raw material; number and geographic distribution of active and inactive deposits (Raw Material Profiles). The data illustrated in this Atlas come from documented sources, reported in the attached bibliography. These data were copied *cum fide factum*, i.e. without any verification of the actual correctness, updating and consistency of the information provided by the sources. Exceptions are location and status of mining activities, which were estimated by the authors from publicly accessible satellite images. It goes without saying that the number of deposits illustrated in the Atlas depends not only on the geological richness of a territory, but on the availability of data and the degree of confidence in the source of such information.

On the other hand, the Atlas does not contain any indication of the mining companies or production data for the individual mines. There are no technical data sheets or technological behaviour data nor information concerning the composition of the raw materials (except for some clarification regarding the iron content of some clays). Nor are there any data on trade, such as import/export volumes or import reliance. This Atlas is not a Register of mining activities: no information is given on mineral exploitation (e.g., exploration permits and mining concessions).

Errors are inevitable when processing a considerable volume of data from a wide range of sources. For some pieces of information, particularly production trends and amount of reserves, there are often data gaps, which are justified (for example, data not disclosed) or which have been addressed through reasoned estimates. We sincerely apologize for any inaccuracies, approximations and data erroneously reported or interpreted by the authors.

With regard to reserves in particular, we stress that the data reported must be contextualized: each source refers to a certain year (therefore to an economic and technological context that may be quite distant in time) and assessment methodology (generally that adopted at national level). Within the case study of the Atlas, mineral resource and reserve assessment systems rarely correspond to the recommendations of CRIRSCO (Committee for Mineral Reserves International Reporting Standards) or the United Nations Framework Classification for Resources to Minerals. In other words, reserve data are to be considered with caution and in general reserves estimated for different countries should not be directly compared.



The Quarry, Furnace

Archibald Kay (1860–1935)

Image credit: McLean Museum and Art Gallery – Inverclyde Council

Glass and Ceramic Raw Materials

Raw material	Description
Barite (ba)	Barite is by far the predominant barium mineral used by industry, although in the production of glasses, frits and ceramics the raw material is always synthetic barium carbonate, which is obtained through barite processing.
Bauxite (bx)	A heterogeneous weathering product composed primarily of one or more aluminium hydroxide minerals (mainly gibbsite, boehmite and diaspore) plus silica, iron oxide, titania, clay minerals and other impurities. *Synthetic alumina* (al), obtained from bauxite processing, is also considered.
Bentonite (be)	Raw materials containing predominantly, but not exclusively, minerals of the smectite group (including any interstratified terms) associated with residual minerals or other alteration phases. They include smectitic clays, hydrated aluminium silicates and bleaching earths or fuller's earths.
Boron minerals (bo)	Raw materials consisting of alkali and alkaline-earths borates (tincalconite, borax, kernite, colemanite, ulexite, probertite, ...) typically associated with lacustrine (e.g., playa lake) sediments and explosive volcanic activity.
Celestine (sr)	Strontium deposits are usually formed by celestine, e.g., as replacement of gypsum or anhydrite in preexisting lacustrine sediments. In frits, the raw material is always synthetic strontium carbonate, which is obtained through celestine processing.
Chromite (cr)	Chromite ores consist of Fe^{2+} and chromium-bearing spinels with varying amounts of aluminium, magnesium and Fe^{3+} depending on the origin of deposits: mainly layered igneous complexes (stratiform) or ophiolites (podiform).
Feldspar (fd)	Feldspathic fluxes from acidic rocks (oversaturated in silica): intrusive (granitoids and aplite-pegmatite); volcanic-hypabyssal (rhyolite-rhyodacite lavas and pyroclastics, porphyry); metamorphic (orthogneiss, metapegmatite, porphyroid) and metasomatic (albitite, epithermal alterations). They include sodium, potassium or mixed types, sometimes containing sericite or zeolites, typically leucocratic and with feldspar > quartz.
Kaolin (ka)	Clay materials mainly containing minerals of the kaolinite group, associated with residual phases or other alteration products. These are essentially kaolins from primary deposits (formed by meteoric, hydrothermal, exhalative or mixed alteration) at expenses of granitoids, felsic metamorphics or arkosic sands.
Kyanite group minerals (ky)	Raw materials based on polymorphs of aluminium silicate, Al_2SiO_5: kyanite, andalusite, and sillimanite, which deposits are formed in different metamorphic conditions. Also, sedimentary deposits, where Al_2SiO_5 minerals occur in placers, are exploited.
Lithium minerals (li)	Raw materials containing one or more lithium-bearing minerals in significant amount: spodumene, petalite, lepidolite, eucryptite, amblygonite (occurring in pegmatites); hectorite, jadarite (in volcano-sedimentary deposits).
Magnesite (mg)	Raw materials consisting of magnesite, sometimes associated with hydromagnesite, brucite, talc, chlorite, serpentine or dolomite, in orebodies formed by replacement of dolostones or ultrabasic rocks or in sedimentary deposits. Huntite (hu) deposits are also considered.
Nepheline syenite and phonolite (ns)	Feldspathic fluxes with feldspathoids from deposits of intermediate igneous rocks (undersaturated or saturated in silica): both intrusive (e.g., syenite) and effusive (trachyte, phonolite, ...) and their metamorphic counterparts. They include sodium, potassium or mixed types, with feldspar + foids >> quartz (if any), commonly with a significant content of mafic minerals.
Olivine (ol)	Raw materials based on forsterite-fayalite solid solutions, recovered from dunite (i.e., ultrabasic rock with over 90% olivine) and secondarily from other types of peridotite, even serpentinized, making up the oceanic crust.

Raw material	Description
Perlite (pe)	Raw materials mainly consisting of volcanic glasses containing combined water (2 to 5 wt%) which typically derive from weathering of rhyolite lavas and pyroclastics or obsidian, pitchstone and "pumicite" (altered ash).
Pyrophyllite (py)	Raw materials containing mainly, but not exclusively, pyrophyllite, which deposits are usually originated by low-grade metamorphism on peraluminous parent rocks or hydrothermal alteration of volcanic rocks, such as rhyolite or dacite.
Quartz-feldspathic sand (qf)	Feldspathic sands and sandstones (*arkose*) from deposits of various origins (marine, alluvial, lacustrine, aeolic) with quartz > feldspars and typically low levels of iron oxide and carbonates.
Quartzous materials (qs-qz)	Almost exclusively siliceous materials of various origins: sedimentary (silica sand, quartzarenite), metamorphic (quartzite) or hydrothermal (quartz veins) with quartz >> feldspars and typically low contents of iron oxide and carbonates. Also recovered as byproduct of kaolin or pegmatite beneficiation.
Red clay (rc)	Fine-grained raw materials, more or less intensively coloured after firing, containing clay minerals of two or more groups (kaolinite, chlorite, illite, smectite and their interstratified terms) usually prevailing over quartz ± feldspars and carbonates from absent to abundant. Vast spectrum of origins from continental (alluvial, eluvial, colluvial, lacustrine, glacial) to transitional and marine (deltaic, tidal flat, neritic, turbiditic and pelagic). Wide variability of the state of lithification, from mud to shale (up to weathered slate and greywacke). This category includes plastic terms used in tilemaking (*red stoneware clay*), *expanded clay*, and low-alumina *fireclays*.
Soda ash (na-sa)	Raw materials consisting mainly of sodium carbonates (trona, nahcolite, pirssonite) or sodium sulphates (thenardite, glauberite) retrieved from deposits related to alkaline volcanism, thermal spring activity, closed basins and arid climate. Synthetic soda ash (sodium carbonate) is mainly obtained by the Solvay process (from halite and limestone).
Talc (tc)	Raw materials with a prevalent talc content, sometimes associated with chlorite and/or Ca-Mg carbonates, deriving from metasomatism of parent rocks of various origin (basic igneous, dolostone, ...). This category includes steatite (massive talc), soapstone (talc-magnesite-chlorite mix) and leucophyllite (white mica-quartz-chlorite assemblages).
White clay (wc)	Clay materials, light-coloured after firing, typically containing clay minerals of the kaolinite, illite and smectite groups (and their interlaminates) associated with quartz and feldspars, with little or no carbonates, and low Fe_2O_3 content. They basically come from sedimentary deposits, with a different diagenetic or metamorphic imprint. This category includes both plastic (*ball clay*) and refractory terms (*fireclay, refractory clay, flint clay*).
Wollastonite (wo)	Raw materials with significant wollastonite content, typically in parageneses with amphiboles, talc, diopside, garnets, etc., deriving from contact metamorphism (e.g., granitoids intruding limestones) or metasomatism at the expense of carbonate rocks.
Zeolites (ze)	Volcanic ash fall tuffs and vitroclastic levels interbedded with lacustrine sediments (epiclastics) more or less intensively zeolitized. The most common zeolites are clinoptilolite, phillipsite, chabazite, heulandite, mordenite, and analcime.
Zirconium minerals (zr)	Zircon sand mined from recent beach or strand line deposits and coastal Aeolian dunes (and also from ancient placers). Baddeleyite is essentially recovered from Archean alkaline complexes.



Country Profiles:

Albania
Algeria
Armenia
Austria
Azerbaijan
Belarus
Belgium
Bosnia-Herzegovina
Bulgaria
Croatia
Cyprus
Czechia
Denmark
Egypt
Estonia
Finland
France
Georgia
Germany
Greece
Hungary
Israel & Palestine
Ireland
Italy
Jordan
Kosovo
Latvia
Lebanon
Libya
Lithuania
Moldova
Montenegro
Morocco
Netherlands
North Macedonia
Norway
Poland
Portugal
Romania
Russia (European)
Serbia
Slovakia
Slovenia
Spain
Sweden
Switzerland
Syria
Tunisia
Turkey
Ukraine
United Kingdom

Albania

The Albanian mining industry is focused on the extraction of chromite, which accounted for 2.5% of world production in 2020 [1] and other strategic metals [2]. Amongst the industrial minerals, the considerable resources of clay materials [3,4] are currently exploited for the brick industry, as well as silica sand. The extraction of kaolin, magnesite, and bauxite has been apparently abandoned. There are also occurrences of bentonite, feldspar, perlite and zeolites [4,5].

Chromite has been exploiting by several mines located in four main ophiolitic massifs of middle Jurassic age: Bulqizë, Kukës, Shebenik, and Tropojë [2,6]. The Albanian production of raw ore is 864,000 tpa as average of the 2015–2024 period (third supplier in the Euro-mediterranean area) with a maximum close to 1.3 million tonnes in 2019 and reserves for 35 million tonnes [6]. Podiform chromitites are hosted in harzburgites with minor dunites of the Eastern Mirdita Ophiolite. The Bulqizë district has been thoroughly investigated as the high Cr_2O_3 content of chromite allows to reach the metallurgical grade [8–11].

Red clays were exploited at an average rate of 797,000 tpa, with a clear decreasing trend in the decade 2015–2024 [1]. Many deposits are registered all over the country and reserves are indicated in 220 million tonnes [3–5]. Currently, a dozen deposits are being exploited for the production of bricks and roof tiles (along with cement) with the largest concentration located in central Albania. Little is accessible about the geology of these clay deposits and their composition; in the Tirana area, they are Cenozoic marine deposits and recent alluvial sediments [12].

Industrial silica: deposits are mainly located in the Kukës county, where is the one currently in operation (21,000 tpa, 2015–2024). No information is available on geology and size of the deposit.

Kaolin: a couple of deposits is known, of which only that at Gomsiqe (Pukë) has been in operation. Although the mine is apparently active, production officially ceased in 1992, peaking at 11,000 t in 1984 [7]. The deposit stems from kaolinization of gabbro and basalt of the ophiolitic Mirdita unit during a Pliocene-Quaternary episode [13].

Bauxite was mined until 2001 in the Dardhë field (Elbasan) which reached the maximum production of 37,700 t in 1988 [7]. No information is available on geology and dimension of the deposit.

Magnesite: small quantities were recovered from the Gomsiqe deposit (close to the kaolin mine) until 1992; the largest output was 2,200 t in 1985 [7]. **Bentonite**: smectitic clays, originated by alteration of ultrabasic rocks and settled in lagoon (Holocene), constitute the Prrenjas deposit in the Korçe county [14]. **Zeolites**: a deposit is reported at Munella (Alessio), where a stilbite-stellerite mineralization was formed at expenses of volcanics of the Central Mirdita zone [15].

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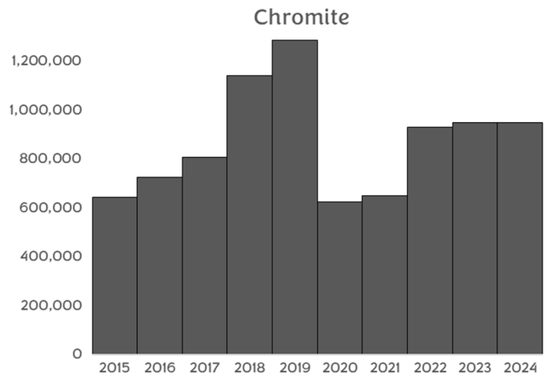
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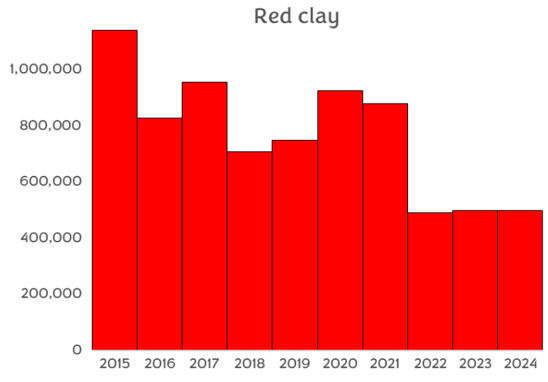
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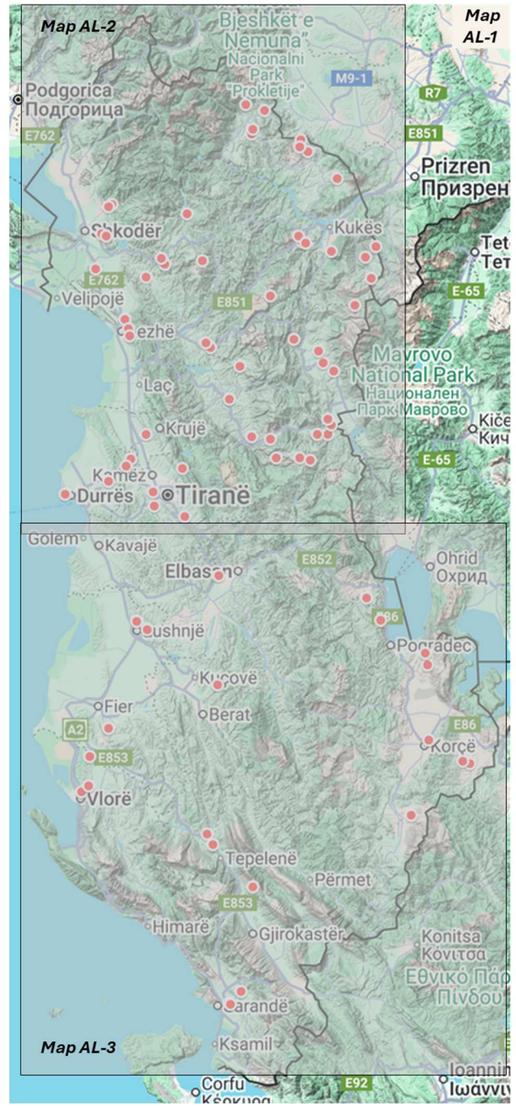
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Albanian raw chromite production (t)



Albanian red clay production (t)



Map data ©2026 Google, GeoBasis-DE/BKG (©2009)

Table AL-a: deposits of raw materials for the ceramic and glass industries in Albania.

#	raw material	st	deposit	county
1	qz	A	Kerrnaje	Kukës
2	rc	I	Tropojë	Kukës
3	cr	I	Rragam	Kukës
4	rc	I	Luzhë	Kukës
5	cr	A	Lugu i Zanit	Kukës
6	cr	A	Zogaj	Kukës
7	cr	A	Zgjeç	Kukës
8	cr	A	Gajrep	Kukës
9	rc	A	Domen	Shkodra
10	rc	I	Drisht	Shkodra
11	mg	O	Lëvrushku	Pukë
12	cr	A	Fusharë	Kukës
13	cr	A	Pllakmena	Kukës
14	cr	A	Kalimash	Kukës
15	rc	O	Nange	Kukës
16	qz	O	Kollovoz	Kukës
17	qz	O	Guri i Derdhur	Kukës
18	rc	O	Renc	Shkodra
19	fd	O	Guri I Zi	Shkodra
20	mg	I	Gomsiqe 1	Pukë
21	ka	A	Gomsiqe 2	Pukë
22	pe	O	Lum Zi	Shkodra
23	rc	I	Zefjanes	Shkodra
24	rc	I	Vig	Shkodra
25	cr	O	Lajthizë	Mirditë
26	qz	I	Kodra e Noçit	Kukës
27	rc	A	Balldre	Alessio
28	rc	A	Fushë Krujë	Alessio
29	rc	I	Gryka e zeze	Alessio
30	qz	I	Sohodoll	Kukës
31	rc	I	Prosek	Mirdizia
32	rc	I	Perlat Qendër	Mirdizia
33	qz	O	Grikë Nokë	Kukës
34	rc	I	Zdojan	Dibër
35	rc	I	Dohoshisht	Dibër
36	qz	O	Urxallë	Dibër
37	rc	O	Kastriot	Dibër
38	rc	I	Shoshaj	Mat
39	rc	O	Shupenze	Bulqizë
40	rc	O	Çerenec	Bulqizë
41	rc	A	Strikçan	Bulqizë
42	rc	I	Zall-Sopot	Bulqizë
43	cr	A	Bulqizë	Bulqizë
44	rc	A	Shëngjun	Klos
45	rc	A	Zallë	Fushë Krujë
46	cr	A	Krastë	Bulqizë
47	cr	A	Maia e Theknès	Bulqizë
48	cr	A	Ternovë	Bulqizë
49	rc	I	Fushë Preze	Tirana
50	rc	I	Marquinet	Tiranë
51	rc	A	Brrar	Tirana
52	rc	A	Karpen-Metalle	Maminas
53	rc	I	Currila	Durrës
54	rc	A	Mëzez	Tirana
55	rc	I	Lamuç	Sharre
56	rc	A	Mullet	Tirana
57	rc	I	Bradashesh	Elbasan
58	cr	I	Katjel	Elbasan
59	cr	A	Pojskë	Pogradec
60	rc	I	Allprenaj-Virovë	Fier
61	rc	I	Kasharaj	Lushnjë
62	ka	O	Alarup	Pogradec
64	be	I	Prrenjas	Korçe
64	rc	O	Krekëz	Saranda
65	rc	I	Kraps	Fier
66	rc	I	Korçe	Korçe
67	rc	O	Treullazër	Vlorë
68	qz	O	Vërlen-Hoçisht	Korçe
69	rc	I	Fitore	Korçe
70	rc	I	Risili	Vlorë
71	rc	I	Qender	Vlorë
72	rc	A	Vb Bezhan	Kolonjë
73	rc	I	Vasjar	Gjirokastër
74	rc	O	Memaliaj	Gjirokastër
75	rc	I	Labove	Gjirokastër
76	rc	O	Mesopotam	Saranda
77	rc	A	Vrion	Saranda
78	bx	I	Dardhë	Elbasan
79	rc	I	Laknas	Tiranë
80	ze	O	Munellë	Alessio

Raw material

ba	barite
be	bentonite, smectitic clays
bx	bauxite
cr	chromite
fd	feldspar, feldspathic rocks
ka	kaolin
mg	magnesite
pe	perlite
qz	quartz, silica sand
rc	red clays
ze	zeolites, zeolitic tuffs

Status of deposit

A	active mine
I	inactive, mine closed
O	occurrence, no recent mining

Map AL-2

Map AL-3

30 km

active inactive

- rc
- cr
- qs
- ka
- be
- mg
- fd
- pe
- bx
- ze

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Algeria

Algeria is a strong producer of red clay and silica sand (quantities not disclosed) – together with feldspar, kaolin and bentonite – to support the domestic brick and tile industry. The Algerian mining industry is the fifth larger supplier of barite in the Euro-Mediterranean zone. Also, pyrophyllite and celestine are apparently being extracted. Moreover, prospects for lithium minerals are being explored [1,2].

Barite is mined in the Ougarta district (40,000 tpa, average 2015-2024) where the Draïssa deposit - a hydrothermal vein system that cuts Cambrian sedimentary rocks – contains 4.5 million tonnes of reserves [3]. Significant barite resources have been reported for the Mizab hydrothermal vein complex (Aurès Mountains) which is sheltered in Cretaceous formations [4].

Feldspar has long been exploited in northeastern Algeria, averaging 168,000 tpa [2], at the Aïn Barbar microgranite deposit [5-7]. Active sources are also quartz-feldspathic sands near Bouira and Skikda [8]. Further resources of feldspar (granite and pegmatite) are reported in Greater Kabylia (*Map DZ-2*) as well as microgranite in Lesser Kabylia [7].

Kaolin is extracted (103,000 tpa, mean 2015-2024) in two mining districts in the Lesser Kabylia massif (*Map DZ-3*). Three deposits are in operation in Tamazert (Jijel): they were formed by hydrothermal alteration of the Beni-Ferguene metamorphic complex [9,10]. Further east, Cretaceous limestones host various karst deposits filled with detrital and diagenized clays, mainly halloysite (Djebel Dabbagh) or kaolinite [11-13].

Bentonite is produced (35,000 tpa, mean 2015-2024) in the Western High-Plateau from intercalations of argillified rhyolitic tuffs in Upper Miocene marls [14]; a similar deposit is known in the Tellian Atlas [15]. Other bentonite occurrences are reported in the Eastern Grand Erg [16,17].

Red clays are extracted from at least seventy quarries to feed the Algerian ceramic industry (wall and floor tiles, bricks and roof tiles, pottery) which has been reinvigorated by restrictions on imports of building materials. Lower Miocene Numidian clays are suitable for red stoneware tiles [18]. The major source for the brickmaking industry in northern Algeria is represented by Upper Miocene blue marls [19-21]. Pliocene continental sediments are utilized in the Greater Kabylia [22] and also in the Saharan Atlas [23]. Triassic red shales have been exploited in the Aurès massif [24]. Further clay occurrences in the vast desert areas are not economically exploitable [25].

Silica sand is recovered essentially from Quaternary deposits: both alluvial sands in the Tell Atlas [26-28] and aeolian sands in the Saharan Atlas [8,29]. Prospects are reported for dune fields in the Grand Erg [30-33] as well as quartz veins in the Hoggar massif [34,35].

Strontium minerals: a Triassic complex in the Tellian Atlas hosts a mineralization of celestine formed by replacement of the anhydrite cement of breccias [36]. The Béni-Mansour mine, producing around 5,000 tpa in the 1975-1994 period [1], seems still in operation. **Pyrophyllite** is apparently extracted from Silurian shales in the Ougarta region: continental sediments (semi-arid climate) affected by diagenesis and later by hydrothermal activity [37]. **Lithium minerals**: prospects for rare-metals pegmatites in the Hoggar massif are reported [38]. Some interest has been aroused by Li concentrations in salt pan brines in chotts of the Eastern Grand Erg [39].

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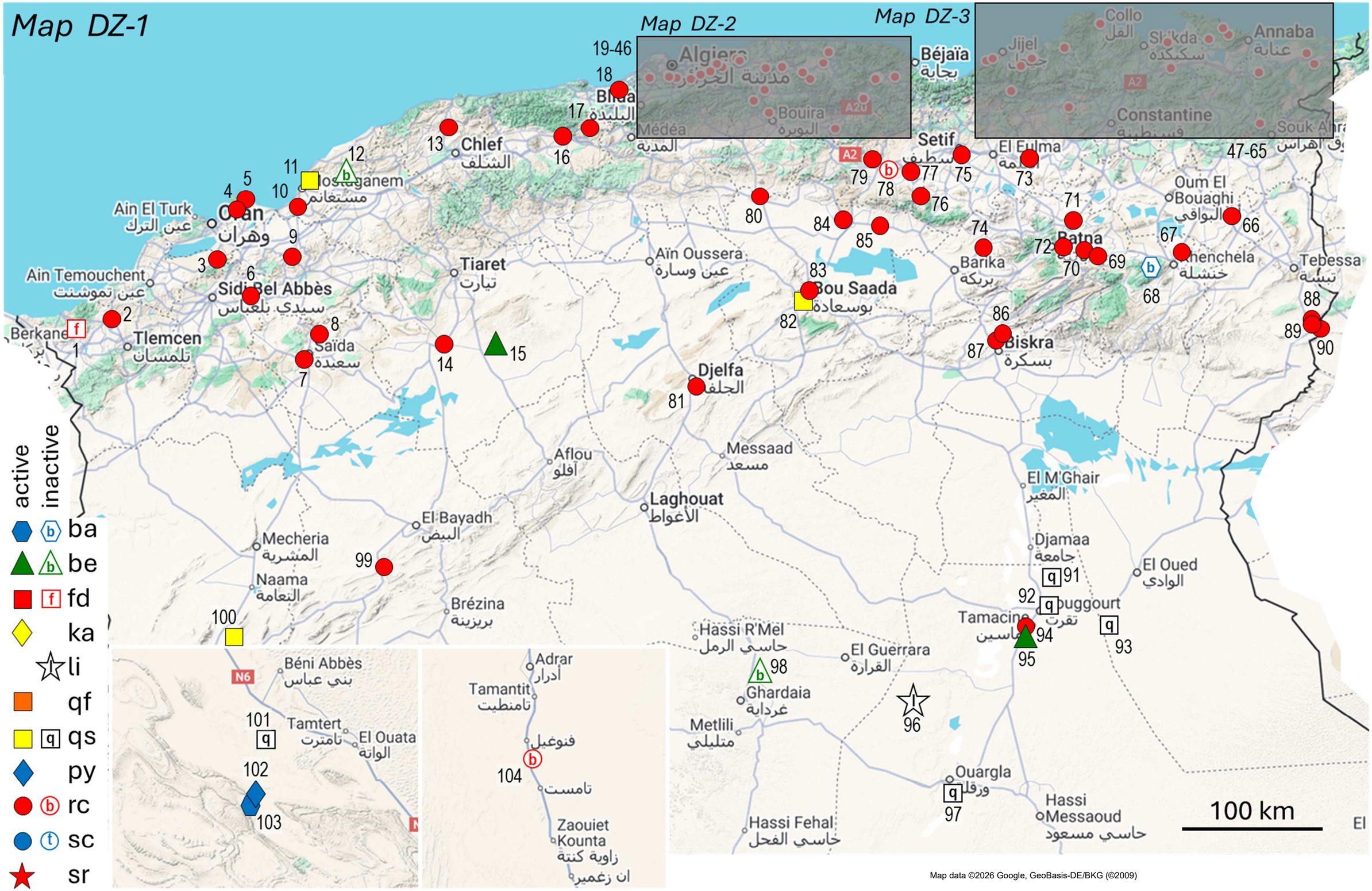

Map DZ-1
Map DZ-2
Map DZ-3
active
inactive
ba
be
fd
ka
li
qf
qs
py
rc
sc
sr
Algiers
Béjaïa
Bouira
Médéa
Blida
Chlef
Ain El Turk
Oran
Ain Temouchent
Sidi Bel Abbès
Berkane
Tlemcen
Saïda
Tiaret
Aïn Oussera
Setif
El Eulma
Barika
Batna
Oum El Bouaghi
Tebessa
Bou Saada
Biskra
Djelfa
Aflou
Messaad
Laghouat
El M'Ghair
Djamaa
El Oued
Mecheria
El Bayadh
Naama
Brézina
Hassi R'Mel
El Guerrara
Ghardaia
Metlili
Ouargla
Hassi Fehal
Hassi Messaoud
Tamacine
Béni Abbès
Tamtert
El Ouata
Adrar
Tamantit
Zaouiet Kounta
100 km
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Table DZ-a: deposits of raw materials for the ceramic and glass industries in Algeria (*cluster of deposits).

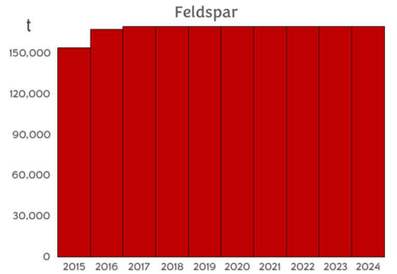
#	r. m.	st	deposit	district
1	fd	O	Nedroma	Tlemcen
2	rc	A	Remchi*	Tlemcen
3	rc	A	Tamzoura	Ayn Temushent
4	rc	A	Gdyel	Ouran
5	rc	A	Arzew*	Ouran
6	rc	A	Mostefa Ben Brahim	Sidi Bel Abbes
7	rc	A	Saida	Saida
8	rc	A	Ouled Khaled	Saida
9	rc	A	Hacine	Mascara
10	rc	A	Aïn Nouïssy	Mostaganem
11	qz	A	Mostaganem	Mostaganem
12	be	O	M'zila	Mostaganem
13	rc	A	Douar Ouailia	Chlef
14	rc	A	Medrissa	Tiaret
15	be	A	Hammam Boughrara	Maghnia
16	rc	A	Hai Oued Rehane	Ayn Defla
17	rc	A	Hoceïnia	Ayn Defla
18	rc	A	Attatba	Tipasa
19	rc	A	Sidi Abed	Algiers
20	rc	A	Baba Ali	Birtouta
21	rc	A	Haouch El Amirette	Baraki
22	rc	I	Mahada	Blida
23	rc	A	Ben Danoun	Boumerdès
24	rc	A	Mouilha	Boumerdès
25	rc	A	Boudouaou 1	Boudouaou
26	rc	I	Boudouaou 2	Boudouaou
27	rc	A	Ben Rahmoune 2	Boumerdès
28	rc	A	Ben Rahmoune 1	Boumerdès
29	rc	A	Bani Fouda	Boumerdès
30	rc	A	Tidjelabine	Boumerdès
31	qz	A	Zemmouri	Boumerdès
32	rc	A	Zemmouri	Boumerdès
33	rc	A	Aomar*	Bouira
34	qf	A	Bouira	Bouira
35	fd	O	Draa El Mizane	Tizi-Ouzou
36	fd	O	Naciria	Boumerdès
37	rc	A	Draâ Ben Khedda	Tizi-Ouzou
38	rc	A	Irdjen	Tizi-Ouzou
39	fd	O	Larba Nait Irathen	Tizi-Ouzou
40	rc	A	Freha	Tizi-Ouzou
41	rc	I	Ighil Mhenni	Tizi-Ouzou
42	sr	A	Béni-Mansour	Bejaia
43	rc	A	Mlakou	Bejaia
44	rc	A	Sidi Aïch 2	Bejaia
45	rc	A	Sidi Aïch 1	Bejaia
46	rc	A	Amizour	Bejaia
47	qz	A	El-Aouana	Jijel
48	sc	A	Timizer	Jijel
49	sc	O	Djimla-Tamantout	Jijel
50	sc	A	Taher	Jijel
51	ka	A	Chekfa	Jijel
52	ka	A	Hadj Ali	Jijel
53	ka	A	Tamazert-El Milia	Jijel
54	rc	I	Aïn Nechma	Mila
55	fd	I	Collo	Skikda
56	qf	A	El-Allia	Skikda
57	fd	I	Filfila	Skikda
58	rc	I	Azzaba	Skikda
59	rc	A	Treat	Annaba
60	fd	A	Aïn Barbar	Annaba
61	fd	O	Wadi El-Anab	Annaba
62	rc	A	El Hcharef	El Tarf
63	rc	A	Būthalja	El Tarf
64	ka	A	Djebel Dabbagh	El Tarf
65	rc	I	Mechroha	Souk Ahras
66	rc	A	Ain Chadjra	Oum el-Bouaghy
67	rc	A	Baghaï	Khenchela
68	ba	I	Mizab-Ain Mimoun	Khenchela
69	rc	A	Timgad	Batna
70	rc	A	Sidi Maancer	Batna
71	rc	A	Djerma	Batna
72	rc	A	Tazoult	Batna
73	rc	A	Tadjenanet*	Mila
74	rc	A	N'Gaous	Batna
75	rc	A	Mechtat Bir Smar	Sétif
76	rc	A	Ayn Ben Ayyad	Borj Bou Arreridj
77	rc	A	Ain Tassera	Borj Bou Arreridj
78	rc	I	El Anasser	Borj Bou Arreridj
79	rc	A	Medjana	Borj Bou Arreridj
80	rc	A	Sidi Aïssa	M'Sila
81	rc	A	Djelfa*	Djelfa
82	rc	A	Boussaâda	M'Sila
83	rc	A	M'Sila	M'Sila
84	qz	A	Boussaâda	Boussaâda
85	rc	A	El Djorf-Ouled Derradj	M'Sila
86	rc	A	Branis 1	Biskra
87	rc	A	Branis 2	Biskra
88	rc	A	Oum Ali 1	Tébessa
89	rc	A	Oum Ali 3	Tébessa
90	rc	A	Oum Ali 2	Tébessa
91	qz	O	Sidi Slimane	Touggourt
92	qz	O	Zaouia El Abidia	Touggourt
93	qz	O	El Oued	El Oued
94	rc	A	Blidet Amor*	Touggourt
95	be	A	Blidet Amor	Touggourt
96	li	O	N'Goussa	Ouargla
97	qz	O	Ouargla	Ouargla
98	be	O	El Menia	Ghardaia
99	rc	A	Ain El Orak	El Bayadh
100	qs	O	Aïn Séfra	Naâma
101	py	A	Ougarta	Béni Abbès
102	qs	O	Draïssa	Béni Abbès
103	ba	A	Draïssa	Béni Abbès
104	rc	I	Fenoughil	Adrar

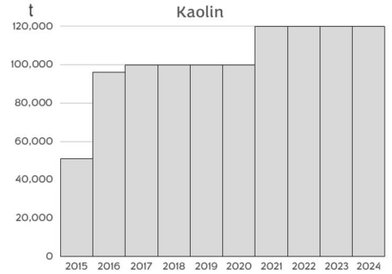
Raw material

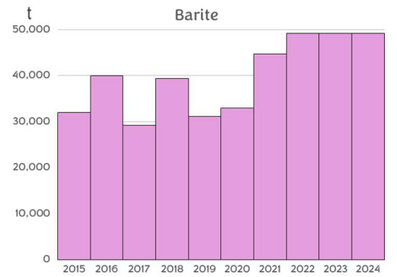
ba	barite
be	bentonite, smectitic clays
fd	feldspar, feldspathic rocks
ka	kaolin
li	lithium minerals
py	pyrophyllite
qf	quartz-feldspathic sand
qs	silica sand
rc	red clays
sc	stoneware clays
sr	celestine (strontium)

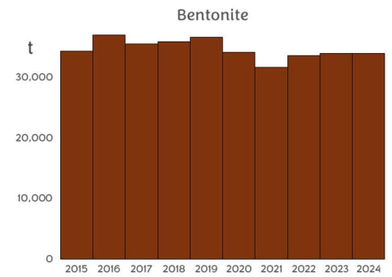
Status of deposit

A	active mine
I	inactive, mine closed
O	occurrence

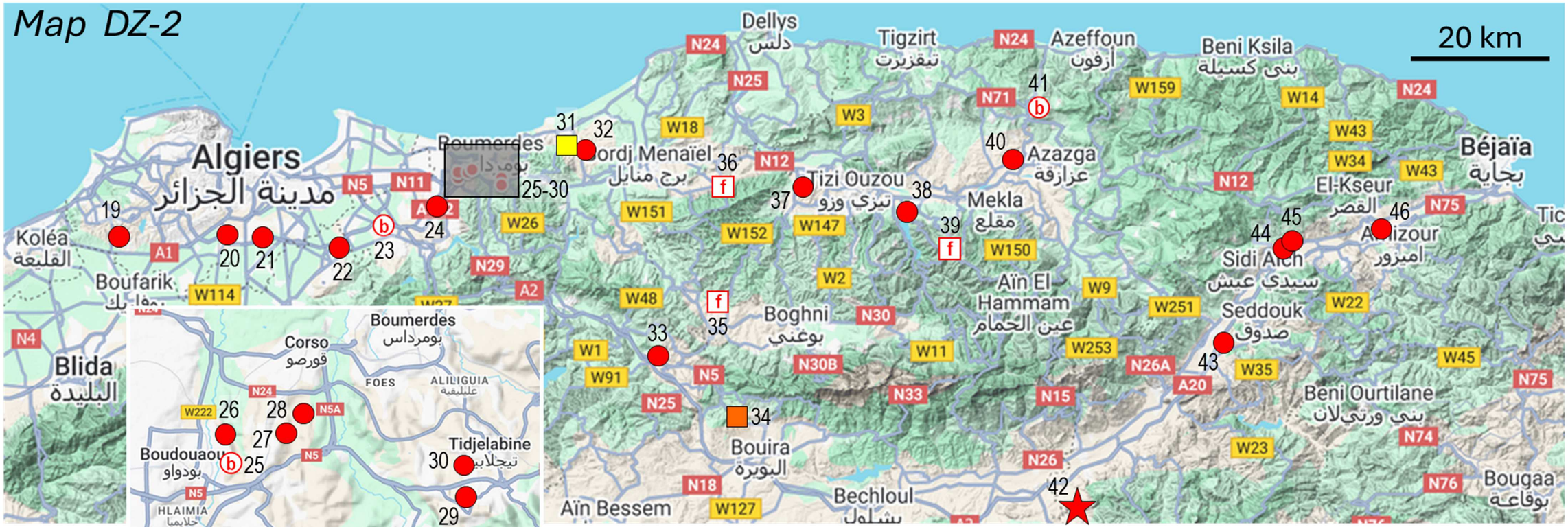




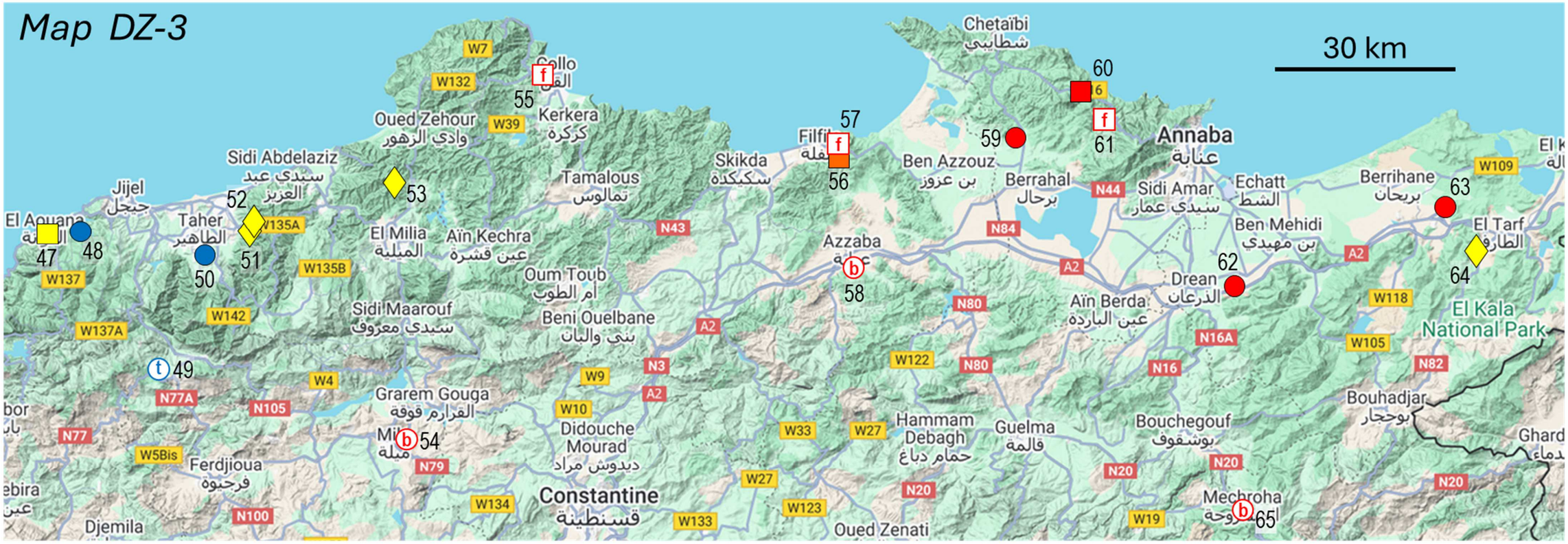




Map DZ-2



Map DZ-3



Armenia

Armenia produces mainly perlite (third larger supplier in the Euro-Mediterranean zone) and bentonite as ceramic and glass raw materials, together with unspecified amounts of zeolites and red clays. Occurrences of barite, feldspar and white clay have been also reported [1,2].

Perlite: large deposits exist in the Aragats Volcanic Province, located in the Lesser Caucasus Mountains, originated by Quaternary explosive eruptions [3,4]. Several quarries are in operation on the southwestern slopes of Aragats stratovolcano [5,6] with an average output of 66,000 tpa [2]. Perlite has been also proposed as feldspathic flux for the production of glass and ceramic tiles [7,8].

Bentonite is mined (13,000 tpa, mean 2015-2024) from the Sarigyukh deposit that was formed by hydrothermal alteration of volcanic tuff intercalations in Cretaceous sediments of Lesser Caucasus [2,9,10].

Zeolite deposits (mostly clinoptilolite-rich tuffs) are exploited in the Armenian Highlands (Artik and Oktemberyanskaya Step) as well as in the Lesser Caucasus, where zeolites occur in dacitic and rhyodacitic altered pyroclastics within Cretaceous volcano-sedimentary sequences [11-13].

Red clays, used essentially in the manufacturing of bricks and pottery, are recovered from Miocene marls and Quaternary loess deposits [14,15]. **White clay**: an occurrence has been claimed in Lesser Caucasus [14].

Feldspar is not currently extracted, but various occurrences have been reported, such as leucogranite [16], rhyolite and trachyte lavas and pyroclastics [17-19].

Barite was mined as a byproduct of the Akhtala Ba-rich polymetallic deposit, which consists of a vein mineralization hosted in Jurassic volcano-sedimentary units [20]. Extraction lasted until 2011, with a maximum production of ~600 tpa of barite [2].

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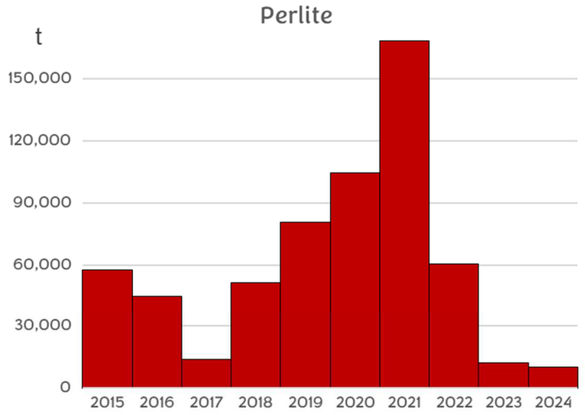
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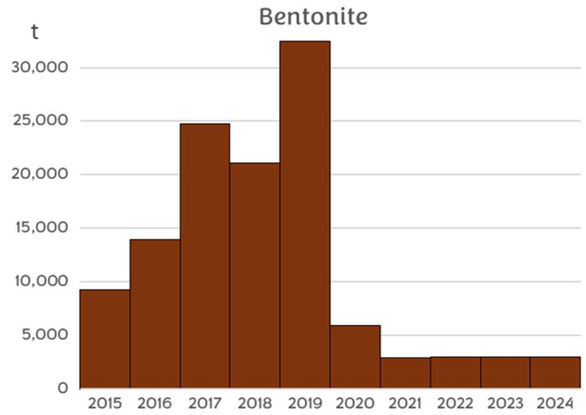
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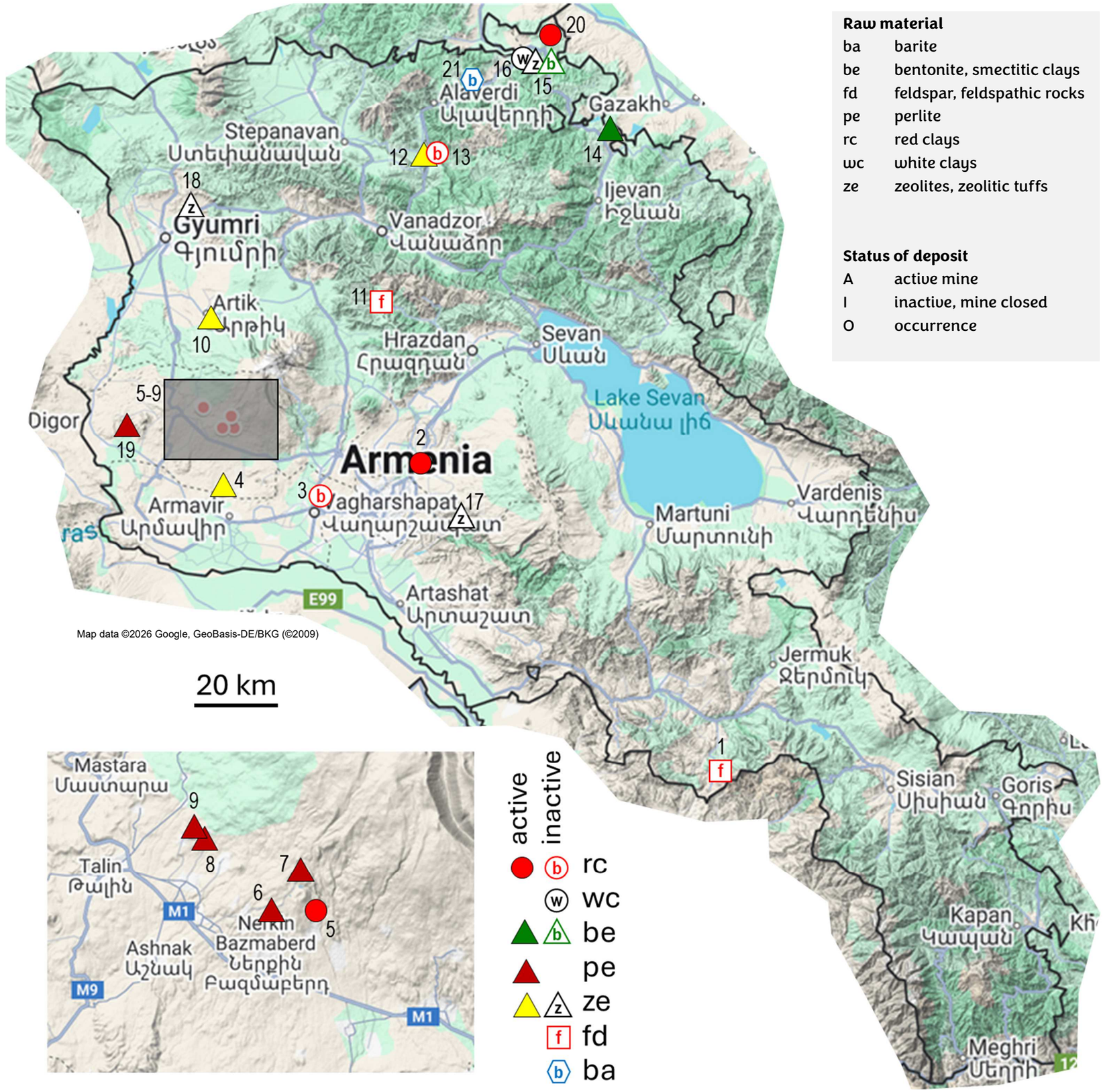
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Table AR-a: deposits of raw materials for the ceramic and glass industries in Armenia (*cluster of deposits).

#	raw material	st	deposit	province
1	fd	O	Aiotsdzor Range	Vayots Dzor
2	rc	A	Getamech	Kotayk'
3	rc	I	Shahumyan	Armavir
4	ze	A	Oktemberyanskaya Step	Aragatsotn
5	rc	A	Kakavadzor	Aragatsotn
6	pe	A	Verin Bazmaberd	Aragatsotn
7	pe	A	Setsadzor*	Aragatsotn
8	pe	A	Yeghnik	Aragatsotn
9	pe	A	Shgharshik*	Aragatsotn
10	ze	A	Artik	Shirak
11	fd	O	Hankavan	Kotayk'
12	ze	A	Tsater	Lori
13	rc	I	Tumanyan	Lori
14	be	A	Sarigyukh	Tavush
15	ze-be	I	Nor Koghb-Noyemberian	Tavush
16	wc	O	Airum	Tavush
17	ze	O	Garni-Goght	Kotayk'
18	ze	O	Shirak	Shirak
19	pe	A	Aragats*	Aragatsotn
20	rc	A	Berdavan	Tavush
21	ba	I	Akhtala	Lori







Raw material

ba	barite
be	bentonite, smectitic clays
fd	feldspar, feldspathic rocks
pe	perlite
rc	red clays
wc	white clays
ze	zeolites, zeolitic tuffs

Status of deposit

A	active mine
I	inactive, mine closed
O	occurrence

Austria

Austria is the fourth largest producer of talc and magnesite in the Euro-Mediterranean area, as well as a major user of red clay (second in Europe for pro capita consumption). Other glass and ceramic raw materials are extracted primarily for the domestic industry: kaolin, feldspar, olivine, and silica sands. Further resources, currently unexploited, include barite, bauxite, bentonite, chromite, kyanite, and lithium minerals [1-3].

Magnesite is extracted from nine mines (737,000 tpa, average 2015-2024) operating in Styria, Tyrol and Carinthia [3] on sparry magnesite deposits of different origins [4,5]. The main deposits are of the Veitsch-type, i.e. diagenetic dolomitization of carboniferous carbonate rocks and subsequent formation of magnesite by metasomatic replacement [6-8]. Further types include mineralization in the greenschist facies in ophiolites (e.g., Breitenau) and others [9,10]. Reserves are given at 49 million tonnes. **Olivine** is recovered as a by-product of magnesite mining in Styria.

Talc is mined in the Rabenswald deposit, where a talc-chlorite mixture (*soapstone*) was formed by hydrothermal and metasomatic actions on lower Australpine gneisses [11-14]. Furthermore, leucophyllite, i.e. a mix of mica, chlorite and quartz, is extracted from the Aspang and Kleinfeistritz deposits [14,15]. The exploitation of the Lassing talcoschists, formed by transformation of Carboniferous dolomas, has been abandoned [16]. Average production is 134,000 tpa [3].

Red clays, essentially addressed to the production of bricks and roof tiles, are extracted from around forty quarries (1,712,000 tpa, average 2015-2024) distributed mainly in Upper Austria (*Map AT-2*) and Styria (*Map AT-4*) [3]. The main source is represented by Pleistocene loess deposits [17] integrated by Neogene marine and fluviatile sediments of the Molasse Zone [18-20] and intramontane basins [21].

Kaolin is obtained from primary deposits (Kriechbaum and Weinzierl) formed by kaolinization of granites to a depth of about 40 m [22-24]. The deposits of lower Austria, which have long been disused, have similar origin (*Map AT-3*). Production is indicated at 13,500 tpa [4].

Silica sand is extensively exploited by 35 quarries (936,000 tpa, on average, considering all sands with SiO_2>80%) mainly located in Upper Austria, Lower Austria and Burgerland [3]. Fluvial sediments, Miocene-Oligocene in age, are the main target of mining operations [25,26]. Quartz is also obtained as byproduct of kaolin beneficiation, as is **feldspar** at Kriechbaum e Weinzierl, with an average output of 35,000 tpa [3].

Lithium minerals: granitic pegmatites in lower Australpine units are currently the exploration target for spodumene [27-29]. The Weinebene-Wolfsberg deposit in Carinthia, where reserves are at least 220,000 tonnes of LiOH, has received particular attention [30-35]. **Bentonite** occurs as a product of high sulphidation hydrothermal alteration of Miocene volcanics in Styria, where it has been mined in the past [36,37]. **Bauxite** deposits are reported in the Northern Calcareous Alps, both in Jurassic [38] and Cretaceous [39] units. Further unexploited occurrences include **barite** [40], **chromite** [41,42] and **kyanite** [1].

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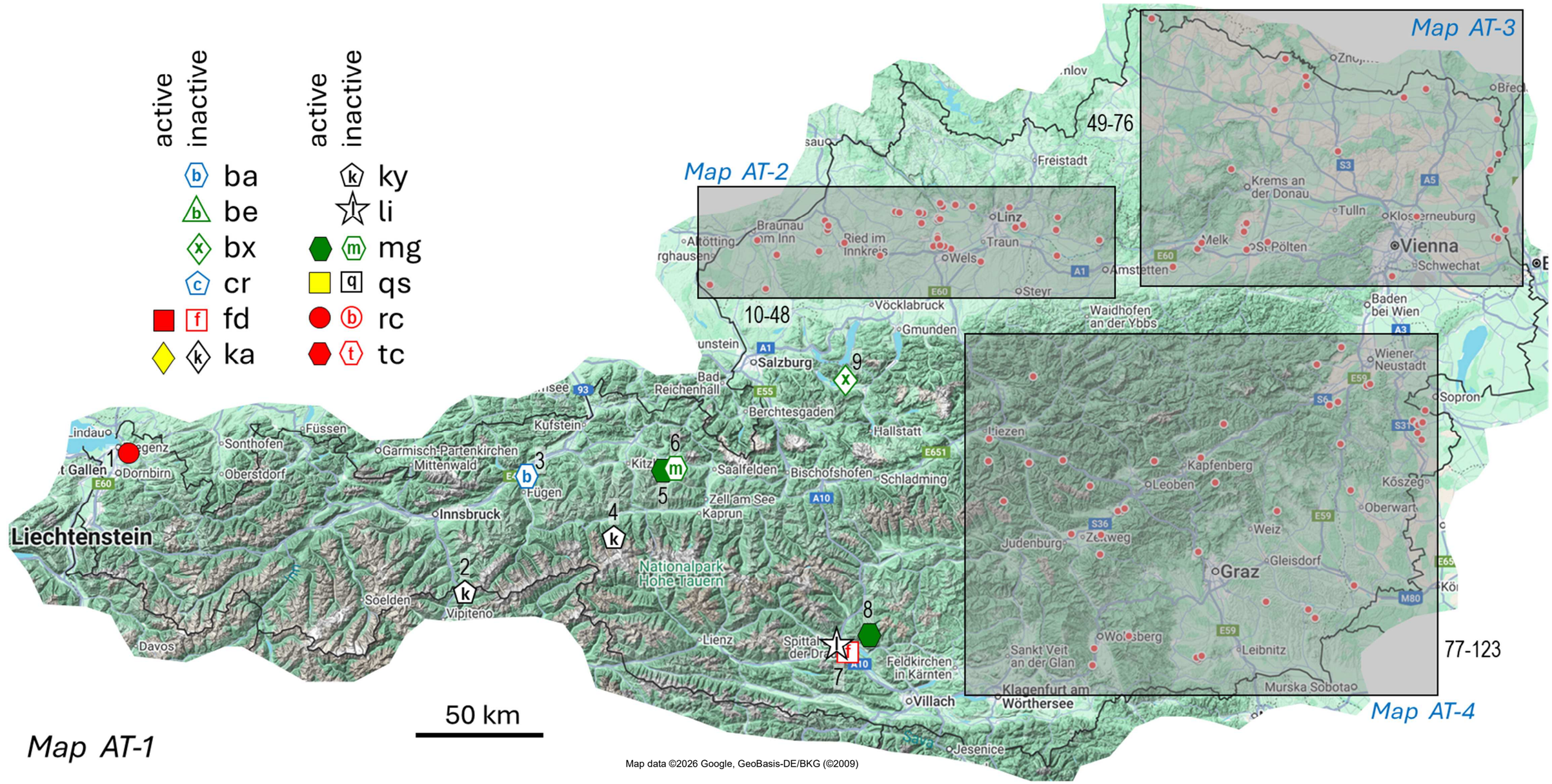
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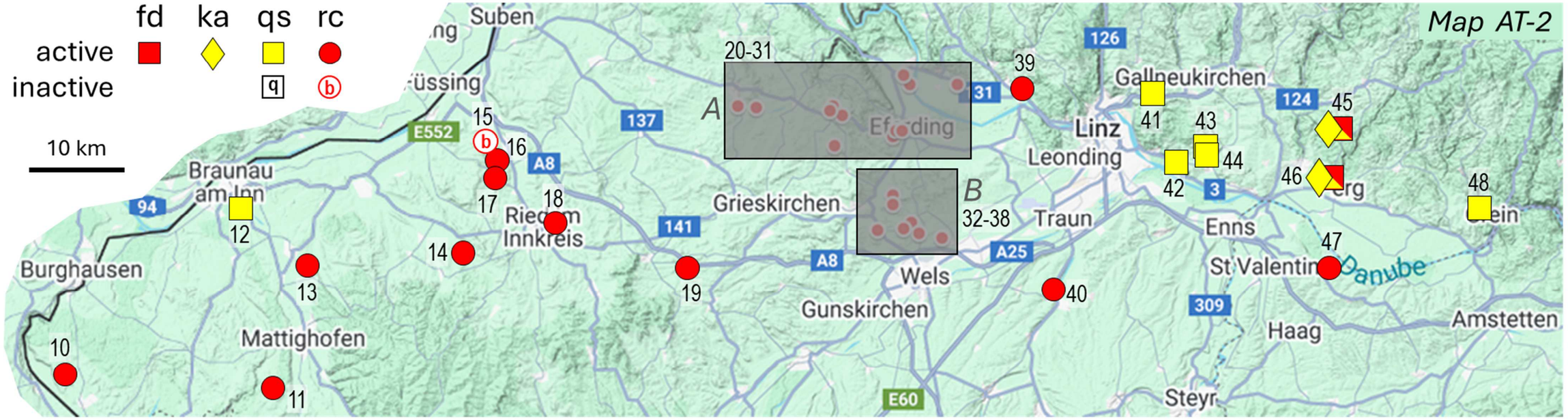
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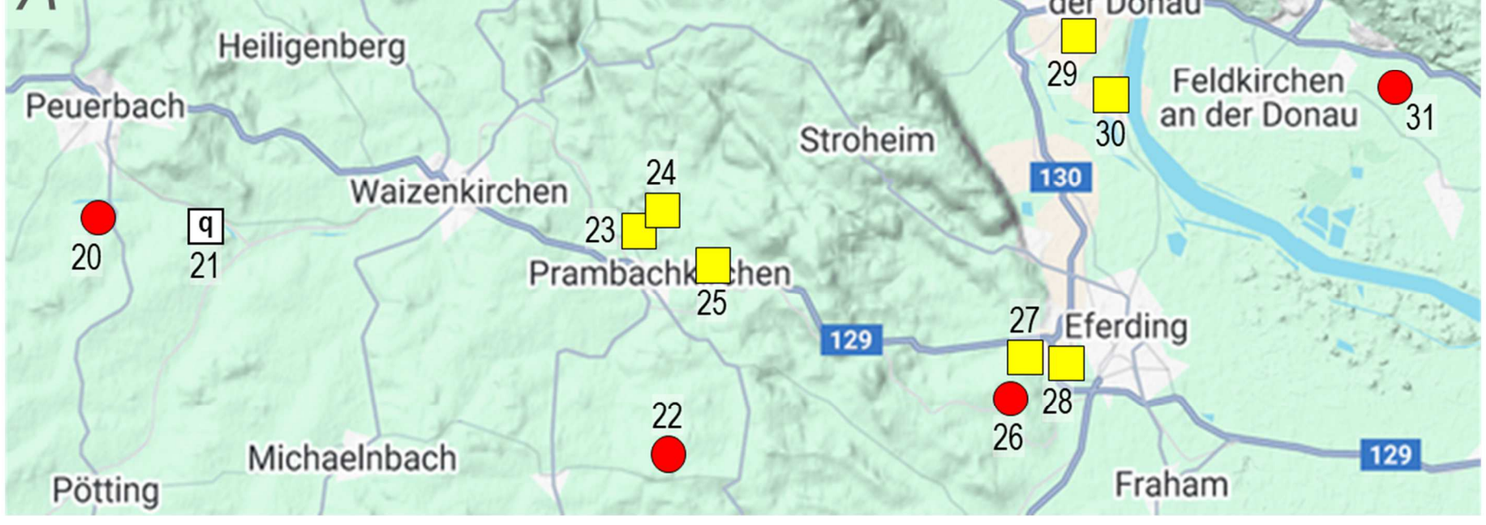
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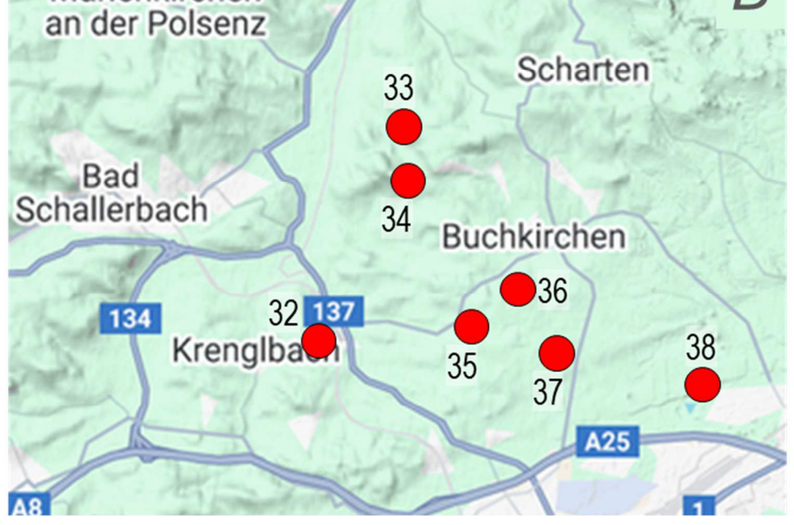
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Raw material

ba	barite
be	bentonite
bx	bauxite
cr	chromite
fd	feldspar
ka	kaolin
ky	kyanite
li	lithium minerals
mg	magnesite
ol	olivine
qs	quartz, silica sand
rc	red clays
tc	talc, leucophyllite

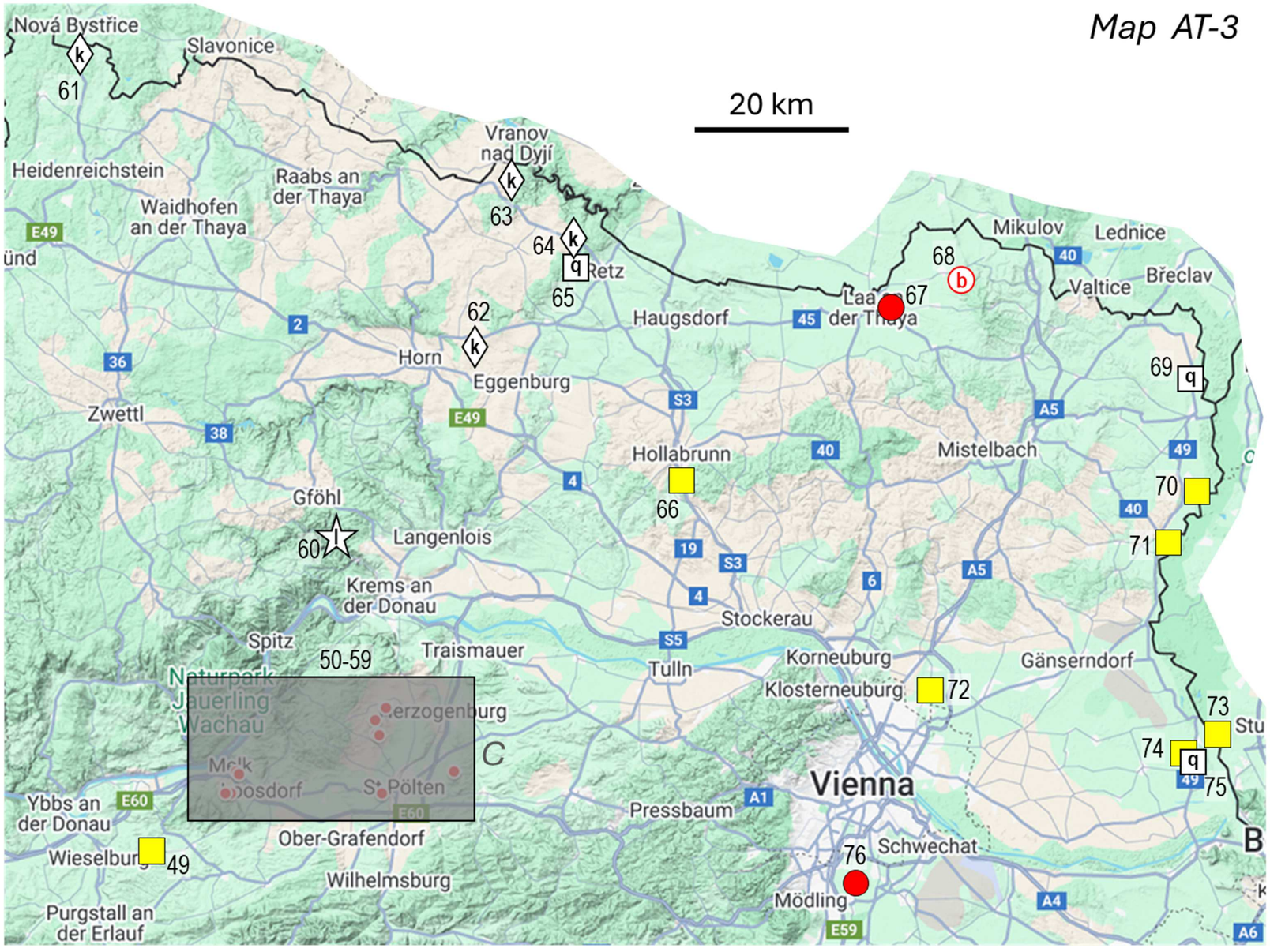
Status of deposit

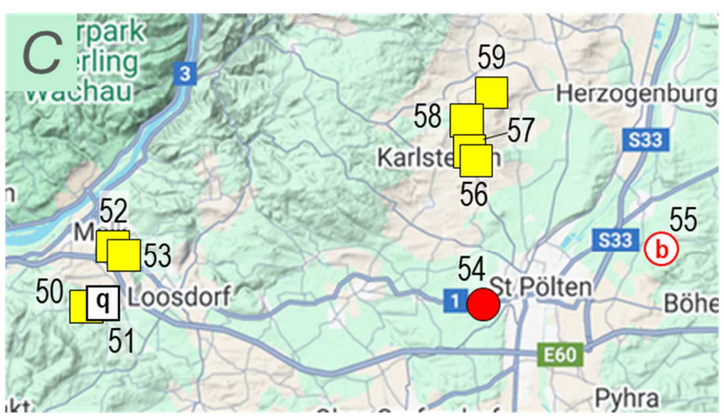
A	active mine
I	inactive, mine closed
O	occurrence, no recent mining

Table AT-a: deposits of raw materials for the ceramic and glass industries in Austria.

#	raw mat.	st	deposit	land
1	rc	A	Bregenz	Vorarlberg
2	ky	O	Wolfendorn	Tyrol
3	ba	O	Reitherkogl	Tyrol
4	ky	O	Untersulzbachtal	Salzburg
5	mg	A	Weissenstein	Tyrol
6	mg	I	Am Bürgl	Tyrol
7	li-fd	I	Spittal an der Drau	Carinthia
8	mg	A	Millstätteralpe	Carinthia
9	bx	O	Lugberg	Upper Austria
10	rc	A	Eckldorf-Sinzinger	Upper Austria
11	rc	A	Auerbach 1+2	Upper Austria
12	qs	A	Oberaching	Upper Austria
13	rc	A	Uttendorf	Upper Austria
14	rc	A	Neundling	Upper Austria
15	rc	I	Greifing	Upper Austria
16	rc	A	Weindorf	Upper Austria
17	rc	A	Weilbach	Upper Austria
18	rc	A	Rabenberg	Upper Austria
19	rc	A	Weibern	Upper Austria
20	rc	A	Peuerbach/Bruck	Upper Austria
21	qs	I	Edtbauer/Oberaching	Upper Austria
22	rc	A	Oberfreundorf	Upper Austria
23	qs	A	Weinzierlbruck	Upper Austria
24	qs	A	Langstögen	Upper Austria
25	qs	A	Prambachkirchen	Upper Austria
26	rc	A	Polsenz	Upper Austria
27	qs	A	Oberrudling	Upper Austria
28	qs	A	Eferding	Upper Austria
29	qs	A	Deinham	Upper Austria
30	qs	A	Fasangarten/Deinham	Upper Austria
31	rc	A	Freudenstein	Upper Austria
32	rc	A	Haiding (Krenglbach)	Upper Austria
33	rc	A	Finklham-Graben	Upper Austria
34	rc	A	Hartberg	Upper Austria
35	rc	A	Radlach	Upper Austria
36	rc	A	Buchkirchen	Upper Austria
37	rc	A	Oberlaafeld	Upper Austria
38	rc	A	Freimüller-Wels	Upper Austria
39	rc	A	Niederottensheim	Upper Austria
40	rc	A	Neuhofen an der Krems	Upper Austria
41	qs	A	Treffling	Upper Austria
42	qs	A	Burger/Luftenberg	Upper Austria
43	qs	A	St. Georgen a.d. Gusen	Upper Austria
44	qs	A	Krempelbauer-St.Georgen	Upper Austria
45	ka-qz-fd	A	Weinzierl	Upper Austria
46	ka-qz-fd	A	Kriechbaum	Upper Austria
47	rc	A	Thürnbuch	Lower Austria
48	qs	A	Lettental	Upper Austria
49	qs	A	Rainberg	Lower Austria
50	qs	A	Pöverding	Lower Austria
51	qs	I	Anzendorf	Lower Austria
52	qs	A	Melk	Lower Austria
53	qs	A	Spielberg	Lower Austria
54	rc	A	Nadelbach	Lower Austria
55	rc	I	Pottenbrunn	Lower Austria
56	qs	A	Untermamau	Lower Austria
57	qs	A	Karlstetten	Lower Austria
58	qs	A	Heinigstetten	Lower Austria
59	qs	A	Obritzberg - Landhausen	Lower Austria
60	li	I	Senftenberg	Lower Austria
61	ka	I	Grametten	Lower Austria
62	ka	I	Mallersbach	Lower Austria
63	ka	I	Niederfladnitz	Lower Austria
64	qs	I	Obermarkersdorf	Lower Austria
65	ka	O	Sigmundsherberg	Lower Austria
66	qs	A	Dietersdorf	Lower Austria
67	rc	A	Laa an der Thaya	Lower Austria
68	rc	I	Neuruppersdorf	Lower Austria
69	qs	I	Rabensburg	Lower Austria
70	qs	A	Drösing/Waltersdorf	Lower Austria
71	qs	A	Dürnkrut	Lower Austria
72	qs	A	Gerasdorf	Lower Austria
73	qs	A	Marchegg	Lower Austria
74	qs	A	Breitensee	Lower Austria
75	qs	I	Zuggersfeld/Breitensee	Lower Austria
76	rc	A	Hennersdorf	Lower Austria
77	bx	O	Dreistetten	Lower Austria
78	rc	A	Halde Richardschacht	Lower Austria
79	rc	I	Walpersbach	Lower Austria
80	rc	A	Erlach	Lower Austria
81	qs	A	Haßbach	Lower Austria
82	qs	A	Penk	Lower Austria
83	mg	A	Veitsch/Mur-Mürztal	Styria
84	bx	O	Prefingkogel	Upper Austria
85	tc-mg	I	Lassing	Styria
86	cr	O	Hochgroessen	Styria
87	Li	O	Hohenwart	Styria
88	mg	A	Hohentauern/Sunk	Styria
89	mg	I	Trieben	Styria
90	mg	A	Wald am Schoberpass	Styria
91	tc	I	Mautern	Styria
92	mg	A	Oberdorf/Laming	Styria
93	rc	A	Ülmitz	Styria
94	mg	A	Breitenau	Styria
95	cr	O	Kraubath-Mitterberg	Styria
96	mg	A	Preggraben	Styria
97	mg-ol	A	Gulsen	Styria
98	rc	A	Fohnsdorf	Styria
99	rc	A	Apfelberg	Styria
100	tc	A	Kleinfeistritz	Styria
101	rc	A	Oberaigen	Carinthia
102	rc	A	Salzburgerwald	Carinthia
103	Li	O	Wolfsberg-Weinebene	Carinthia
104	rc	I	Hartberg	Styria
105	rc	A	Graschach	Styria
106	rc	A	Pistorf	Styria
107	rc	A	Gratkorn St. Stefan	Styria
108	rc	A	Trössengraben	Styria
109	be	I	Gossendorf	Styria
110	rc	A	Mataschenfeld	Styria
111	rc	A	Königsdorf	Burgenland
112	tc	A	Rabenwald	Styria
113	rc	A	Riedlingsdorf-Pinkafeld	Burgenland
114	tc	A	Aspang	Lower Austria
115	rc	A	Stoob/Lizzi	Burgenland
116	rc	I	Raiding	Burgenland
117	rc	I	Unterfrauenhaid	Burgenland
118	qs	A	Lackendorf 3	Burgerland
119	qs	A	Lackendorf 2	Burgerland
120	qs	A	Lackendorf 4	Burgerland
121	qs	A	Lackendorf 1	Burgerland
122	qs	A	Ritzing-Lackendorf	Burgerland
123	qs	A	Ritzing-Zauberberg	Burgerland

Map AT-3

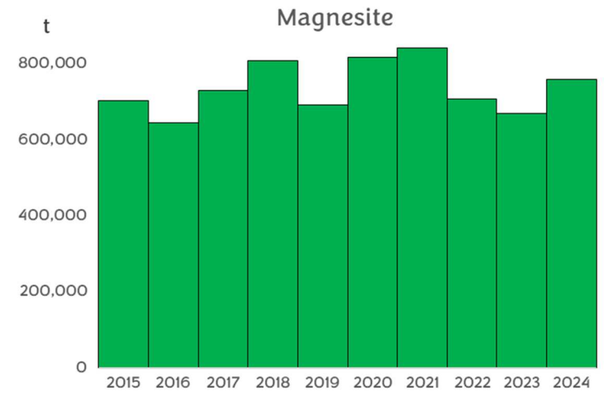


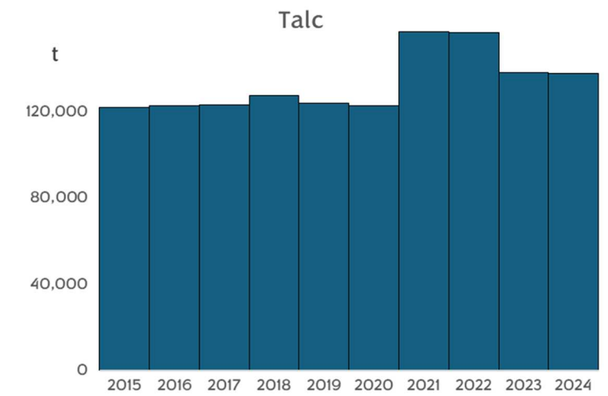


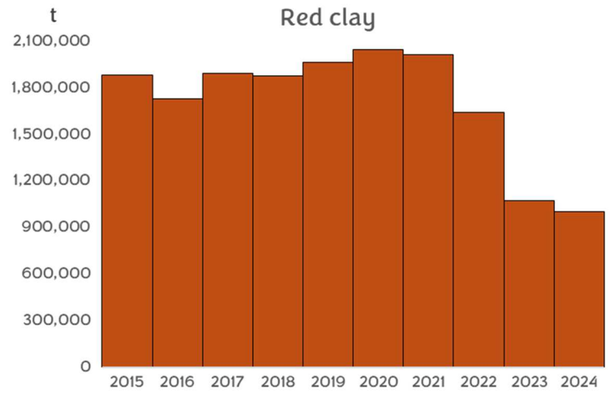
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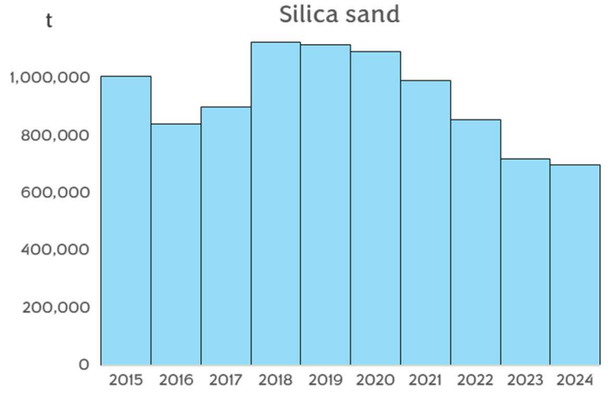
- k ka
- li
- q qs
- b rc

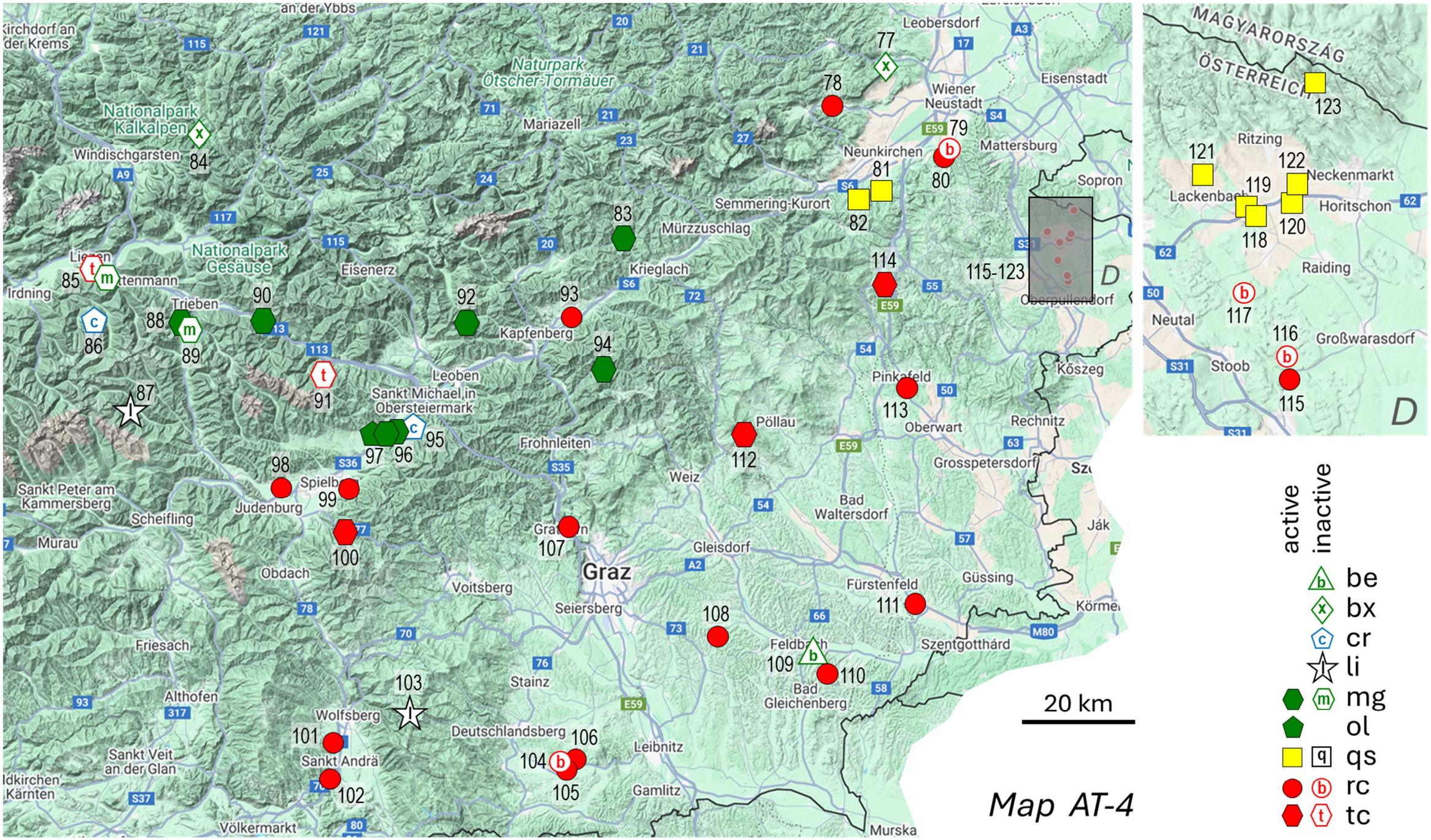
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Azerbaijan

Azerbaijan boasts significant resources of ceramic and glass raw materials, the production of which is known only for bentonite (ninth in the Euro-Mediterranean area), while for white clays, silica sand, alumina, zeolites and red clays the quantities extracted are not specified. Occurrences of bauxite, chromite, perlite and pyrophyllite are also reported [1-5].

Bentonite is currently extracted (157,000 tpa, mean 2015-2024) from the Daș Salahlı and Șemkir deposits in northwestern Azerbaijan [1,5]. Smectite-rich beds were formed by hydrothermal alteration of Cretaceous rhyolite-dacite extrusives [6,7]. Reserves are indicated in 99 million tonnes [1].

White clays: several deposits are reported in the Jurassic-Cretaceous Lok-Karabakh volcanic arc of Lesser Caucasus, which is considered as the biggest porphyry-epithermal ore field of Azerbaijan [8,9]. Most of them seem related to argillification (kaolinite-sericite-alunite) of felsic volcanics, as in the Western Zaglik area and in Chardakhli *(Map AZ-1A)* where two mines are in operation [1,3]. In the same context, a **pyrophyllite** mineralization with 6.5 million tonnes of reserves is claimed [1].

Red clays are used by a dozen brick factories distributed throughout the country, which essentially exploit Pliocene molasse deposits [10]; reserves are around 192 million tonnes [1].

Silica sands are excavated from Quaternary deposits in the Absheron Peninsula. Two quarries are in operation in the eastern part of Baku, with reserves of 7.6 million tonnes [1].

Zeolites are reported in Cretaceous and Cenozoic pyroclastic and sedimentary rocks. The major deposit (Aidagh) consists of zeolitized tuff (clinoptilolite) within a volcano-sedimentary sequence of Upper Cretaceous age. Reserves are estimated to be 12.5 million tonnes [1].

Alumina is produced by the Ganja plant [5]. **Bauxite** is not mined in Azerbaijan, even though some laterite occurrences are hosted by Paleozoic carbonatic formations in Nagorno-Karabakh [1,2].

Chromite deposits occur in the ophiolite belt of the Lesser Caucasus, hosted by serpentinized ultrabasic rocks (harzburgite, dunite) of Cretaceous age [1,3]. In addition, an **andalusite** occurrence is reported at Paragachay (Nagorno-Karabakh) while a **perlite** deposit at Kechaldag (Lesser Caucasus) is being sized 6.6 million tonnes of reserves [1].

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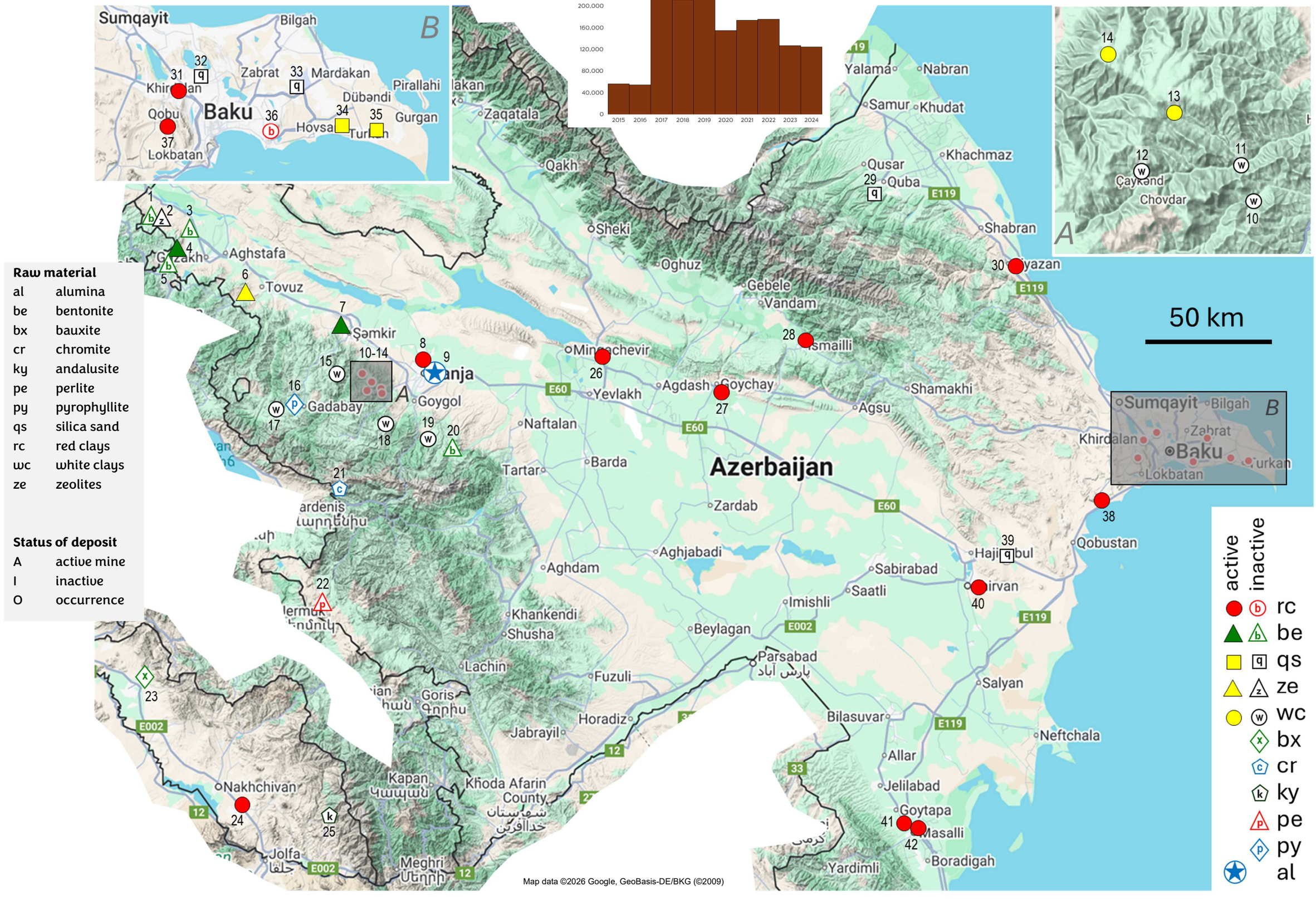
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Table AZ-a: deposits of raw materials for the ceramic and glass industries in Azerbaijan.

#	raw material	st	deposit	district
1	be	I	Qaimaqli	Qazakh
2	ze	I	Kemerli	Qazakh
3	be	O	Ali Bayramli	Qazakh
4	be	A	Daș Salahlı	Qazakh
5	be	O	Kizil Hajily	Qazakh
6	ze	A	Ai-dag	Tovuz
7	be	A	Șemkir	Șemkir
8	rc	A	Ganja	Ganja
9	al	A	Ganja	Ganja
10	wc	I	Danayeri	Goygol
11	wc	I	Agekhush	Goygol
12	wc	I	Anshapur	Goygol
13	wc	A	Zaglik	Goygol
14	wc	A	Chardakhli	Șemkir
15	wc	I	Gotul	Șemkir
16	py	O	Kirvakar	Gedebey
17	wc	O	Kara-Merad	Gedebey
18	wc	O	Mirzik	Goygol
19	wc	O	Qarabulaq	Goygol
20	be	O	Yuxarı Ağcakend	Goranboy
21	cr	O	Geydara	Kalbajar
22	pe	I	Kechaldag	Kalbajar
23	bx	O	Geran-galasi	Sharur
24	rc	A	Güznüt	Babek
25	and	O	Paragachay	Ordubad
26	rc	A	Gülövșe	Yevlakh
27	rc	A	Göyçay	Göyçay
28	rc	A	Ismayıllı	Ismayıllı
29	qz	O	Quba	Quba
30	rc	A	Siyezen	Siyezen
31	rc	A	Xirdalan	Absheron
32	qz	I	Geokmalin	Baku
33	qz	I	Khyrdalan	Baku
34	qz	A	Kirkmaklin	Baku
35	qz	A	Stepan Rasin	Baku
36	rc	I	Gunashli	Baku
37	rc	A	Qobu	Absheron
38	rc	A	Qaradag	Baku
39	qz	I	Adjavelia	Hajigabul
40	rc	A	Șirvan	Salyan
41	rc	A	Meşəkənarı	Masally
42	rc	A	Seybetin	Masally



Raw material

al	alumina
be	bentonite
bx	bauxite
cr	chromite
ky	andalusite
pe	perlite
py	pyrophyllite
qs	silica sand
rc	red clays
wc	white clays
ze	zeolites

Status of deposit

A	active mine
I	inactive
O	occurrence

active / inactive

rc, be, qs, ze, wc, bx, cr, ky, pe, py, al

Belarus

Belarusian production of raw materials for glass and ceramics consists of silica sands and red clays, as well as unspecified quantities of fireclay and bentonite. In addition, deposits of kaolin, feldspar, pyrophyllite, talc and wollastonite have been reported [1].

Red clays are used in the manufacture of clay bricks and ceramic tiles with red paste [2–8]. There are six active quarries (740,000 tpa, average 2015–2024) exploiting mostly glacio-lacustrine deposits (almost all in the Minsk region). Reserves are approximately 226 million m³ [1]. **Quartz sands** are mined (623,000 tpa on average) from Quaternary deposits in the Hrodna and Minsk regions [8,9]; reserves are estimated at ~64 million tonnes [1]. **Fireclay** is exploited in the Lukoml' deposit [10], where there are reserves for about 51 million tonnes [1]. **Bentonite:** the Ostrozhanska deposit appears to be active, with reserves estimated at 88 million tonnes [1,2].

Kaolin was formed as weathering product of gneisses and granites of the Lower Archean or shales and granites of the lower Proterozoic [1,11,12]. Four deposits contain 7.3 million tonnes of kaolin reserves but lie beneath the thick glacial cover that covers the Precambrian basement [1]. **Feldspar** has never been extracted in Belarus, but the granite that outcrops in the Ukrainian Crystalline Shield – widely used in construction, of which there are huge reserves – has been proposed as a feldspathic flux for glass and ceramic tiles [1,13,14]. **Basalt** and saponite-containing tuffs, occurring in the Brest region, have been proposed for stone wool production, in force of reserves as high as 54.5 million tonnes [1,15]. A **talc** deposit is also reported at Onostskoe [1]. **Bauxite:** in the southern part of the Pripyat trough, a peculiar dawsonite-bauxite ore deposit is reported at Zaozerny, where 181 million tonnes of resources have been estimated. The depth of ore-bearing rocks (kaolinitic clays) is between 300 and 660 m below the surface [1]. **Wollastonite** occurrences were discovered in the crystalline basement of the central part of the Belarusian massif for a total of 1.17 million tonnes of reserves. The main deposit (Rudmyanskoye) lies at depths from 320 m to 570 m below the surface [1,16]. **Pyrophyllite**-bearing sediments are spread along the southern side of the Pripyat trough, along the border with the Ukrainian Crystalline Shield. In the Lelchitsy area, estimated reserves are huge, but the depth of occurrence ranges from 80 to 350 and more meters [1,17].

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Table BY-a: deposits of raw materials for the ceramic and glass industries in Belarus.

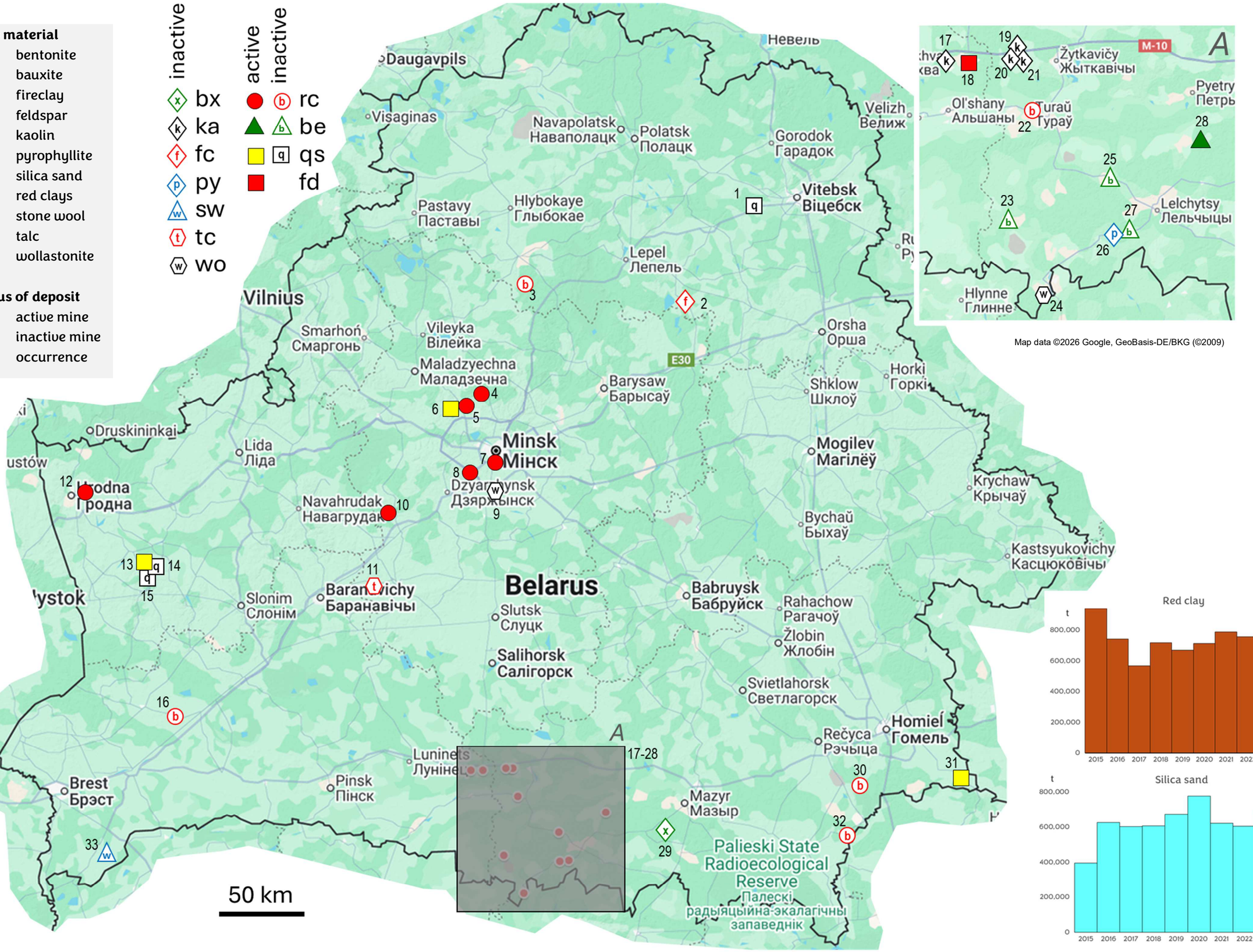
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2	fc	A	Lukoml'	Vitebsk
3	rc	O	Zapolye	Vitsebsk
4	rc	A	Radoshkovichi	Minsk
5	rc	A	Gaidukovka	Minsk
6	qs	A	Wiazynka	Minsk
7	rc	A	Siarova	Minsk
8	rc	A	Fanipol'	Minsk
9	wo	O	Rudmyanskoye	Minsk
10	rc	A	Atalez	Minsk
11	tc	O	Onostskoe	Minsk
12	rc	A	Hrodna	Brest
13	qs	A	Kolyadichi	Hrodna
14	qs	I	Borovoe	Hrodna
15	qs	I	Krejdavyja	Hrodna
16	rc	I	Kabaki	Brest
17	ka	I	Sitnitsa	Brest
18	fd	A	Mikaševiči	Brest
19	ka	O	Dedovka	Gomel
20	ka	O	Skripitsy	Gomel
21	ka	O	Lyudenevichi	Gomel
22	rc	I	Turaŭ	Gomel
23	be	O	Bukcha	Gomel
24	wo	I	Glushkevichi	Gomel
25	be	O	Simonichi	Gomel
26	py	O	Borovoe	Gomel
27	be	O	Markovskoe	Gomel
28	be	A	Ostrozhanska	Gomel
29	bx	O	Zaozerny	Gomel
30	rc	I	Gorodok	Gomel
31	qs	A	Lenindar	Gomel
32	rc	I	Krupeiskii Sad	Gomel
33	sw	I	Malaryta	Brest

Raw material

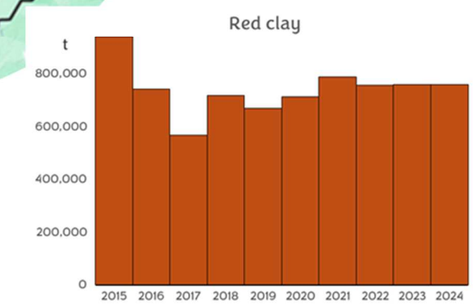
be	bentonite
bx	bauxite
fc	fireclay
fd	feldspar
ka	kaolin
py	pyrophyllite
qs	silica sand
rc	red clays
sw	stone wool
tc	talc
wo	wollastonite

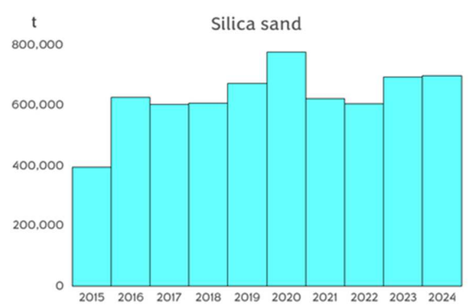
Status of deposit

A	active mine
I	inactive mine
O	occurrence



Map data ©2026 Google, GeoBasis-DE/BKG (©2009)





Belgium

Belgium plays a dual role in the ceramic and glass raw material chessboard: an important trading hub in the international market (import-export of kaolin, nepheline syenite, and glass sands, among others) and a producer of red clay for the domestic industry (first per capita in the Euro-Mediterranean area). There is also a small production of silica sand and kaolin, as well as no longer mined resources of barite and bentonite.

Red clays are mined in nearly forty quarries located mostly in the western and northern parts of the country. Production is estimated at around 2.5 million tpa to meet domestic demand (clay bricks, roof tiles, vitrified drainage pipes, and lightweight aggregates) plus ~400,000 tpa exported to the Netherlands. The main sources are [1-5]:

- *Ieper Group* clays (which are Belgium's main source of brick raw materials): a dozen quarries is exploiting Eocene marine sediments of the Kortrijk and Tielt Formations (Flanders);
- *Campine* clays: Pleistocene estuarine deposits of the Meuse and Rhine rivers (Antwerp);
- *Boom* clays: Oligocene marine sediments that represent the second main source for the Belgian brick industry and an important raw material for expanded clay (north-eastern Flanders);
- *Hénis* clays: Eocene marine deposits with lagoonal episodes (Limburg);
- *Hainault Group* (Wealdian) clays: Cretaceous marine deposits (Mons Basin);
- *Polders*: Quaternary sediments of the tidal plain (Ostend coast);
- *Wanlin* clays: from weathering of Devonian rocks during the Cenozoic time (Ardennes).

Quartz sand is currently obtained from Eocene deltaic to tidal sediments of the Tongres Group (eastern Limburg) where some quarries are active (but production and reserves are unknown).

Kaolin: the Belgian deposits were formed by weathering of arkoses and schists of Paleozoic age during the peneplanation of the Ardennes at the end of the Cenozoic. The alteration extends up to at least 35 m below the paleosurface and has given rise to kaolinite-sericite mixtures [6]. Several deposits have been exploited in a 40 km long area from Louette-Saint-Pierre to Libramont [6,7]. There are also small deposits of halloysite, associated with fine-grained sands that fill karst holes in the Dinant limestones [6,8]. Most of the mines have been closed and current production is unspecified (however modest).

Barite was mined until 2001 in three sites in Wallonia, with peak production of 50,000 tonnes in 1991 (estimated reserves of around 800,000 tonnes). These deposits are associated with karstic depressions in Paleozoic formations (Flerus) or veins cutting Devonian sediments [6].

Bentonite: the "Smectite de Herve", close to Liège, was exploited in the past; the deposit, overlying a bedrock of Carboniferous limestones and shales, is characterised by smectite-illite assemblages up to 20 m-thick [9].

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Table BE-a: deposits of raw materials for the ceramic and glass industries in Belgium.

#	r.m.	st	deposit	province
1	rc	A	Le Touquet	West Flanders
2	rc	A	Zonnebeke	West Flanders
3	rc	A	Gistel*	West Flanders
4	rc	A	Kortemark	West Flanders
5	rc	A	Moorseelsesteenweg	West Flanders
6	rc	A	Menen	West Flanders
7	rc	A	Sterreberg	West Flanders
8	rc	I	Egem	West Flanders
9	rc	I	Klijtberg Bellegem	West Flanders
10	rc	A	Ketelberg	West Flanders
11	rc	A	Meulebeke	West Flanders
12	rc	A	Zwevegem*	West Flanders
13	rc	A	Barry	Hainaut
14	rc	A	Péruwelz	Hainaut
15	rc	A	Oudenaarde	East Flanders
16	rc	A	Pottelberg	Hainaut
17	rc	A	Sirault	Hainaut
18	rc	A	Ninove	East Flanders
19	rc	A	Sint-Gillis-Waas	East Flanders
20	rc	A	Sint-Niklaas	East Flanders
21	rc	A	Temse	East Flanders
22	ec	A	Kruibeke	East Flanders
23	rc	A	Schelle	East Flanders
24	rc	A	Reet*	East Flanders
25	ba	I	Fleurus	Hainaut
26	ka-qz	I	Oret	Namur
27	ba	I	Vierve-sur-Viroin	Namur
28	rc	A	Westmalle*	Antwerp
29	rc	A	Kraaienhorst*	Antwerp
30	rc	A	Rijkevorsel	Antwerp
31	rc	A	Den Hout*	Antwerp
32	rc	A	Nova	Antwerp
33	ec	A	Boensberg	Antwerp
34	rc	A	Goorkensdreef*	Antwerp
35	qs	I	Weillen	Namur
36	qs	I	Onhaye	Namur
37	ka	O	Louette-St-Pierre	Namur
38	ka	I	Malvoisin	Namur
39	ka	O	Haut-Fays	Namur
40	rc	A	Wanlin	Namur
41	ba	I	Ave-et-Auffe	Namur
42	rc	A	Transinne	Luxembourg
43	ka	I	Libin (Arfaye)	Luxembourg
44	ka	A	Bras	Luxembourg
45	ka	O	Libramont	Luxembourg
46	rc	A	Membruggen	Limburg
47	rc	A	Kleine Spouwen	Limburg
48	rc	A	Lafelt	Limburg
49	rc	A	Heylen	Limburg
50	qs	A	Romont	Lièges
51	qs	A	Kreco-Loen	Lièges
52	qs	A	Emael	Lièges
53	be	I	Hallembaye	Lièges
54	rc	I	Maasmechelen	Limburg
55	rc	A	Maaseik	Limburg
		*	Cluster of deposits	

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Raw material

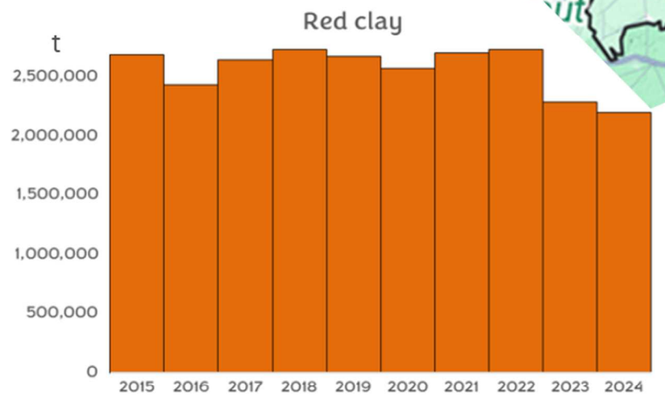
ba	barite
be	bentonite
ec	expanded clay
ka	kaolin
qs	quartz, silica sand
rc	red clays

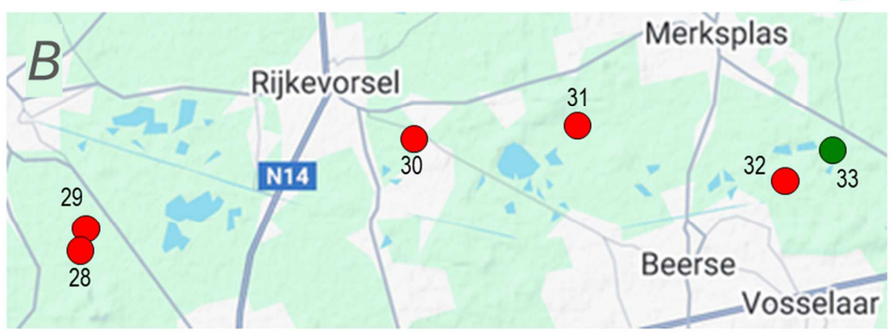
Status of deposit

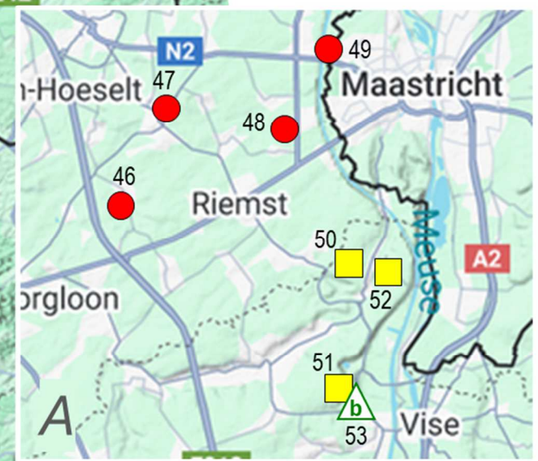
A	active mine
I	inactive mine
O	occurrence

active / inactive

rc (b) · qs (q) · ka (k) · ec · ba (b) · be (b)







30 km

Bosnia and Herzegovina

A wide range of glass and ceramic raw minerals is mined both in the Federation of Bosnia-Herzegovina and in the *Republika Srpska*: bentonite, kaolin, ball clay, magnesite, red clay, and silica sand (along with those to produce soda ash). Bauxite is of particular importance, as Bosnia is the third largest supplier in the Euro-Mediterranean area, and which has given rise to an alumina manufacturing chain. In addition, deposits of barite, chromite, talc, lithium and boron minerals are reported [1-3].

Bauxite karst deposits are numerous in the carbonatic successions of Dinarides, where they formed along a wide timespan from Triassic to Oligocene [4,5]. Bosnian production (760,000 tpa, average 2015-2024) is achieved in three main districts: Jajce (Upper Cretaceous) [5-7], Srebrenica (Lower Cretaceous) [8], and Posušje (Eocene) [9], then conveyed to the **alumina** production site at Zvornik (191,000 tpa on average). Both Triassic (Bihać) and Jurassic (Trebinje) bauxites are no longer mined.

Kaolin has been mined until 2023 (on average 145,000 tpa of raw ore and 27,000 tpa of beneficiated kaolin) in the Prijedor and Motajica districts, both in Republika Srpska. In Prijedor, kaolinization occurred at the expense of Paleozoic metamorphic rocks [10-12]; the Crna Dolina mine is active (resources estimated for the district around 16 million tonnes). In Motajica, the parent rock is granite and the Brusnik mine is active [13].

Ball clay: numerous deposits are known, mainly represented by Cenozoic fluvio-lacustrine sediments outcropping in eastern Bosnia [11,12]. The deposits currently active (mean production 18,000 tpa) are located in the Bratunac Basin and the Sočkovac Basin, where the source rocks include serpentinites and chloritoschists [14]. White clays from central Bosnia are no longer in use [11,15]. Resources are indicated in several million tonnes.

Bentonite is produced from the "Greda" deposit (69,000 tpa, mean 2015-2024) which was formed by alteration of volcanic tuffs in a Miocene sedimentary sequence [16,17].

Red clays are used in the production of bricks (750,000 tpa, on average) with the main resources represented by Miocene sediments, from marine to continental, deposited in intramontane basins, e.g. the Bosna valley between Sarajevo and Zenica, and along the Sava river valley. Secondly, Pliocene and recent alluvial deposits have been exploited [11,18,19].

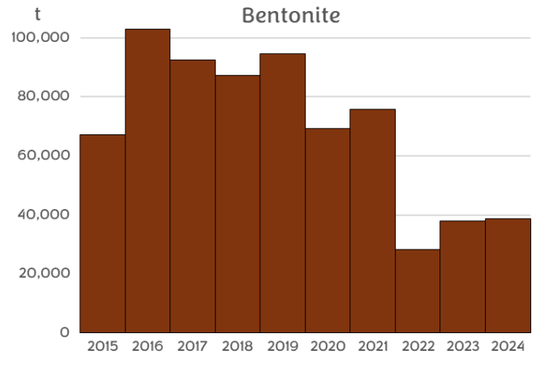
Silica sands are excavated (111,000 tpa, on average) predominantly from Miocene sedimentary sequences in northern Bosnia and in intramontane basins in the Dinarides. Reserves are indicated to be over 20 million tonnes in the Tuzla region [19]. **Soda ash** is synthetically produced at the Lukavac plant (103,000 tpa, average 2015-2024).

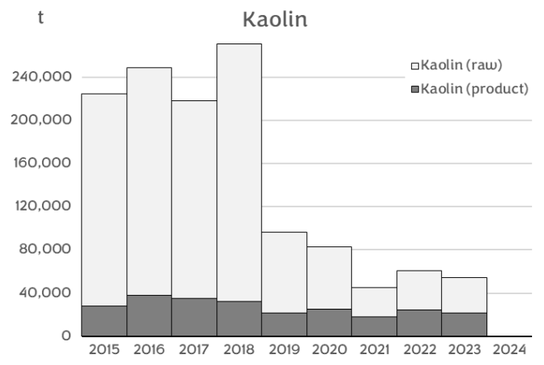
Magnesite: many deposits have been identified along the NW-SE oriented ophiolitic belt, which extends from Banja Luka to Kosovo. These have different origins (hydrothermal, sedimentary) and structure (vein, stockwork, detrital) which give rise to a range of deposit types [20-23]. The Crna Rijeka mine is apparently active, although Bosnian production, always modest, officially ceased in 2012 [24]. Also in the ophiolite belt are known occurrences of **talc**, the extraction of which has long since ceased, and **chromite**, not under development [3,25,26].

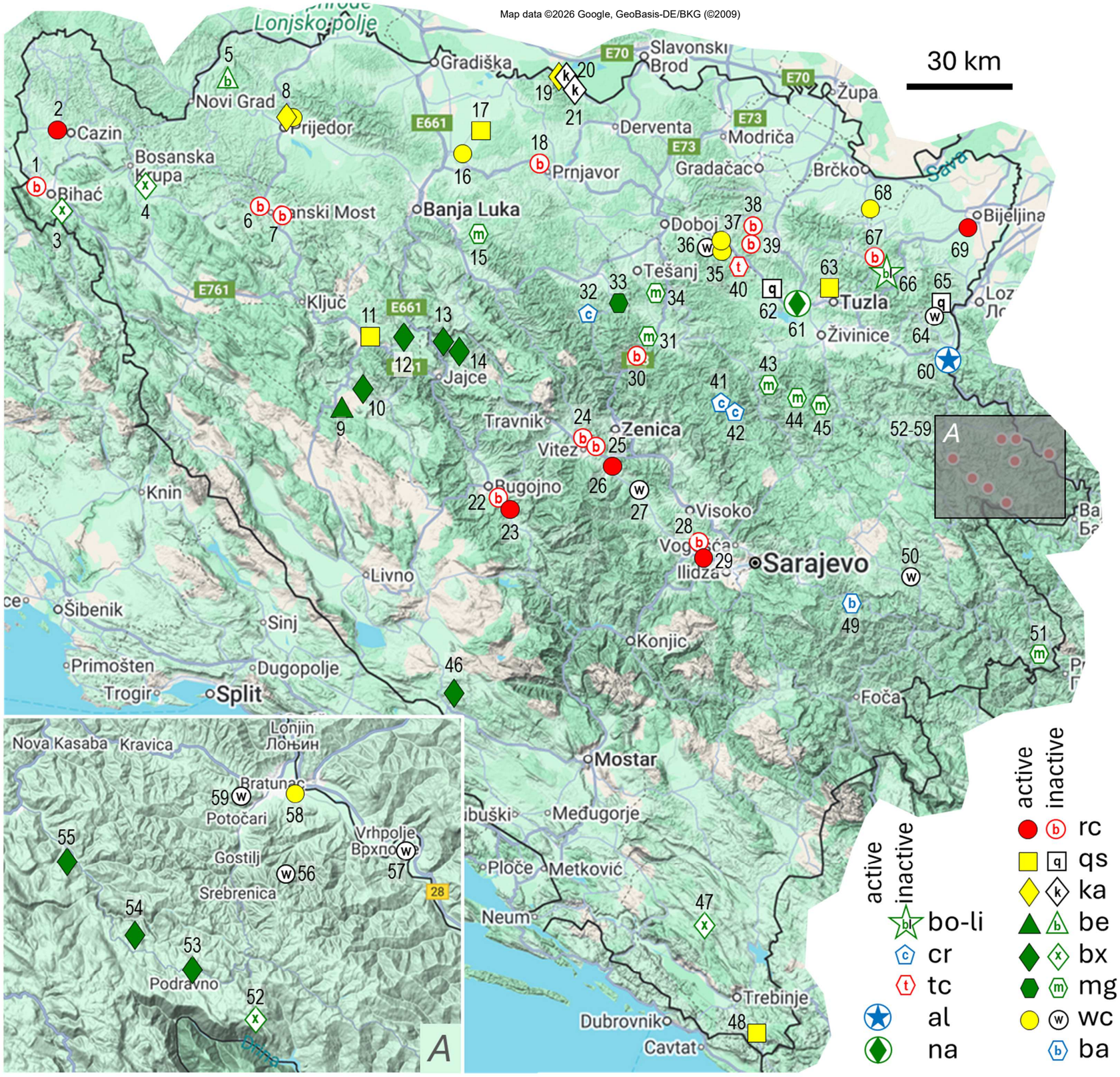
Barite deposits, not yet developed, occur with different structures (veins, lenses, brecciated bodies) at several places in Paleozoic rocks of southeastern Bosnia, where they were formed by hydrothermal fluids [27]. Finally, the occurrence of **lithium and boron minerals** near Lopare is of some interest, as it could be part of the Li-B metallogenic zone of the western Balkans, which extends subparallel to the Sava-Vardar zone, having analogies with the Jadar basin in Serbia [28].

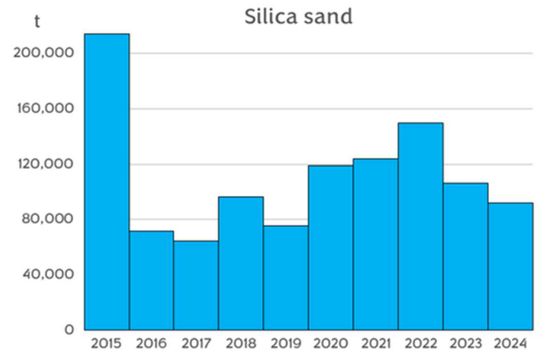
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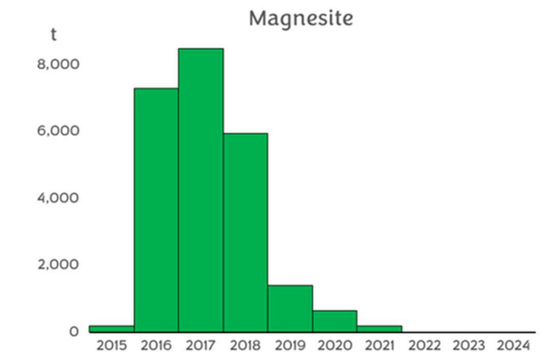
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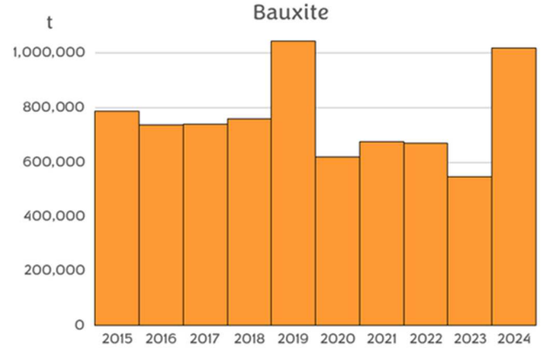





Map data ©2026 Google, GeoBasis-DE/BKG (©2009)
30 km
Lonjsko polje
Novi Grad
Cazin
Bosanska Krupa
Bihać
Prijedor
Gradiška
Slavonski Brod
Derventa
Modriča
Županja
Gradačac
Brčko
Sava
Bijeljina
Prnjavor
Banja Luka
Doboj
Tešanj
Tuzla
Živinice
Ključ
Jajce
Travnik
Zenica
Vitez
Bugojno
Visoko
Sarajevo
Ilidža
Konjic
Foča
Mostar
Međugorje
Ploče
Metković
Neum
Trebinje
Dubrovnik
Cavtat
Knin
Šibenik
Sinj
Primošten
Trogir
Split
Dugopolje
Livno
Nova Kasaba
Kravica
Lonjin
Bratunac
Potočari
Srebrenica
Vrhpolje
Gostilj
Podravno
Drina
E70
E73
E661
E761
A
active
inactive
bo-li
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na
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Silica sand
t
200,000
160,000
120,000
80,000
40,000
0
2015 2016 2017 2018 2019 2020 2021 2022 2023 2024


Magnesite
t
8,000
6,000
4,000
2,000
0
2015 2016 2017 2018 2019 2020 2021 2022 2023 2024


Bauxite
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600,000
400,000
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0
2015 2016 2017 2018 2019 2020 2021 2022 2023 2024

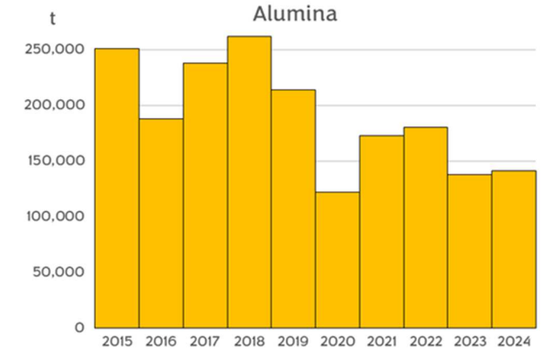

Alumina
t
250,000
200,000
150,000
100,000
50,000
0
2015 2016 2017 2018 2019 2020 2021 2022 2023 2024

Table BH-a: deposits of raw materials for the ceramic and glass industries in Bosnia and Herzegovina.

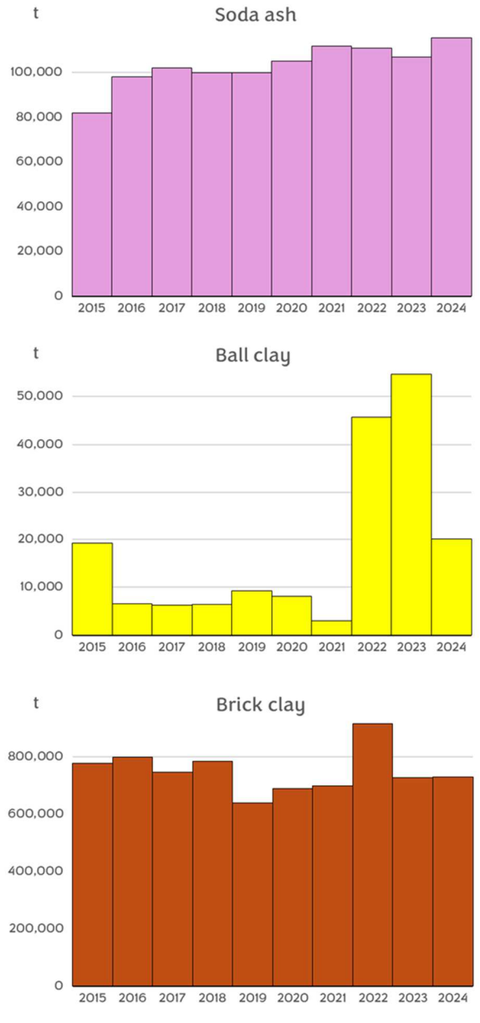
#	r.m.	st	deposit	municipality
1	rc	I	Klokot	Bihać
2	rc	A	Coralici	Cazin
3	bx	I	Skočaj	Bihać
4	bx	I	Jasenica	Lusći Palanka
5	be	I	Lješljani	Novi Grad
6	rc	O	Demiševci	Sanski Most
7	rc	O	Čardačište-Kruhari	Sanski Most
8	ka-wc	A	Crna Dolina*	Prijedor
9	be	A	Sokolac "Greda"	Šipovo
10	bx	A	Gradina	Mrkonjić Grad
11	qz	A	Podbrdo	Mrkonjić Grad
12	bx	A	Bjelajce	Mrkonjić Grad
13	bx	A	Bešpelj	Jajce
14	bx	A	Crvene Stijene-Poljane	Jajce
15	mg	O	Snjiegotina-Vrbanja	Celinac
16	wc	I	Milosavci	Laktaši
17	qz	A	Stari Martinac	Srbac
18	rc	I	Ratkovac	Prnjavor
19	ka	A	Brusnik	Srbac
20	ka	I	Kobaš	Srbac
21	ka	I	Đidovi	Srbac
22	rc	O	Golo brdo	Bugojno
23	rc	A	Gračanica	Humac
24	rc	I	Jardol	Vitez
25	rc	O	Šljibčica	Pirići
26	rc	A	Čavka	Busovača
27	wc	I	Bilalovac	Kiseljak
28	rc	I	Rakovica	Zenik
29	rc	A	Kakrinje-Kobiljača	Ilidža
30	rc	O	Džebe	Zenica-Duboj
31	mg	I	Blijuva	Žepče
32	cr	O	Ohrid-Mladikovine	Teslić
33	mg	A	Crna rijeka	Teslić
34	mg	I	Ošve	Novi Šeher
35	wc	A	Kečkovac	Sočkovac
36	wc	I	Poljave	Sočkovac
37	wc	A	Spreča	Spreča
38	br	O	Ratiš-Lipje	Srebrenik
39	br	I	Gornji Moranjci	Tuzla
40	tc	I	Zarkovac	Petrovo
41	cr	O	Borak	Zenica-Duboj
42	cr	I	Duboštica	Zenica-Duboj
43	mg	O	Krivaja-Konjuh	Zenica-Duboj
44	mg	I	Miljevica	Kladanj
45	mg	I	Kladanj	Kladanj
46	bx	A	Posušje	Posušje
47	bx	I	Crveni pijesci-Plece	Trebinje
48	qs	A	Grab	Trebinje
49	ba	O	Prača	Pale
50	wc	I	Kovanj	Rogatica
51	mg	I	Duvnica	Rudo
52	bx	I	Kosturi	Srebrenica
53	bx	A	Gunjaci	Milići
54	bx	A	Poljanci	Srebrenica
55	bx	A	Derventa	Milići
56	wc	I	Borići	Srebrenica
57	wc	O	Tegare	Bratunac
58	wc	A	Rakovac	Bratunac
59	wc	I	Smoljave-Zagoni	Bratunac
60	al	A	Zvornik	Zvornik
61	na	A	Lukavac	Lukavac
62	qs	O	Šikulje	Lukavac
63	qs	A	Bukinje	Tuzla
64	wc	I	Ugljari	Zvornik
65	qz	O	Malešić	Zvornik
66	bo-li	O	Labucka	Lopare
67	rc	I	Pukis	Lopare
68	wc	A	Pukiš	Lopare
69	rc	A	Bijeljina	Bijeljina
		*	cluster of deposits	

Raw material

ba	barite
be	bentonite, smectitic clays
bx	bauxite
ka	kaolin
mg	magnesite
qs	quartz, silica sand
rc	red clays

Status of deposit

A	active mine
I	inactive, mine closed
O	occurrence, no recent mining



Bulgaria

Bulgaria is producing a wide range of glass and ceramic raw materials: barite (third largest supplier in the Euro-Mediterranean area), kaolin, quartz and quartz-feldspathic sands, red clay, bentonite, fireclay, feldspar, perlite and zeolites, together with the precursors of soda ash and stone wool. The amount of production and reserves of various raw materials is undisclosed. Further resources, currently unexploited, include magnesite, talc, and white clay [1,2].

Kaolin is extracted in a large mining district in the north-east of the country, where several mines exploit deposits of kaolinized arkosic sands, associated with paleokarst structures, of Cretaceous age [3,4]. Total production is 320,000 tpa (average 2015-2024) of beneficiated kaolin [5]. There are two mining centers [4] in Vetovo (*Map BG-3*) and Kaolinovo (*Map BG-4*). Similar deposits in Razgrad and Silistra oblasts are no longer exploited [6] as the occurrence of halloysite in the northern slope of Rhodopes, where it originated from the alteration of Oligocene andesites [7].

Fireclay is mined in two districts, which have been active for decades [4]: the first is located in the transition zone between the Balkans and the Rhodopes, where Jurassic lacustrine sediments outcrop, often with rather high iron levels [8]; the second near Pleven (*Map BG-2*) where Miocene continental sediments are quarried [4]. Furthermore, an unusual occurrence of smectite-illite siltites is reported in the Razgrad province [1].

Industrial silica is mainly obtained (~950,000 tpa on average) from **quartz sands** found in Cenozoic alluvial deposits present in various areas of the country, as well as from quartzites [1,9]. **Quartz-feldspathic sands** represent an important resource, from which feldspar concentrates can be separated [10,11]: they are extensively exploited in Iskar, Srednya, and in southeastern Bulgaria [12]. **Feldspar** is also obtained from granitic pegmatites, which occur in various geological settings in the Balkans [13], the Srednogorie zone [14] and the Rhodope massif [15] where leucogranites also outcrop [16].

Red clays are extracted in a dozen deposits – 730,000 tpa, as 2015-2024 average [2] – located in the Moesian Platform and Fore-Balkan Mountains, as well as in the Kamchiya valley [1,17]. They are mainly represented by Cretaceous marine marly clays and Quaternary-Neogene alluvial sediments [17-20].

Bentonite is extracted (54,000 tpa on average) from deposits related to Oligocene volcanism of the Rhodope Mountains (*Map BG-5*), which were formed in a range of genetic conditions, from hydrothermal alteration of volcaniclastics to smectitic clays redeposited in Miocene sedimentary sequences [5,21-23].

Barite has been mined in the past (63,000 tpa as average 2015-2024) the carbonate-hosted, sedimentary-exhalative polymetallic deposit of Kremikovtsi, close to Sofia, where barium sulfate was recovered as a byproduct [24,25]. The opening of the new Tevni dol barite mine, in a kind of deposit known in the western Rhodopes [26], is facing social opposition.

Paleogene volcano-sedimentary sequences in the eastern Rhodopes host economically exploitable concentrations of both **perlite** [27,28], with an average production of ~5,000 tpa, and **zeolites** (clinoptilolite predominant on analcime and mordenite) [29-33].

Furthermore, **soda ash** is manufactured by the Devnya plant [34]. **Talc** and **magnesite** occurrences have also been reported in the Rhodope Mountains [35], whose economic importance is not disclosed.

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Table BG-a: deposits of raw materials for the ceramic and glass industries in Bulgaria (* cluster of deposits).

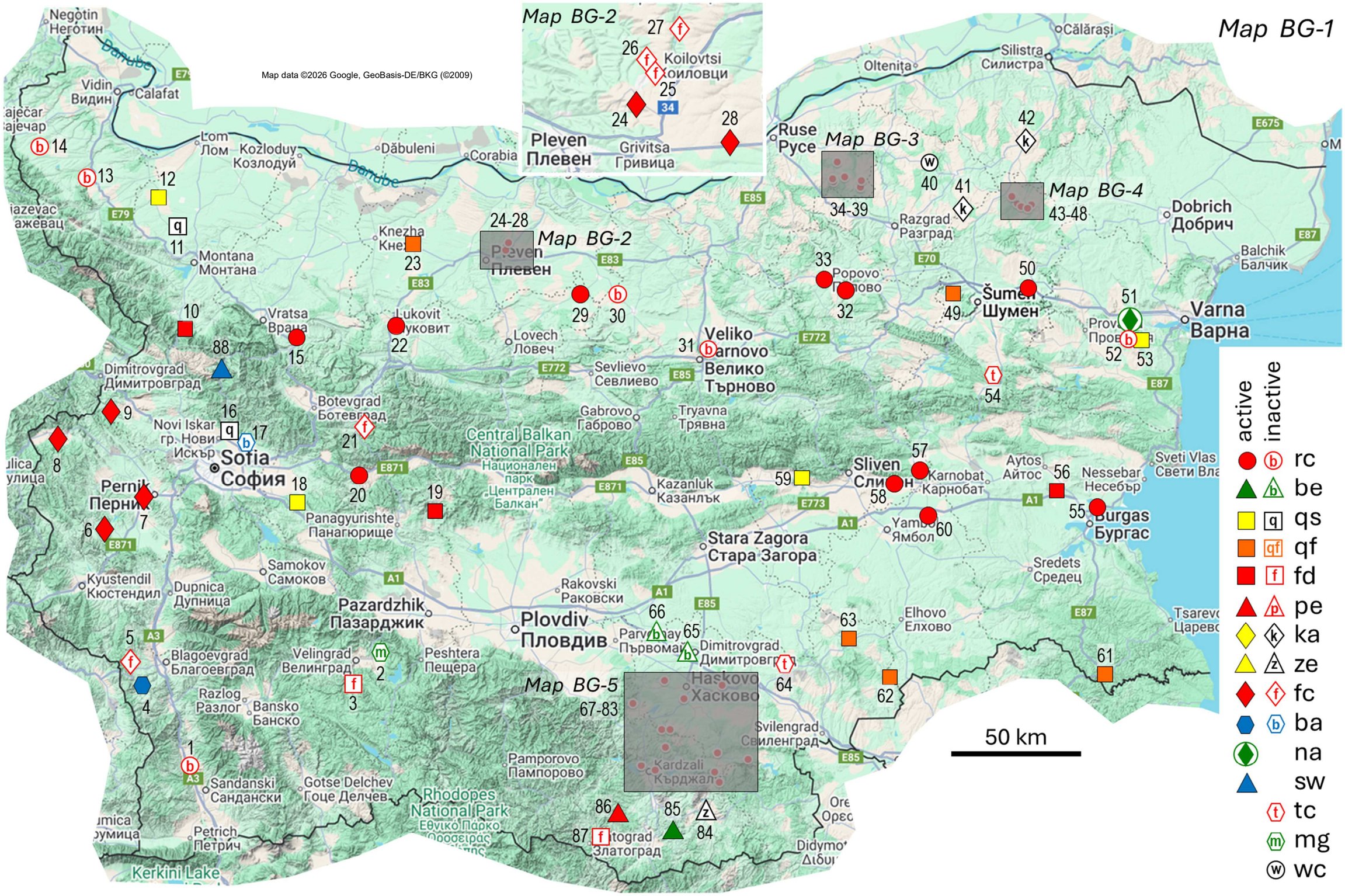
#	raw material	st	deposit	province
1	rc	I	Kresna	Strumjani
2	mg	I	Dorkovo	Velingrad
3	fd	I	Sukata Reka	Pazardžik
4	ba	A	Tevni dol	Blagoevgrad
5	fc	I	Klisura	Blagoevgrad
6	fc	A	Žablyano	Pernik
7	fc	A	Bela Voda	Pernik
8	rc	I	Zabel	Pernik
9	fc	A	Garmishte	Dragoman
10	fd	A	Dukata	Montana
11	qs	I	Doktor Yosifovo	Montana
12	qs	A	Brusartsi	Montana
13	rc	O	Bela	Vidin
14	rc	O	Staropatitsa	Vidin
15	rc	A	Mezdra	Vratsa
16	qs	I	Podgumer	Sofia
17	ba	I	Kreminotsi	Sofia
18	qs	A	Elin Pelin	Sofia
19	fd	A	Strelča	Pazardžik
20	rc	A	Mirkovo	Sofia
21	fc	O	Etropole	Etropole
22	rc	A	Lukovit	Lovech
23	qf	A	Iskar	Pleven
24	fc	A	Suchyrat Kladenec	Pleven
25	fc	I	Varbitsa	Pleven
26	fc	I	Chuchura	Pleven
27	fc	I	Brashlyanitsa	Pleven
28	fc	A	Slavyanovo	Pleven
29	rc	A	Letnitsa	Lovech
30	rc	I	Butovo	Veliko Tarnovo
31	rc	O	Tanyova Molgila	Gorna Oryahovitsa
32	rc	A	Alexandra-Svetlen	Targovishte
33	rc	A	Popovo	Targovishte
34	ka	A	Smirnenski	Ruse
35	ka	A	Vetovo 1	Ruse
36	ka	I	Vetovo 4	Ruse
37	ka	A	Vetovo 2	Ruse
38	ka	I	Vetovo 3	Ruse
39	ka	A	Senovo	Ruse
40	wc	I	Zavet	Razgrad
41	ka	I	Kara Michal	Razgrad
42	ka	I	Dulovo	Silistra
43	ka	I	Kaolinovo 4	Shumen
44	ka	A	Kaolinovo 1	Shumen
45	ka	A	Kaolinovo 2	Shumen
46	ka	A	Kaolinovo 3	Shumen
47	ka	A	Doyrantsi 1	Shumen
48	ka	A	Doyrantsi 2	Shumen
49	qf	A	Srednya	Shumen
50	rc	A	Kilik-Kaspichan	Shumen
51	na	A	Devnya	Varna
52	rc	I	Razdelna	Varnensko
53	qs	A	Avren*	Varna
54	tc	I	Smyadovo	Shumen
55	rc	A	Sokata	Burgas
56	ns	A	Bulgarovo	Burgas
57	rc	A	Konak Tarla	Yambol
58	rc	A	Blatets	Sliven
59	qz	A	Strupets	Sliven
60	rc	A	Blatoto	Yambol
61	qf	A	Malko Tarnovo	Burgas
62	qf	A	Ustrem	Haskovo
63	qf	A	Topolovgrad	Haskovo
64	tc	O	Ovcharovo	Harmanli
65	be	I	Dimitrovgrad	Haskovo
66	be	I	Zlatna livada	Chirpan
67	qs	I	Harmanli	Haskovo
68	fd	O	Alexandrovo	Haskovo
69	pe	A	Garvanovo	Haskovo
70	rc	O	Haskovo	Haskovo
71	pe	I	Sarnitsa	Haskovo
72	ze	A	Beli Plast	Kărdžali
73	ze	O	Golemantsi	Haskovo
74	ze	O	Gorna Krepost	Kărdžali
75	be	A	Tokmakliyski bair	Haskovo
76	qf	I	Bliketa	Haskovo
77	qf	A	Keremidkite	Haskovo
78	ze	I	Lyaskovets	Haskovo
79	ka	O	Glavanak	Haskovo
80	pe	I	Golobradovo	Haskovo
81	ze	O	Moriantsi	Kărdžali
82	be	A	Propast-Dobrovoletz	Kărdžali
83	be	A	Enchetz	Kărdžali
84	ze	O	Vransko	Kărdžali
85	be	A	Ralitsa	Kărdžali
86	pe	A	Dzhebel	Kărdžali
87	fd	O	Pripek	Zlatograd
88	sw	A	Bov	Sofia

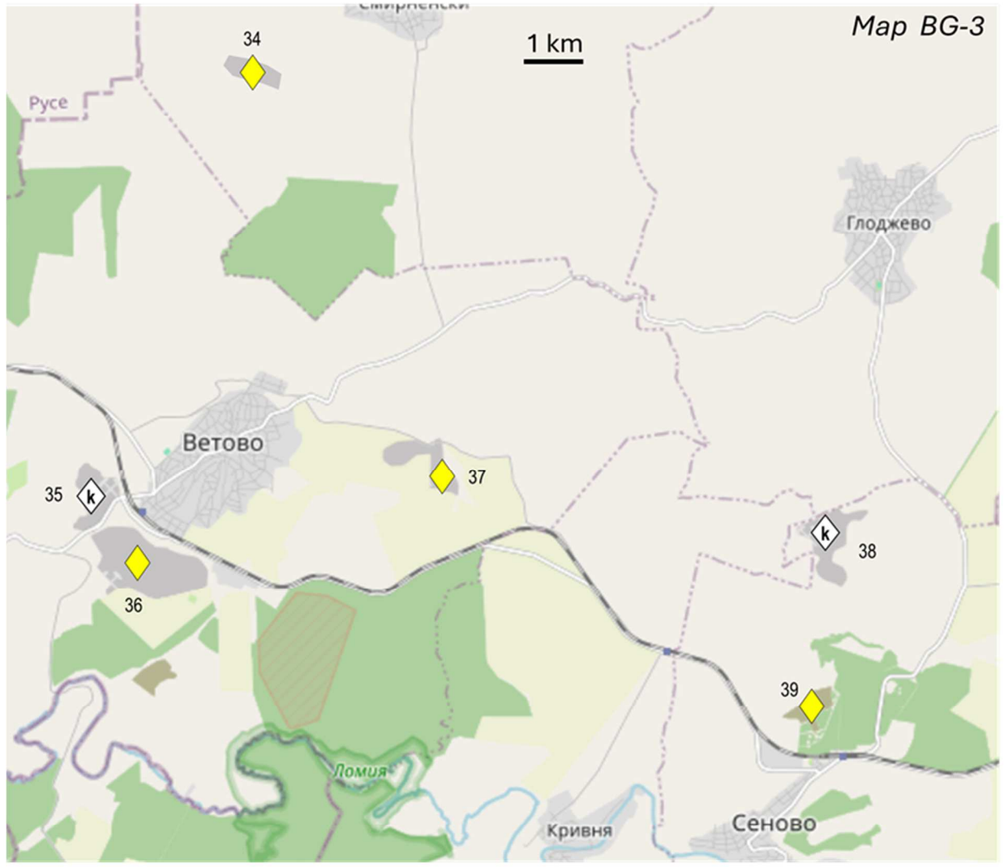
Raw material

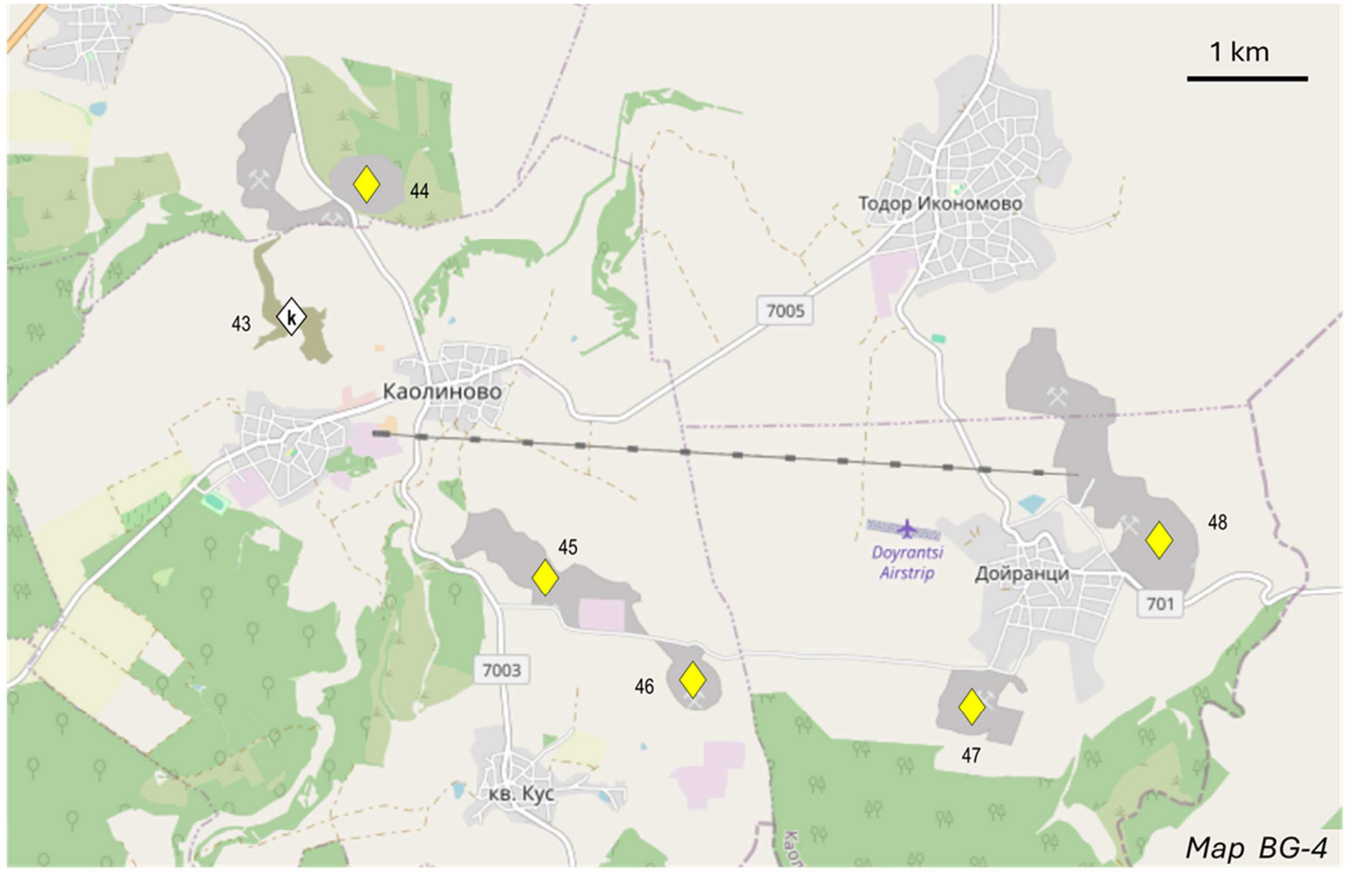
ba	barite
be	bentonite, smectitic clays
fc	fireclay, refractory clay
fd	feldspar, feldspathic rocks
ka	kaolin
mg	magnesite
na	soda ash
pe	perlite
qf	quartz-feldspathic sand
qz	quartz, silica sand
rc	red clays
sw	stone wool
tc	talc, leucophyllite
wc	white clay
ze	zeolites, zeolitic tuffs

Status of deposit

A	active mine
I	inactive, mine closed
O	occurrence, no recent mining

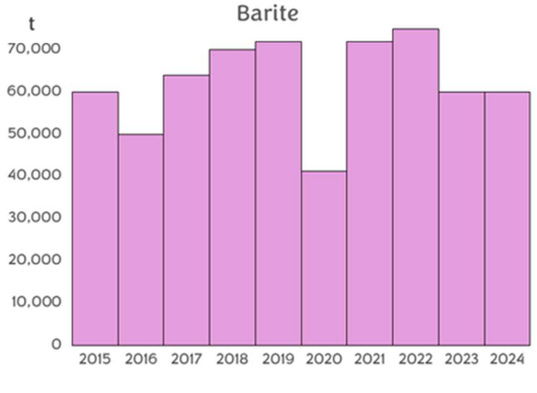

Map BG-1
Map BG-2
Map BG-3
Map BG-4
Map BG-5
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)
Negotin
Неготин
Vidin
Видин
Calafat
Lom
Лом
Kozloduy
Козлодуй
Dăbuleni
Corabia
Călărași
Silistra
Силистра
Oltenița
Ruse
Русе
Razgrad
Разград
Dobrich
Добрич
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Балчик
Varna
Варна
Šumen
Шумен
Popovo
Поповo
Montana
Монтана
Knezha
Кнежа
Pleven
Плевен
Koilovtsi
Коиловци
Grivitsa
Гривица
Lukovit
Луковит
Vratsa
Враца
Lovech
Ловеч
Veliko Tarnovo
Велико Търново
Sevlievo
Севлиево
Gabrovo
Габрово
Tryavna
Трявна
Dimitrovgrad
Димитровград
Botevgrad
Ботевград
Novi Iskar
гр. Нови Искър
Sofia
София
Central Balkan National Park
Национален парк „Централен Балкан"
Kazanluk
Казанлък
Sliven
Сливен
Karnobat
Карнобат
Aytos
Айтос
Nessebar
Несебър
Burgas
Бургас
Yambol
Ямбол
Stara Zagora
Стара Загора
Sredets
Средец
Pernik
Перник
Panagyurishte
Панагюрище
Samokov
Самоков
Kyustendil
Кюстендил
Dupnica
Дупница
Pazardzhik
Пазарджик
Plovdiv
Пловдив
Rakovski
Раковски
Parvomay
Първомай
Dimitrovgrad
Димитровград
Elhovo
Елхово
Tsarevo
Царево
Blagoevgrad
Благоевград
Velingrad
Велинград
Peshtera
Пещера
Razlog
Разлог
Bansko
Банско
Haskovo
Хасково
Svilengrad
Свиленград
Kardzali
Кърджали
Pamporovo
Пампорово
Sandanski
Сандански
Gotse Delchev
Гоце Делчев
Rhodopes National Park
Εθνικό Πάρκο Ροδοπών
Petrich
Петрич
Kerkini Lake
Didymo
Διδυμ
Ore
Орε
Aytos
Sveti Vlas
Свети Вла
Danube
E79
E83
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E87
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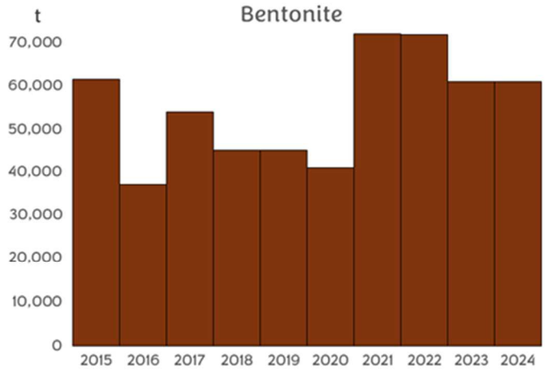


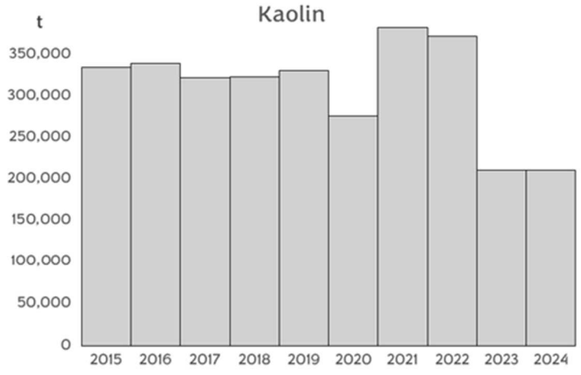


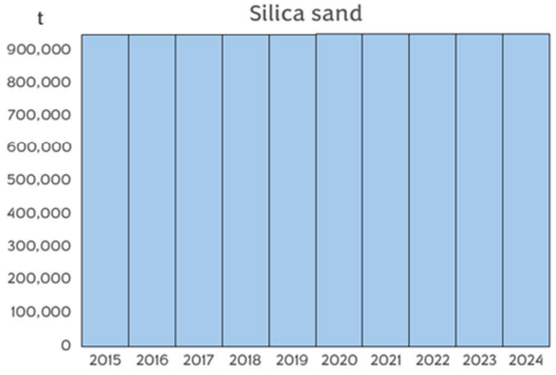
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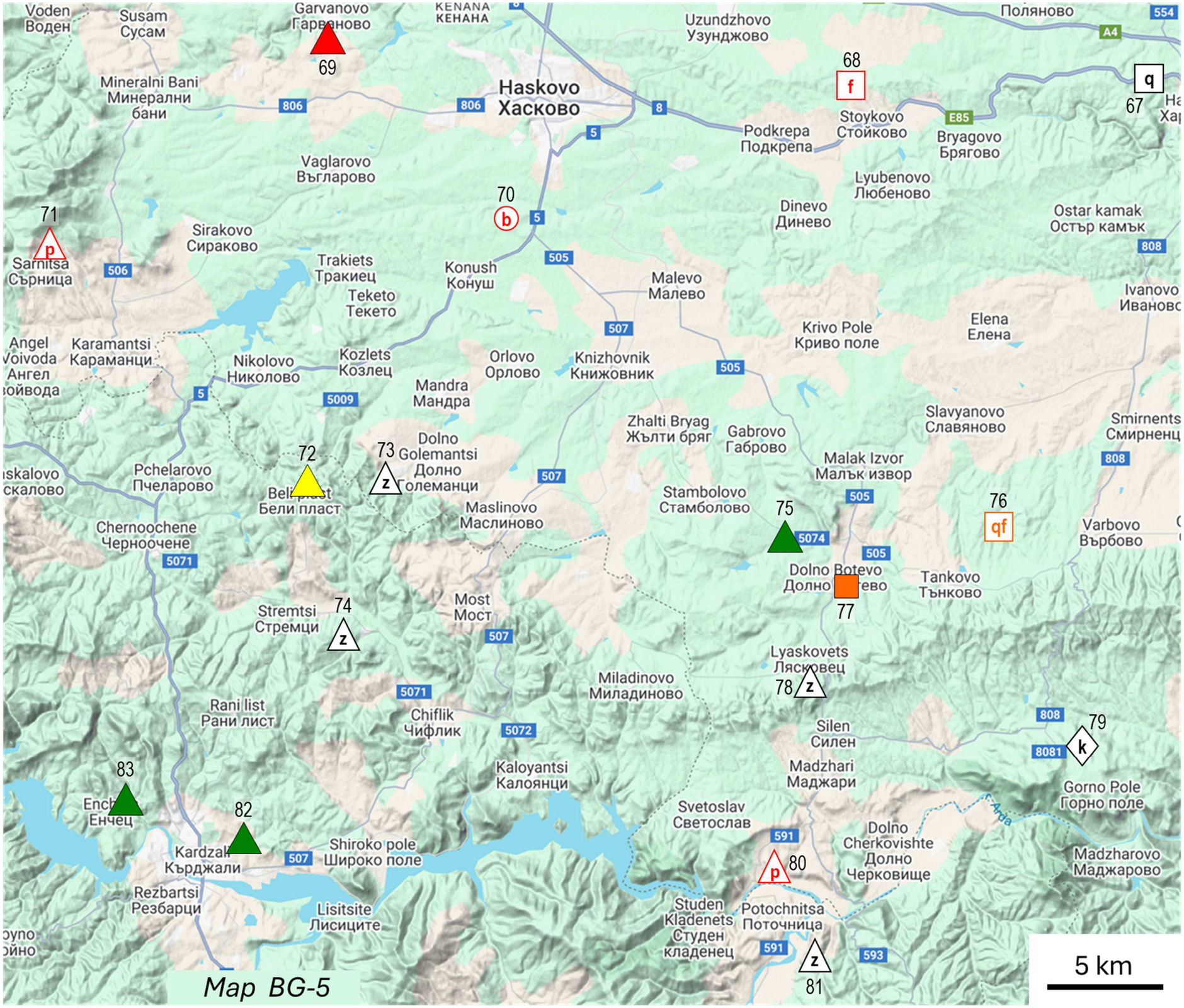
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Haskovo
Хасково
Garvanovo
Гарваново
Uzundzhovo
Узунджово
Поляново
Mineralni Bani
Минерални бани
Podkrepa
Подкрепа
Stoykovo
Стойково
Bryagovo
Брягово
Vaglarovo
Въгларово
Lyubenovo
Любеново
Dinevo
Динево
Ostar kamak
Остър камък
Sarnitsa
Сърница
Sirakovo
Сираково
Trakiets
Тракиец
Konush
Конуш
Teketo
Текето
Malevo
Малево
Ivanovo
Иваново
Krivo Pole
Криво поле
Elena
Елена
Angel Voivoda
Ангел Войвода
Karamantsi
Караманци
Nikolovo
Николово
Kozlets
Козлец
Orlovo
Орлово
Knizhovnik
Книжовник
Mandra
Мандра
Zhalti Bryag
Жълти бряг
Gabrovo
Габрово
Slavyanovo
Славяново
Smirnents
Смирненц
Malak Izvor
Малък извор
Dolno Golemantsi
Долно Големанци
Pchelarovo
Пчеларово
Belo pласт
Бели пласт
Maslinovo
Маслиново
Stambolovo
Стамболово
Varbovo
Върбово
Chernoochene
Черноочене
Dolno Botevo
Долно Тъ...ево
Tankovo
Тънково
Stremtsi
Стремци
Most
Мост
Lyaskovets
Лясковец
Miladinovo
Миладиново
Rani list
Рани лист
Chiflik
Чифлик
Silen
Силен
Madzhari
Маджари
Kaloyantsi
Калоянци
Gorno Pole
Горно поле
Svetoslav
Светослав
Dolno Cherkovishte
Долно Черковище
Madzharovo
Маджарово
Shiroko pole
Широко поле
Kardzali
Кърджали
Rezbartsi
Резбарци
Lisitsite
Лисиците
Studen Kladenets
Студен кладенец
Potochnitsa
Поточница
Arda
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5 km
Map BG-5
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)
active
inactive
rc
be
qs
qf
fd
pe
ka
ze



The Quarry

Hans Heysen (1877–1968)

Courtesy of Art Gallery of New South Wales

Croatia

Croatia produces, for the domestic ceramic and glass industry, red clays and silica sand. In addition, a bauxite mine is active. Occurrences, currently unexploited, of ball clay, bentonite, feldspar, fireclay, pyrophyllite, talc, and zeolites are reported, but the amount of reserves is undisclosed [1-4].

Red clay: a dozen quarries are currently active in the counties of Karlovac, Varaždin, Zagreb and in eastern Croatia. They are used for bricks and roof tiles (as were numerous disused deposits). The quantities extracted are around 400,000 tpa, while reserves are approximately 72 million tonnes. The demand is mainly satisfied by Pliocene-Quaternary alluvial and loessic sediments of the Pannonian and Zagorje basins [1,5,7,8].

Silica sand is excavated in northern Croatia, predominantly from fluvial sediments of the Drava basin [1]. Reserves are indicated to be 33 million tonnes [9].

Bauxite: there are numerous occurrences in the carbonatic sequences of the Dinarides [10,11] but the only active mine is at Rovinj in Istria, with an average production of 13,500 tpa [12] and over 1 million tonnes of reserves [1]. The deposit was formed in the Jurassic limestone by a complex interplay of tectonic, climatic, depositional and physicochemical processes [13-15].

White-firing clays: the extraction ceased some years ago. Croatian production was estimated at around 300,000 tpa of clay materials, with reserves close to 3 million tonnes [9,16]. Deposits of both ball clays, illite-smectite-kaolinite in composition, and fireclays are found in the Pliocene-Pleistocene sedimentary series of Carniola and the Zagreb region [1,16,17].

Bentonite was extracted, among numerous occurrences in the Croatian territory, from deposits formed by transformation of Miocene andesitic volcanoclastics in the counties of Krapina-Zagorje and Sisak-Moslavina [1,18,19]. Proven reserves of bentonite are about 2.3 million tonnes [18].

A dacite is used as a raw material for **stone wool** in Novi Marof [1].

Other raw materials were mined in the past in northern Dinarides: a **talc**-chloritic schist in Slavonia; a diaspore-**pyrophyllite** shale linked to bauxitization processes in Dalmatia; **feldspar** from arkose processing in Vrlinska [1]. In addition, granite pegmatites are reported in the massif of Moslavačka Gora [20] but never extracted, as **zeolites** in two Miocene occurrences: clinoptilolite-rich volcaniclastic rocks in Krapina-Zagorje, and analcime-bearing rocks, formed in saline alkaline lake, in Slavonia [21].

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Rovinj bauxite deposit [15]

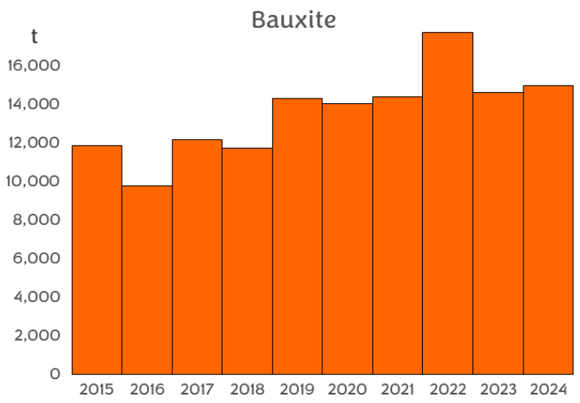
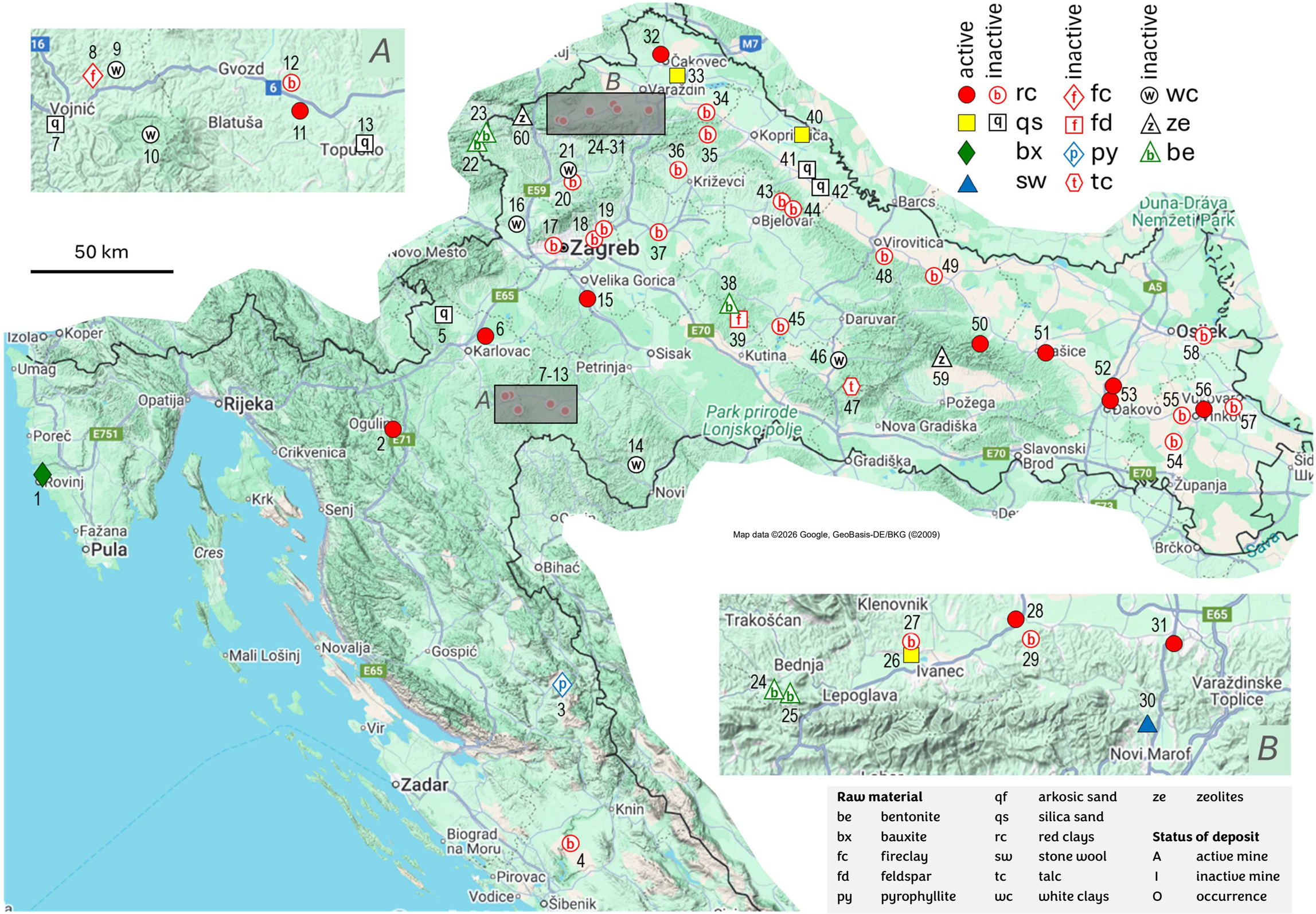


Table HR-a: deposits of raw materials for the ceramic and glass industries in Croatia.

#	raw material	st	deposit	county
1	bx	A	Rovinji	Istrija
2	rc	A	Ogulin	Karlovac
3	py	O	Mazin	Zadar
4	rc	I	Dujici zapad	Sibenik-Tenin
5	qs	I	Ozalj	Karlovac
6	rc	A	Rečica	Karlovac
7	qs	I	Vojnić	Karlovac
8	fc	O	Kordun-Banija	Karlovac
9	wc	I	Kovirevo	Karlovac
10	wc	I	Ivošević Gaj	Karlovac
11	rc	A	Donja Čemernica	Sisak-Moslavina
12	rc	I	Brkovec	Sisak-Moslavina
13	qs	I	Topusko	Sisak-Moslavina
14	wc	I	Pedalj	Zagreb
15	rc	A	Mraclin	Zagreb
16	wc	I	Zaprešić	Zagreb
17	rc	I	Črnomerec	Zagreb city
18	rc	I	Novacica	Zagreb city
19	rc	I	Vrbovec	Zagreb
20	rc	I	Bedekovčina	Krapina-Zagorje
21	wc	I	Đurđevićeu Brijeg	Krapina-Zagorje
22	be	I	Luke Poljanske	Krapina-Zagorje
23	be	I	Bratkovec	Krapina-Zagorje
24	be	I	Šaša-Bednja	Krapina-Zagorje
25	be	I	Šeprun-Bednja	Krapina-Zagorje
26	qs	A	Jerovec	Varazdin
27	rc	I	Čret	Varaždin
28	rc	A	Cerje Tužno	Varazdin
29	rc	I	Lukavec	Varaždin
30	sw	A	Novi Marof	Varaždin
31	rc	A	Cukavec	Varazdin
32	rc	A	Šenkovec	Medzimurje
33	qs	A	Štefanec	Medzimurje
34	rc	I	Ribnjak	Korpivnica
35	rc	I	Ludbreski vinogradi	Varaždin
36	rc	I	Guščerovec	Korpivnica
37	rc	I	Soblinec	Zagreb city
38	be	I	Murinski jarak-Gornja Jelenska	Sisak-Moslavina
39	qf	I	Vrlinska	Sisak-Moslavina
40	qs	A	Gabajeva Greda	Koprivnica-Križevci
41	qs	I	Đurdevac	Koprivnica-Križevci
42	qs	I	Kloštar	Koprivnica-Križevci
43	rc	I	Dominkovica	Bjelovar
44	rc	I	Paulovac	Bjelovar
45	rc	I	Garešnica	Bjelovar
46	wc	I	Pakrac	Požega-Slavonia
47	tc	I	Psunj	Brod-Posavina
48	rc	I	Bilo	Virovitica-Podravina
49	rc	I	Sladojevci	Virovitica-Podravina
50	rc	A	Orahovica	Virovitica-Podravina
51	rc	A	Kukljaš-Našice	Osijek-Baranja
52	rc	A	Tomašanci	Osijek-Baranja
53	rc	A	Djakovo	Osijek-Baranja
54	rc	I	Cerna	Vukovar-Srijem
55	rc	I	Dren	Vukovar-Srijem
56	rc	A	Slavonka	Vukovar-Srijem
57	rc	I	Avaluci	Vukovar-Srijem
58	rc	I	Sarvaš	Osijek-Baranja
59	ze	O	Poljanska-Mount Papuk	Požega-Slavonia
60	ze	O	Macelj	Krapina-Zagorje



Raw material					
be	bentonite	qf	arkosic sand	ze	zeolites
bx	bauxite	qs	silica sand		
fc	fireclay	rc	red clays	**Status of deposit**	
fd	feldspar	sw	stone wool	A	active mine
py	pyrophyllite	tc	talc	I	inactive mine
		wc	white clays	O	occurrence

Cyprus

Cyprus produces bentonite and red clays among ceramic and glass raw materials, the former mainly for export and the latter to feed domestic industry. Chromite is no longer mined, while occurrences of magnesite, talc and strontium minerals have been reported [1,2].

Bentonite is extracted (98,000 tpa, mean 2015-2024) in half a dozen deposits located all around the Troodos ophiolitic complex [2]. Basic pyroclastic rocks, overlying pillow lavas, were altered to bentonites, which occur within pelagic sediments of the Paradedi and Kannaviou formations of Cretaceous age [3,4].

Red clays are currently quarried (133,000 tpa as average of the last decade) in four areas, where different geological sources are exploited [1,5,6]:

- marine marls of the Nicosia Formation (Pliocene) and Pakhna Formation (Miocene);
- patches of the Lefkara Formation (Paleocene-Oligocene) lying on ophiolites;
- shales of the Mamonia complex (Cretaceous-Eocene).

Quarries in northern Cyprus, which excavated Holocene alluvial deposits or Oligocene-Miocene flysch of the Kythrea Formation, have been abandoned [7,8]. Reserves are estimated to be 1.4 million tonnes [9].

Chromite was exploited in the past by underground mining in three main deposits located in the central Troodos ophiolite complex (Cretaceous). Here, podiform chromitites and minor layered bodies are hosted in harzburgite and dunite [10-13]. Also, Cretaceous ophiolites host mineralizations of **magnesite** and **talc**, no longer exploited [1].

Strontium minerals: a mineralization is hosted by calcareous rocks with gypsum beds of the Miocene Pakhna Formation at Maroni. Evaporites are potential source of strontium in this sediment-hosted celestine deposit [14].

Table CY-a: deposits of raw materials for the ceramic and glass industries in Cyprus.

#	raw material	st	deposit	district
1	mg	I	Neo Chorio	Paphos
2	mg	I	Ineia	Paphos
3	be	I	Nata	Paphos
4	be	I	Kannaviou	Paphos
5	be	A	Kidasi	Paphos
6	cr	I	Hadjipavlou	Limassol
7	cr	I	Kokkinorotsos	Limassol
8	cr	I	Kannoures	Limassol
9	rc	I	Trimiklini	Limassol
10	rc	I	Zoopigi	Limassol
11	tc	I	Gerasa	Limassol
12	rc	I	Kalo Chorio	Limassol
13	tc	I	Apsiou-Louvaras	Limassol
14	mg	I	Apsiou	Limassol
15	be	I	Kato Moni	Nicosia
16	rc	I	Diorios	Kyrenia
17	rc	I	Karşıyaka	Kyrenia
18	be	A	Potira	Limassol
19	be	A	Armenochori	Limassol
20	be	A	Monigrouli	Limassol
21	mg	I	Vasa	Larnaca
22	be	A	Pentakomon	Larnaca
23	be	I	Parsata	Larnaca
24	rc	A	Pano Lefkara	Larnaca
25	rc	A	Delikipos 1	Larnaca
26	rc	A	Delikipos 2	Larnaca
27	sr	O	Maroni	Larnaca
28	rc	A	Tseri	Nicosia
29	rc	I	Tseri E120	Nicosia
30	rc	I	Agia Varvara	Nicosia
31	rc	I	Pera Chorio	Nicosia
32	rc	I	Dali	Nicosia
33	rc	I	Şehit Savaş Kaşif Caddesi	Lefkoşa
34	rc	I	Haspolat	Lefkoşa
35	rc	I	Demirkan	Lefkoşa
36	be	I	Troulloi	Larnaca
37	br	I	Steliou Mavrommati	Nicosia
38	br	A	Kato Koutrafas	Nicosia
39	br	I	Pano Koutrafas S	Nicosia
40	br	I	Pano Koutrafas N	Nicosia
41	br	A	Ezousa	Paphos
42	br	A	Stavrokonou	Paphos
43	br	I	Mavrokolympos	Paphos

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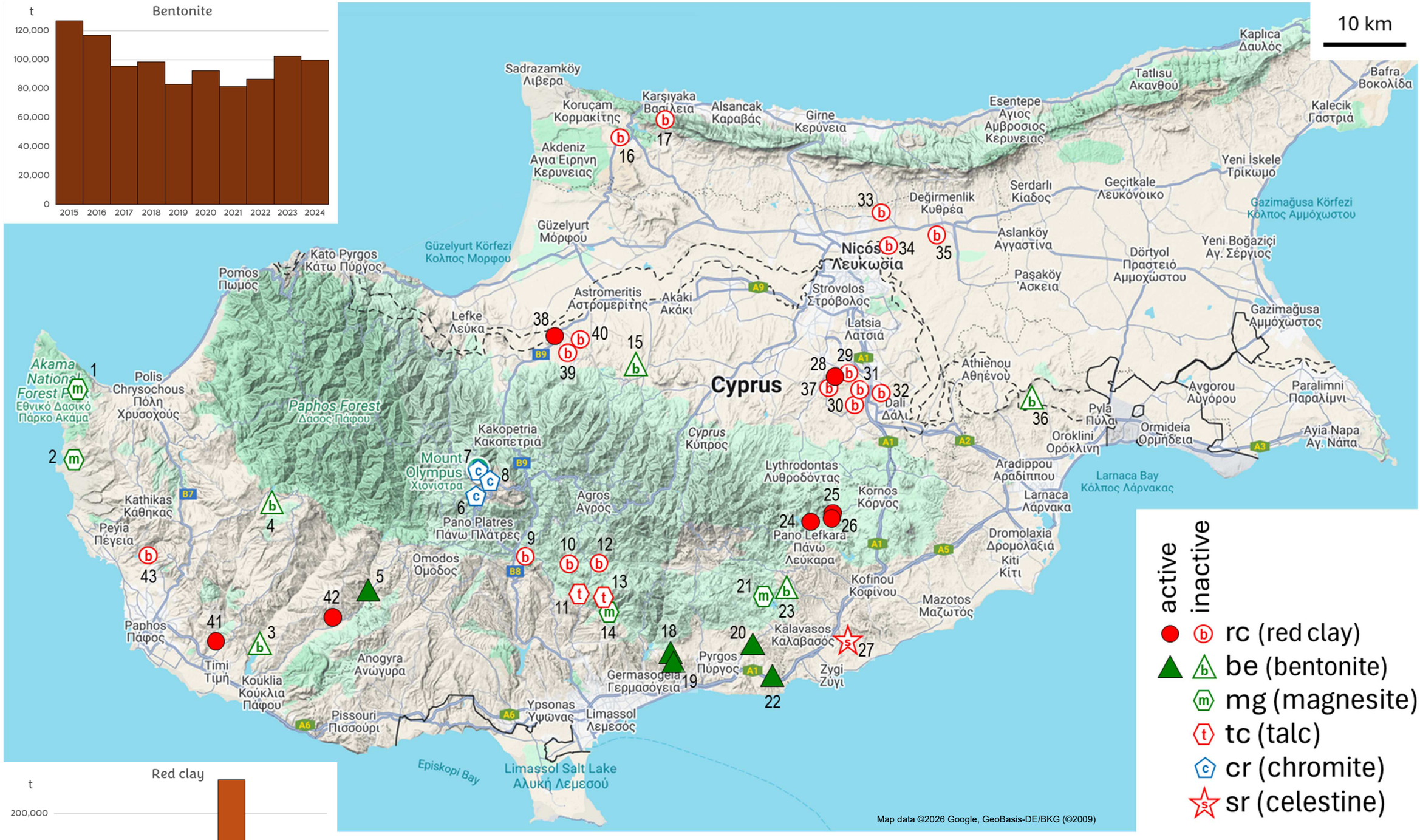
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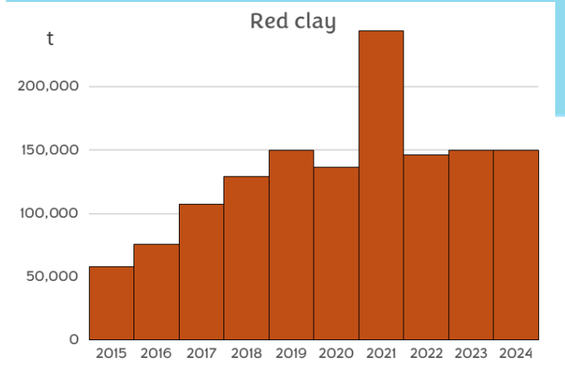
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Bentonite
t
120,000
100,000
80,000
60,000
40,000
20,000
0
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024


10 km
Cyprus
Κύπρος
Nicosia
Λευκωσία
Limassol
Λεμεσός
Larnaca
Λάρνακα
Paphos
Πάφος
Sadrazamköy
Λιβερα
Karşıyaka
Βασίλεια
Alsancak
Καραβάς
Girne
Κερύνεια
Esentepe
Άγιος Αμβρόσιος Κερυνειας
Kaplıca
Δαυλός
Tatlısu
Ακανθού
Bafra
Βοκολίδα
Kalecik
Γαστριά
Yeni İskele
Τρίκωμο
Gazimağusa Körfezi
Κόλπος Αμμόχωστου
Gazimağusa
Αμμόχωστος
Yeni Boğaziçi
Αγ. Σέργιος
Dörtyol
Πραστειό Αμμοχώστου
Geçitkale
Λευκόνοικο
Serdarlı
Κίαδος
Değirmenlik
Κυθρέα
Aslanköy
Αγγαστίνα
Paşaköy
Άσκεια
Güzelyurt Körfezi
Κόλπος Μορφου
Güzelyurt
Μόρφου
Kato Pyrgos
Κάτω Πύργος
Pomos
Πωμός
Akama National Forest Park
Εθνικό Δασικό Πάρκο Ακάμα
Polis Chrysochous
Πόλη Χρυσοχούς
Paphos Forest
Δάσος Πάφου
Kathikas
Κάθηκας
Peyia
Πέγεια
Astromeritis
Αστρομερίτης
Akaki
Ακάκι
Lefke
Λεύκα
Strovolos
Στρόβολος
Latsia
Λατσιά
Athienou
Αθηένου
Dali
Δάλι
Pyla
Πύλα
Oroklini
Ορόκλινη
Ormideia
Ορμήδεια
Avgorou
Αυγόρου
Paralimni
Παραλίμνι
Ayia Napa
Αγ. Νάπα
Larnaca Bay
Κόλπος Λάρνακας
Kornos
Κόρνος
Pano Lefkara
Πάνω Λεύκαρα
Lythrodontas
Λυθροδόντας
Aradippou
Αραδίππου
Dromolaxia
Δρομολαξιά
Kiti
Κίτι
Kofinou
Κοφίνου
Mazotos
Μαζωτός
Kalavasos
Καλαβασός
Zygi
Ζύγι
Pyrgos
Πύργος
Germasogeia
Γερμασόγεια
Agros
Αγρός
Omodos
Όμοδος
Pano Platres
Πάνω Πλάτρες
Kakopetria
Κακοπετριά
Mount Olympus
Χιονίστρα
Anogyra
Ανώγυρα
Kouklia
Κούκλια Πάφου
Timi
Τιμή
Pissouri
Πισσούρι
Ypsonas
Ύψωνας
Episkopi Bay
Limassol Salt Lake
Αλυκή Λεμεσού
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)
active
inactive
rc (red clay)
be (bentonite)
mg (magnesite)
tc (talc)
cr (chromite)
sr (celestine)


Red clay
t
200,000
150,000
100,000
50,000
0
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024

Czechia

The Czech Republic has long been an international benchmark for kaolin (fifth largest producer in the Euro-Mediterranean area) and refractory clays (largest exporter). Feldspar and bentonite (5th and 6th position in Europe, respectively) are also produced, together with quartz and quartz-feldspathic sands, ball clays and red clays. There are also occurrences, currently unexploited, of barite and lithium minerals [1].

Kaolin is extensively mined with an average production of 3,207,000 tpa of raw ore (2015-2024) from which ~600,000 tpa of beneficiated kaolin are obtained [1]. There are three main mining areas in the Karlovy Vary, Plzeň and Ústí nad Labem regions, with numerous active mines and total reserves of 1144 million tonnes, of which 236 million tonnes of kaolin for ceramics [1]. The most important mining area is in the vicinity of Plzeň, where large deposits of kaolinized arkosic sandstones and conglomerates (Carboniferous) are exploited. In the Karlovy Vary region, kaolin is extracted from self-metamorphosed granites, sometimes in association with bentonite. The deposits in the Ústí nad Labem region are within granulitic gneisses or Permo-Carboniferous subarkoses [1-6].

White clays are extracted from a dozen mines, which together produce 479,000 tpa (2015-2024 average) – mainly refractory clays and secondarily ball clays [1]. Czech deposits exhibit a broad spectrum of genetic conditions, age of formation, parent rocks and geological context; the most economically relevant ones are found in western Bohemia [1,7-9]. *Refractory clays* with high alumina content, with varying degrees of plasticity, are extracted in the Kladno-Rakovník (Permo-Carboniferous schistous clays), the Prague Basin, and Moravian and East Bohemian basins (Cretaceous). Both fireclay and ball clay are mined in the Plzeň, Cheb-Sokolov and South Bohemian basins. *Ball clays* are recovered from Cretaceous lacustrine sediments (Líšt'any) and also from Quaternary deposits in Moravia. Overall the reserves amount to 909 million tonnes [1].

Red clays, intended primarily for the brick and roof tile industry, are quarried at two dozen sites with an average production of 1,666,000 tpa [1]. The main source is given by Quaternary loams (aeolian, deluvial, or glacial) but also lacustrine-palustrine pelites (Neogene, Cretaceous, or Permo-Carboniferous in age) and weathered shales (Paleogene flysch or Early Paleozoic and Proterozoic units) are used [1]. Overall reserves are estimated to be 524 million m^3 [1].

Silica sand is obtained (704,000 tpa on average) mostly from weakly consolidated quartz sandstones in the Czech Cretaceous basin. A second source is represented by Pliocene gravels in the Cheb basin. About 268 million tonnes of total reserves are indicated [1,10,11].

Feldspar is extracted from a dozen deposits (451,000 tpa on average) pertaining to a range of sources with 114 million tonnes of reserves [1]. The arkosic sands and gravels of the Jihlava and Lužnice rivers are exploited to obtain predominantly potassium feldspar [12]. Leucocratic granitoids provide mixed sodium-potassium feldspar at Krásno [13-15] or sodium-calcium feldspar (trondhjemite from the Mračnice Massif). Granitic pegmatites are mined in the Poběžovice-Domažlice district [12,16]. The nepheline phonolite of Želenice in the Ore Mountains is characterized by high content of both alkali and chromophores [12].

Bentonite deposits were all formed by argillization of volcanic rocks. The Czech production is 261,000 tpa, on average, with 323 million tonnes of reserves [1]. The vast majority of bentonite deposits and reserves are concentrated in the area of the Doupov Mountains and the Central Bohemian Uplands [1,7].

Lithium minerals are recognized in the Krušné hory batholith, linked to Li-Sn-W greisen deposits [17,18]. They have sporadically given rise to small production (Cínovec). Reserves are valued at 1.14 million tonnes of lithium metal [1,19].

Barite: the Czech deposits are mostly of hydrothermal origin (veins or stockwork) and distributed unevenly in the Bohemian Massif. The most important mineralizations are in Krušné Hory and Železné Hory; occurrences are also known from the Proterozoic of Bohemia and Orlické Hory [1,20]. Overall reserves are valued at 1.56 million tonnes [1].

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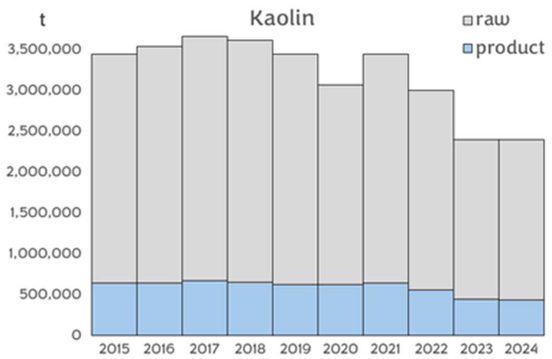
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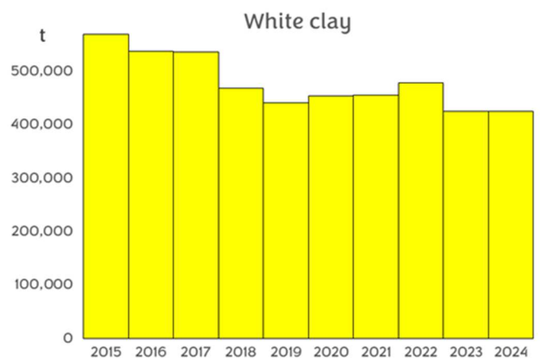
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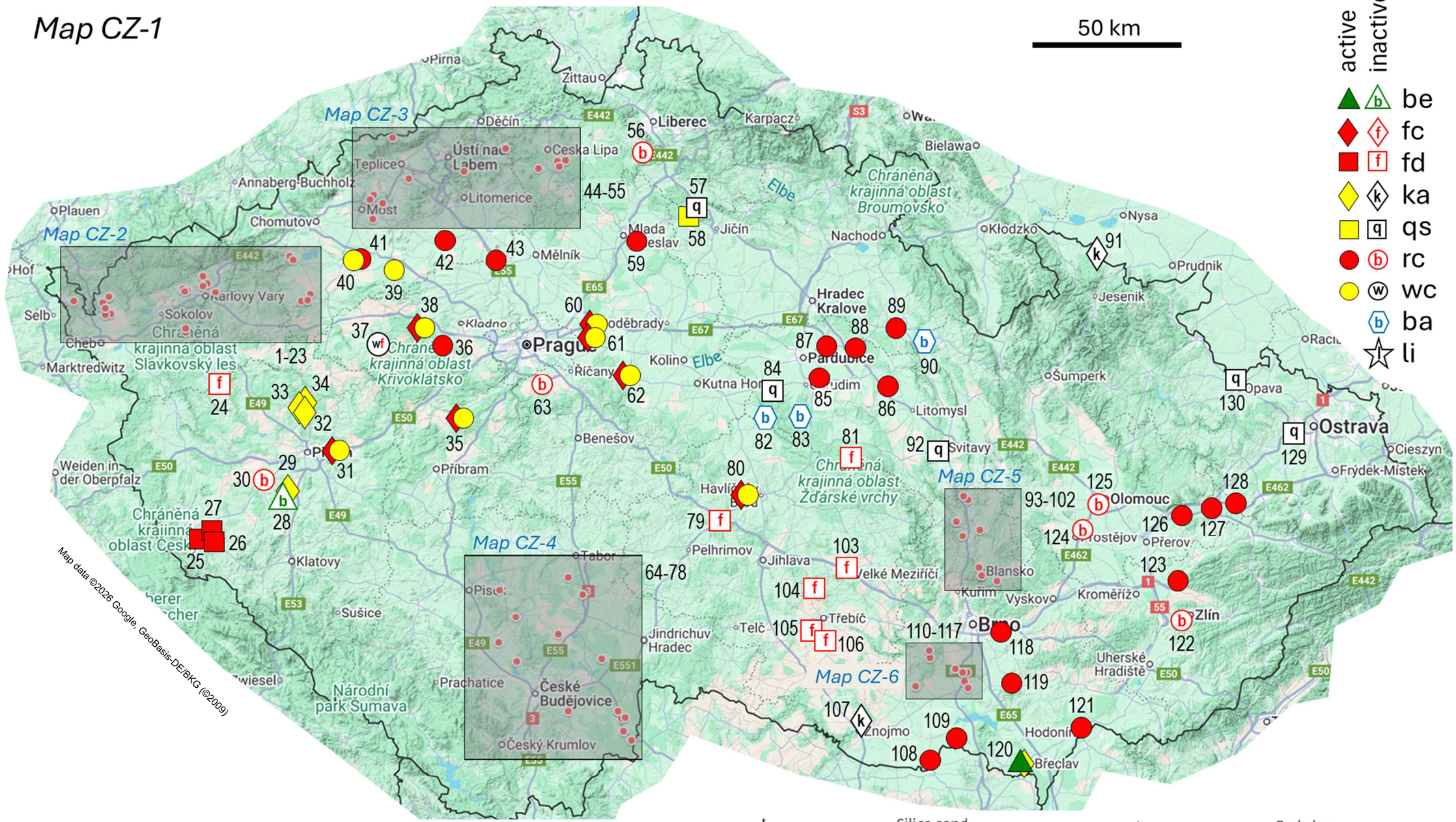
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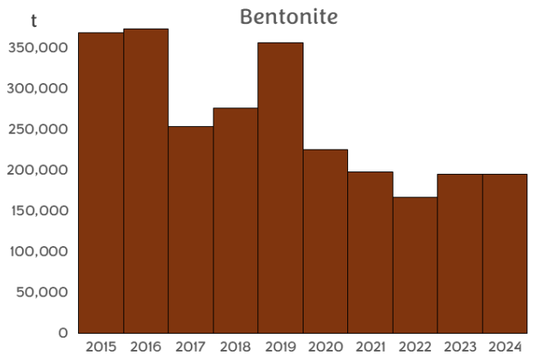


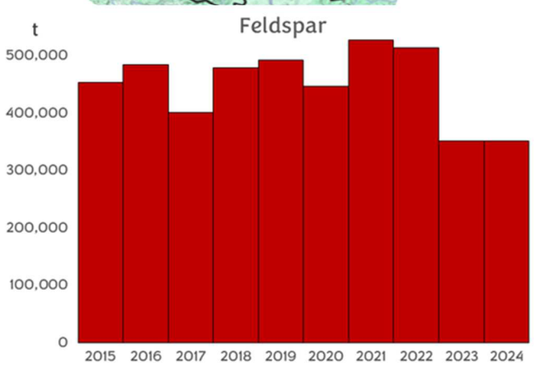


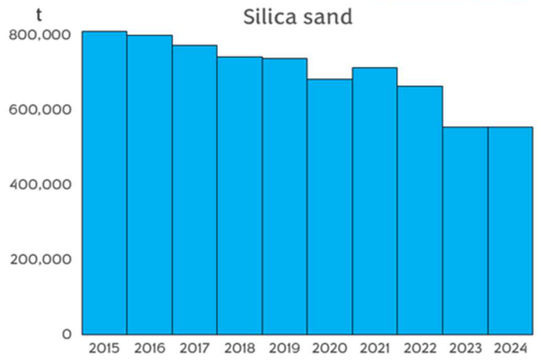
Map CZ-1



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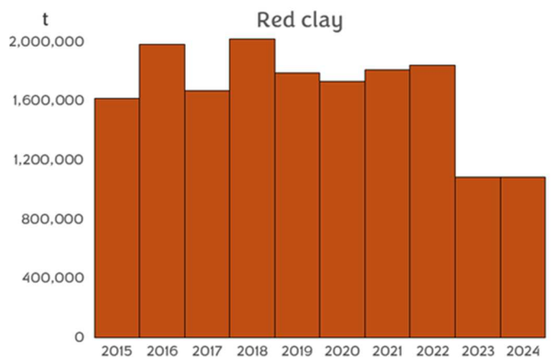
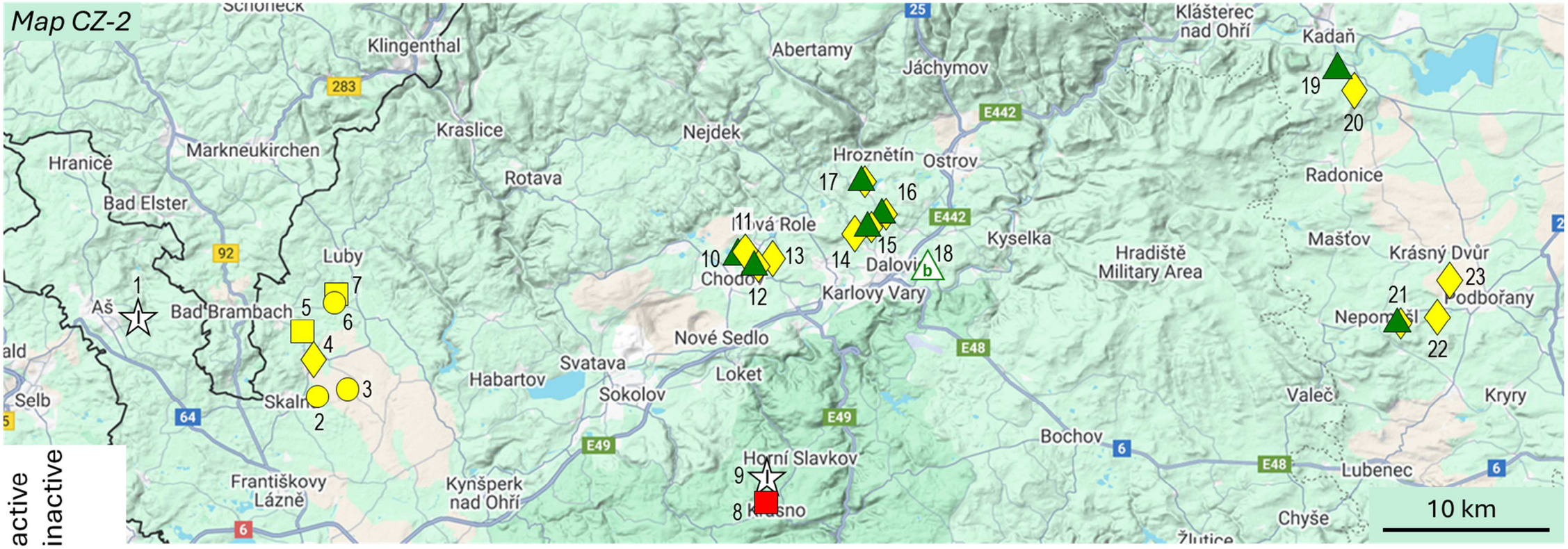


Table CZ-a: deposits of raw materials for the ceramic and glass industries in Czechia.

#	r. m.	st	deposit	region
1	li	O	Vernéřov u Aš	Karlovy Vary
2	wc	A	Skalná	Karlovy Vary
3	wc	A	Nová Ves u Křižovatky	Karlovy Vary
4	ka	A	Plesná-Velký Luh	Karlovy Vary
5	qs	A	Velký Luh	Karlovy Vary
6	wc	A	Vackov	Karlovy Vary
7	qs	A	Lomnička u Plesné	Karlovy Vary
8	fd	A	Krásno	Karlovy Vary
9	li	O	Horní Slavkov	Karlovy Vary
10	be	A	Božičany-Osmosa-jih	Karlovy Vary
11	ka	A	Božičany	Karlovy Vary
12	ka-be	A	Mírová	Karlovy Vary
13	ka	A	Jimlíkov	Karlovy Vary
14	ka	A	Katzenholz	Karlovy Vary
15	ka-be	A	Otovice	Karlovy Vary
16	ka-be	A	Podlesí	Karlovy Vary
17	ka-be	A	Ruprechtov	Karlovy Vary
18	be	I	Všeborovice	Karlovy Vary
19	be	A	Rokle u Kadaně	Ústí nad Labem
20	ka	A	Rokle	Ústí nad Labem
21	be-ka	A	Nepomyšl-Maledivy	Ústí nad Labem
22	ka	A	Podbořany	Ústí nad Labem
23	ka	A	Krásný Dvůr	Ústí nad Labem
24	fd	I	Beroun	Karlovy Vary
25	fd	A	Ždánov	Plzeň
26	fd	A	Luženičky	Plzeň
27	fd	A	Mračnice	Plzeň
28	be	I	Dněšice	Plzeň
29	ka	A	Chlumčany-Dnešice	Plzeň
30	rc	I	Stod	Plzeň
31	wc-fc	A	Kyšice-Ejpovice	Plzeň
32	ka	A	Horní Bříza	Plzeň
33	ka	A	Kaznějov-jih	Plzeň
34	ka	A	Lomnička-Kaznějov	Plzeň
35	wc-fc	A	Vižina	Central Bohemia
36	rc	A	Bratronice	Central Bohemia
37	wc-fc	I	Lubná-Marta	Central Bohemia
38	wc-fc	A	Rynholec-Hořkovec	Central Bohemia
39	wc	A	Líšťany	Ústí nad Labem
40	wc	A	Turšice	Ústí nad Labem
41	rc	A	Selibice	Ústí nad Labem
42	rc	A	Libochovice	Ústí nad Labem
43	rc	A	Ledčice	Ústí nad Labem
44	be	I	Stránce	Ústí nad Labem
45	fd	A	Želenice	Ústí nad Labem
46	be	I	Střimice	Ústí nad Labem
47	be	A	Braňany-Černý vrch	Ústí nad Labem
48	li	O	Cínovec	Ústí nad Labem
49	rc	A	Doklanky	Ústí nad Labem
50	fd	I	Tašov	Ústí nad Labem
51	fd	I	Valkeřice-Zaječí vrch	Ústí nad Labem
52	qs	I	Holany	Liberec
53	qs	A	Srní-Okřešice	Liberec
54	qs	I	Provodín	Liberec
55	qs	I	Srní 2-Veselí	Liberec
56	rc	I	Český Dub	Liberec
57	qs	A	Střeleč	Hradec Králové
58	qs	I	Mladějov u Čechách	Hradec Králové
59	rc	A	Řepov	Central Bohemia
60	wc-fc	A	Nehvizdy	Central Bohemia
61	wc-fc	A	Vyšehořovice	Central Bohemia
62	wc-fc	A	Brník	Central Bohemia
63	rc	I	Jesenice	Central Bohemia
64	be	A	Maršov	South Bohemia
65	wc-fc	A	Jehnědno	South Bohemia
66	be	A	Rybova Lhota	South Bohemia
67	rc	A	Všemyslice	South Bohemia
68	rc	A	Dolní Bukovsko	South Bohemia
69	rc	A	Záblatí	South Bohemia
70	wc-fc	A	Zahájí-Blana	South Bohemia
71	ka	O	Kolence	South Bohemia
72	wc-fc	A	Borovany-Ledenice	South Bohemia
73	fd	I	Majdalena	South Bohemia
74	fd	I	Krabonoš	South Bohemia
75	ka	O	Klikov	South Bohemia
76	fd	I	Tušť	South Bohemia
77	fd	I	Dvory nad Lužnicí	South Bohemia
78	fd	A	Halámky	South Bohemia
79	fd	I	Humpolec	Vysočina
80	wc-fc	A	Březinka	Vysočina
81	fd	I	Malá Tresná-Svratka	Vysočina
82	ba	I	Běstvina	Pardubice
83	ba	O	Křižanovice	Pardubice
84	qs	I	Načešice	Pardubice
85	rc	A	Úhřetice	Pardubice
86	rc	A	Vysoké Mýto	Pardubice
87	rc	A	Časy	Pardubice
88	rc	A	Holice	Pardubice
89	rc	A	Kostelec na Orlici	Hradec Králové
90	ba	I	Bohousová	Olomouc
91	ka	I	Vidnava	Olomouc
92	qs	I	Svitavy-Vendolí	Pardubice
93	qs	O	Deštná-Dolní Smržov	South Moravia
94	qs	O	Babolky	South Moravia
95	qs	A	Nýrov	South Moravia
96	qs	I	Rudka-Kunštát	South Moravia
97	qs	O	Boskovice-Chrudichromy	South Moravia
98	qs	A	Voděrady	South Moravia
99	qs	A	Spešov-Dolní Lhota	South Moravia
100	qs	A	Blansko 2-Mošna	South Moravia
101	qs	O	Blansko-Jezírka	South Moravia
102	qs	I	Rudice-Seč	South Moravia
103	fd	I	Velké Meziříčí-Lavičky	Vysočina
104	fd	I	Smrček	Vysočina
105	fd	I	Mikulovice	Vysočina
106	fd	I	Výčapy	Vysočina
107	ka	I	Únanov	South Moravia
108	rc	A	Hevlín	South Moravia
109	rc	A	Novosedly	South Moravia
110	rc	A	Lesonice	South Moravia
111	fd	I	Ivančice	South Moravia
112	be	O	Ivančice-Réna	South Moravia
113	fd	A	Bratčice	South Moravia
114	fd	A	Ledce	South Moravia
115	fd	A	Hrušovany	South Moravia
116	fd	A	Smolín	South Moravia
117	fd	A	Žabčice	South Moravia
118	rc	A	Šlapanice	South Moravia
119	rc	A	Šitbořice	South Moravia
120	wc-be	I	Poštorná	South Moravia
121	rc	A	Hodonín	South Moravia
122	rc	I	Malenovice	Zlín
123	rc	A	Holešov	Zlín
124	rc	I	Držovice na Moravě	Olomouc
125	rc	I	Olomouc	Olomouc
126	rc	A	Jezernice	Olomouc
127	rc	A	Hranice	Olomouc
128	rc	A	Polom	Moravian-Silesian
129	qs	I	Polanka nad Odrou	Moravian-Silesian
130	qs	I	Palhanec-Váňovice	Moravian-Silesian

Map CZ-2





be
fd
ka
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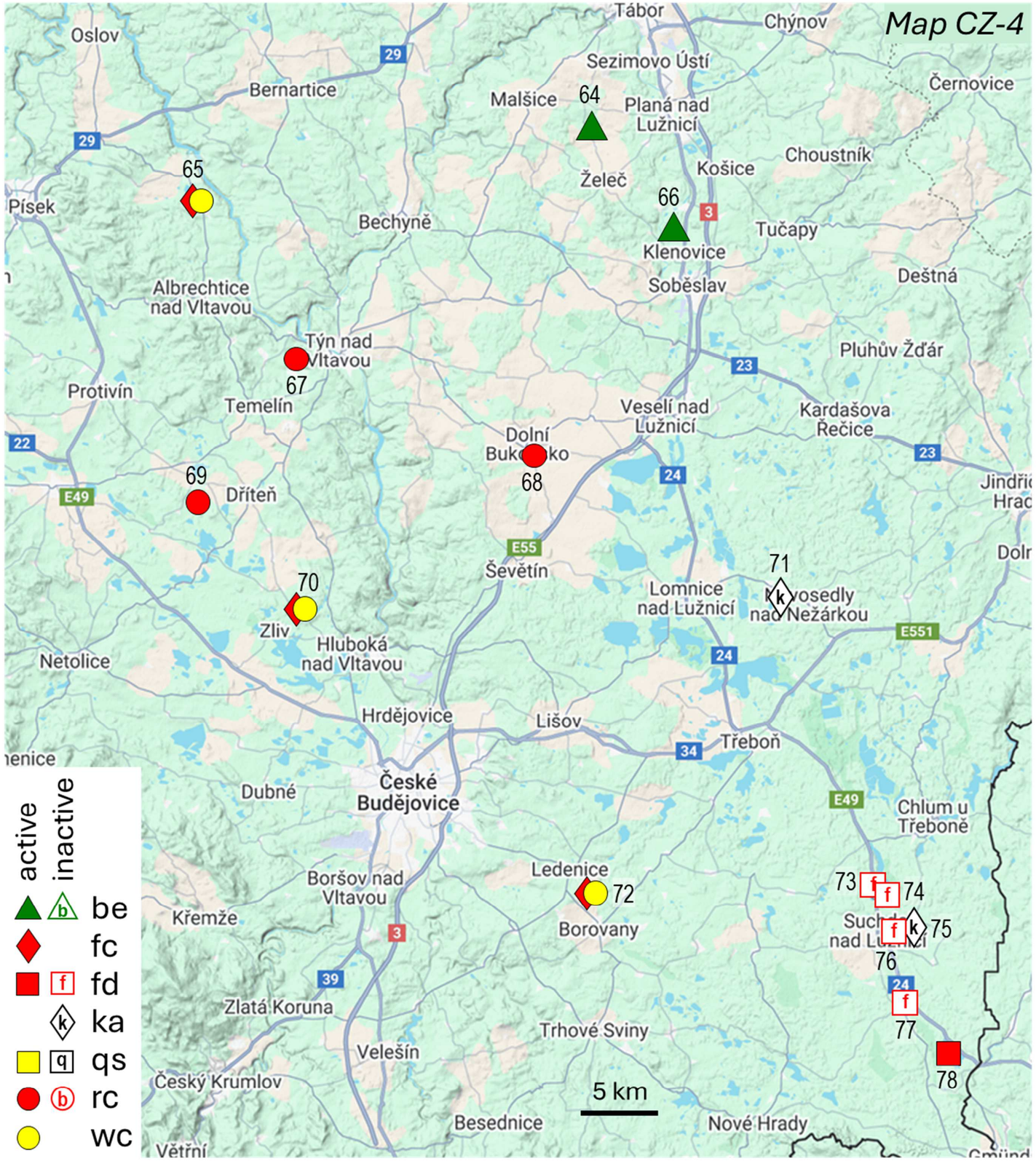
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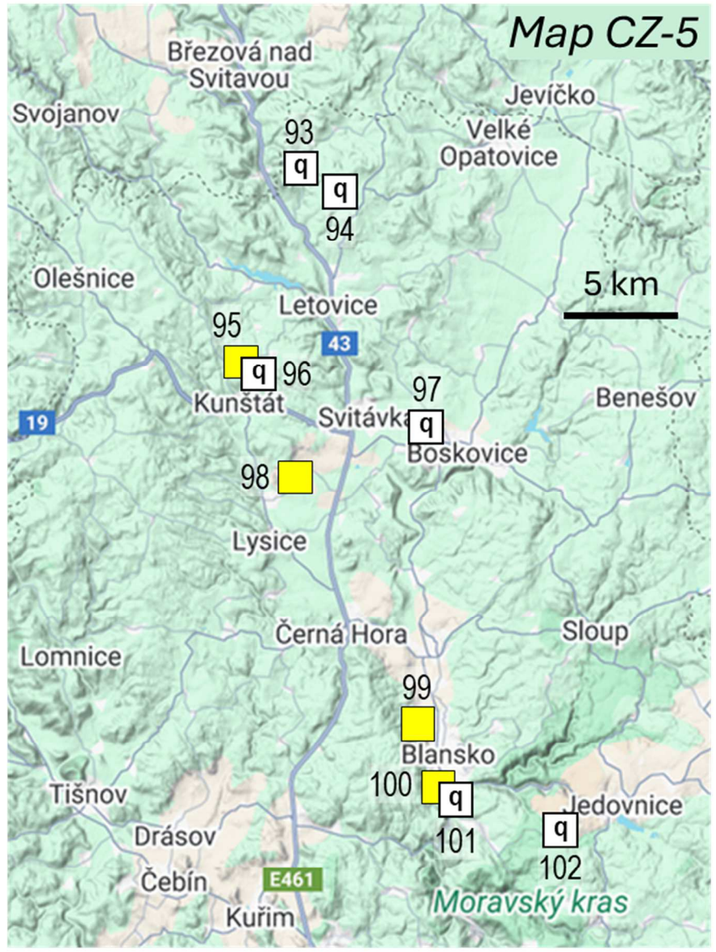
Raw material

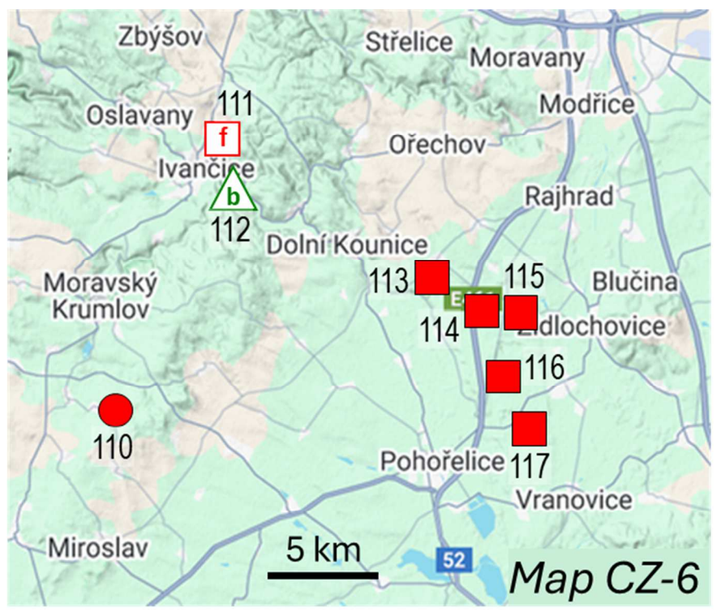
ba	barite
be	bentonite
fc	fireclay, refractory clays
fd	feldspar, feldspathic materials
li	lithium minerals
qs	silica sand
rc	red clays
wc	white clays

Status of deposit

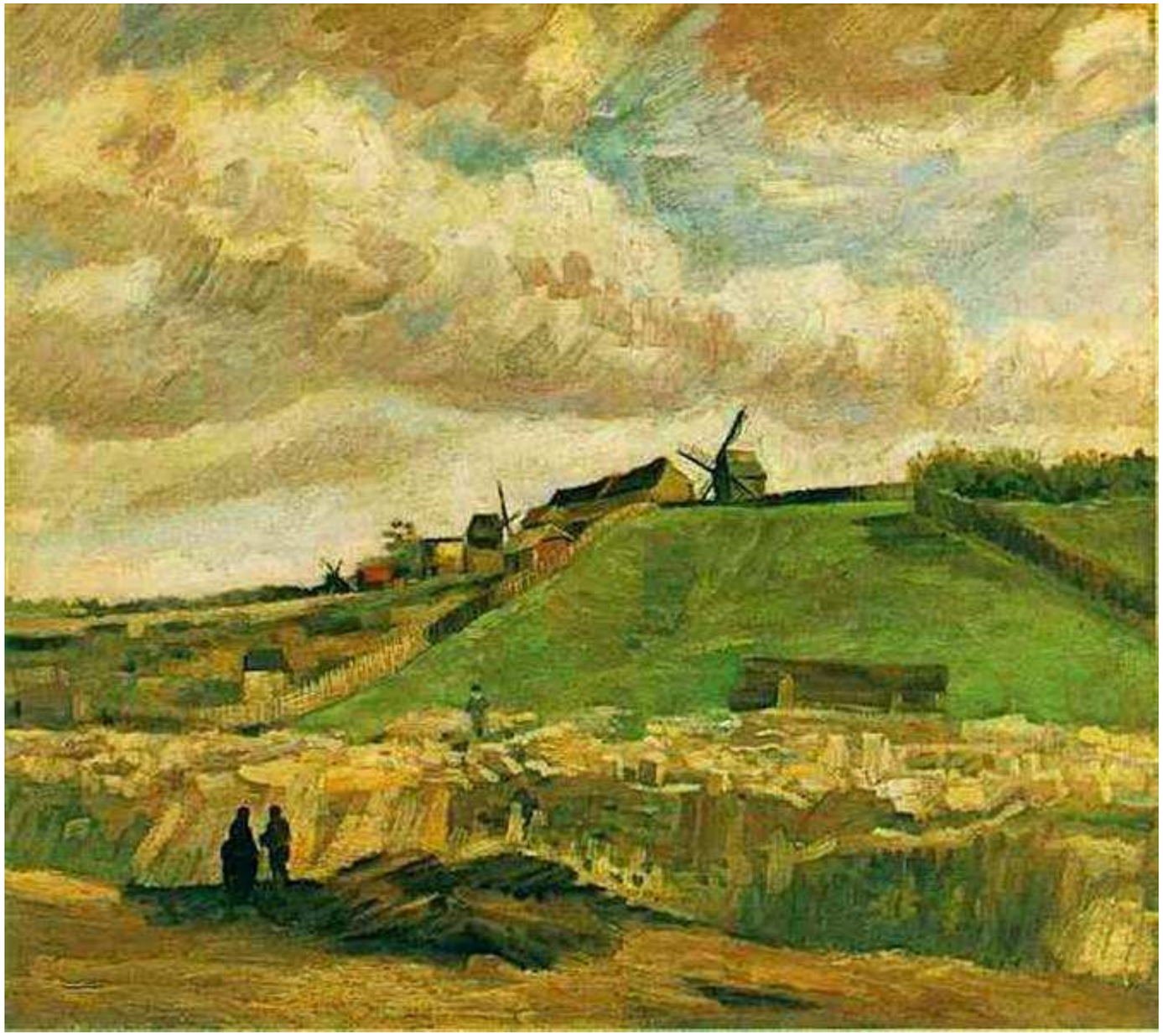
A	active mine
I	inactive mine, mine closed
O	occurrence







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The Hill of Montmartre with Stone Quarry

Vincent van Gogh (1853-1890)

Denmark

The Danish mining industry produces mainly red clays and *moler* (a peculiar diatomite-smectite-volcanic ash sediment) for ceramic manufacturing. There is also extraction of bentonite and quartz sand, while kaolin mining ceased. Cenozoic marine sediments, predominantly argillaceous, outcrop throughout much of the Jutland Peninsula and the major islands, except in the northern belt, where they lie beneath a glacial overburden [1,2].

Red clays are used (790,000 tpa, average 2015–2024) for the production of bricks, roof tiles, vitrified drainage pipes, and lightweight aggregates for the domestic and Scandinavian market [3]. They are extracted from several Cenozoic formations, mostly fine-grained and shallow marine sediments [1,4,5]: Kerteminde Marl (Paleocene); Røsnæs Clay, Lillebælt Clay, and Søvind Marl (Eocene); Branden Fm (Oligocene); and Klintinghoved Fm (Miocene). Further brick raw materials are recovered from clay tills and glaciolacustrine deposits [5]. Overall clay reserves overpass 100 million m³ [2].

Industrial silica is mined (~630,000 tpa on average) mainly from the Fur Formation (Eocene) on the islands of Fur and Mors in northern Jutland. These are marine deposits, ~60 m thick, represented by a clay diatomite interbedded with layers of volcanic ash, called *moler*, which allowed the development of a strong Danish industry of lightweight aggregates [6–10]. Additionally, quartz sand is mined from the Billund Formation (Miocene) in central Jutland [10].

Bentonite is excavated from the Bjerreby deposit on the island of Tåsinge (42,000 tpa, mean of the last decade) which exploits predominantly smectitic marine sediments of the Paleocene Holmehus Formation [11]. Reserves are estimated to be 22 million cubic metres [12]. **Kaolin** was extracted until 1992 from the Rønne deposit on the island of Bornholm, formed by weathering of granodiorite [13,14], with peak production of 19,600 tonnes in 1985 [15].

Table DK-a: deposits of raw materials for the ceramic and glass industries in Denmark.

#	raw material	st	deposit	municipality
1	rc	A	Helligso (Hurup Thy)	Thisted
2	mo	O	Mosebjerg	Mors
3	mo	O	Staerhoj	Mors
4	mo	A	Skarrehage	Mors
5	mo	A	Ejerslev	Mors
6	mo	A	Anschede	Skive
7	mo	A	Elke	Skive
8	mo	A	Elvergården	Skive
9	mo	A	Midtoen	Skive
10	mo	I	Ounild	Skive
11	mo	A	Junget	Skive
12	rc	I	Hasselholt Nørre	Holstebro
13	rc	A	Øster Hassing	Aalborg
14	rc	A	Gandrup	Aalborg
15	rc	A	Støvring	Rebild
16	rc	A	Kastbjerg	Vindø
17	be	O	Holmehus	Røjle
18	rc	A	Højslev	Skive
19	rc	A	Stoholm	Viborg
20	rc	A	Hammershøj	Hammershøj
21	ec	A	Ølst	Randers
22	qs	A	Silkeborg	Silkeborg
23	rc	A	Petersminde	Vejen
24	rc	A	Grasten	Sønderborg
25	rc	A	Nybøl	Sønderborg
26	rc	A	Skodsbøl	Sønderborg
27	rc	I	Bogyden	Assens
28	rc	A	Stenstrup	Sønderborg
29	be	A	Bjerreby	Tåsinge
30	rc	A	Lundby	Vordingborg
31	rc	A	Gribskov-Fredensborg	Gribskov
32	ka	I	Rønne	Bornholm

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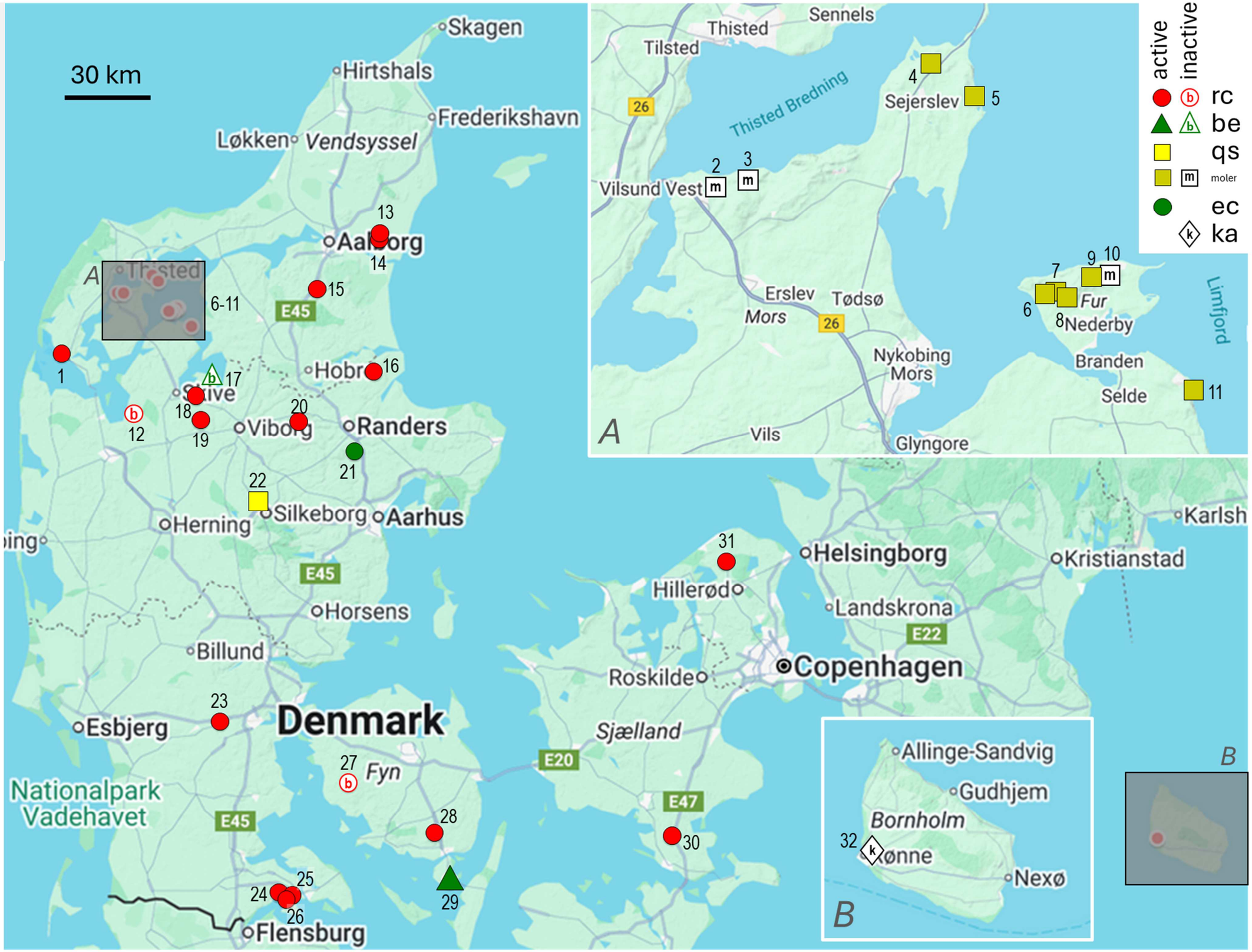
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Raw material

be bentonite
ec expanded clay
ka kaolin
mo moler
qs silica sand
rc red clays

Status of deposit

A active mine
I inactive mine
O occurrence



Map data ©2026 Google, GeoBasis-DE/BKG (©2009)

Egypt

Egypt boasts large resources of glass and ceramic raw materials, located mainly in the Eastern Desert and the Sinai Peninsula. Egypt's mining industry produces kaolin, feldspar, silica sand, talc, barite, bentonite, and natural soda ash (although official statistics appear somehow underestimated compared to the output of the domestic ceramic and glass manufacturers). Magnesite and red clays are also extracted (in unspecified quantities). In addition, occurrences of chromite, olivine and zeolites, as well as lithium, strontium and zirconium minerals, have been reported [1-4].

Feldspar is mined (215,000 tpa, mean 2015-2024) mainly from Neoproterozoic pegmatite-aplite deposits, which are widely distributed in the Arabian-Nubian Shield [5-13]. Another source under exploitation is a peculiar Neoproterozoic igneous complex (El-Tarr in the Sinai Peninsula) consisting of hypabyssal and volcanic albitites, emplaced together with carbonates and affected by alkali metasomatism [14-16]. Important resources are represented by different granitoids outcropping in the Eastern Desert, where in particular have attracted attention alkali-granites [17-19] but also other granite occurrences have been investigated [20-23]. Some rare-metal granitoids in the Arabian-Nubian Shield, such as the Abu Dabbab and Nuweibi deposits, are albite-rich and also have noteworthy **lithium** concentrations [24-26]. Furthermore, quartz-feldspathic stream sediments, i.e. colluvial-alluvial sands resulting from the dismantling of granite massifs in the Eastern Desert, have been explored [27,28]. Rhyolitic and trachytic volcanics, from Sinai or the Eastern Desert, have also been proposed as ceramic fluxes [29-31]. **Nepheline syenite** is present in several ring complexes emplaced, from Lower Paleozoic to Cretaceous, in the Arabian-Nubian Shield [32]; most of these deposits are found in remote areas (*Map EG-8*): from Marsa Alam to the Sudanese border [33-38], which makes difficult any exploitation program, even if some ring complex is further north [39] or in Sinai [40] and in the Western Desert [41]. Overall, the Egyptian reserves of feldspar are huge [3].

Kaolin sedimentary deposits are mined (230,000 tpa, average 2015-2024) in three districts: Sinai, Aswan and Suez [42-45]. In central-western Sinai (*Map EG-6A*), kaolinite-rich lenses are present in continental sequences of both Carboniferous Abu Thora Formation [46,47] and Cretaceous Malha Formation [46-50]; reserves are estimated to be over 100 million tonnes [46]. The Malha Formation also outcrops further west, where it is mined at Abu Darag, south of Suez [51-53]. The Kalabsha deposit, located southwest of Aswan (*Map EG-8*), consists of laterite-derived kaolin lenses within alluvial sediments of the Cretaceous Timsah Formation [54-57]. Kaolin occurrences are also reported around the Bahariya Oasis in the Western Desert [58] and particularly in sediments of the Cretaceous Naqb El Sillim Formation [52].

Stoneware clays, often referred to in the literature as "ball clays" with a high iron oxide content, are quarried in various locations, mainly for ceramic tiles, vitrified drainage pipes and lightweight aggregates [59,60]. A major pole is northeast of Aswan (*Map EG-8C*) where claystones are extracted from the Cretaceous Abu Aggag Formation [52,61,62] and the Carboniferous Gilf Formation [63,64]. Further shales are exploited from Heiz and Naqb El-Sillim Cretaceous formations near the Bahariya Oasis [52,59] as well as Jurassic Wadi Natrun Formation [59], Cretaceous-Paleocene Dakhla Formation [59,65]; Paleocene-Eocene Esna Formation and Eocene Qattara Formation [59,66,67]. **Red clays**: although the traditional manufacture of bricks and roof tiles is in sharp decline, particularly in the El-Saf district (Giza), it remains a widespread activity especially in the Nile Delta and the Fayum Basin. Brickworks located all along the Damietta and Rosetta branches (*Map EG-3*) use Holocene clay sediments of the Nile River [68-72]. Holocene lake sediments [73,74] and related eluvial soils, as well as shales of the Eocene Qasr El-Sagha Formation [52,75], are employed in the Fayum Depression (*Map EG-4*). Pliocene clays (marine-estuarine environment) are utilised in the brickmaking districts of Giza [76,77]. Towards the south, Pliocene [78] and Eocene [79-81] shales are used, while Miocene and Cretaceous deposits are used in the Suez and Sinai regions, respectively [82,83].

Silica sand is produced in many places in Egypt (700,000 tpa on average) with most quarries concentrated in northern Sinai and the Gulf of Suez, where Cretaceous (Wadi Qena Formation) and Carboniferous (Somr El-Qaa Formation) sandstones are exploited [84] and quartz sand reserves are substantial [85].

Talc is produced (20,000 tpa, mean 2015-2024) from various deposits in the Arabian-Nubian Shield, which occur in two distinct geologic settings [86]. The first is within ophiolitic mélanges, usually serpentinite-hosted and associated to tectonic sutures, as in Wadi Allaqi and other deposits [87-89] in southernmost Eastern Desert (*Map EG-8*), as well as further north [90-95] in the Marsa Alam area (*Map EG-7B*). In this genetic environment, talc can be associated to magnesite-chromite-olivine ores, as at El-Barramiya mine [96,97]. The second concerns Hamata-Atshan-Darhib deposits near Berenice (*Map EG-8*) that were emplaced in the Precambrian Shadli metavolcanic rocks, where talc was formed by a process of intensive Mg-metasomatism [98-101]. **Magnesite** is mined at Umm-Salatit [102] as well, not far El-Barramiya, and also occurs in other hydrothermal vein deposits cutting serpentinites [103]. **Olivine** deposits are found in Neoproterozoic ophiolitic peridotites of the Arabian-Nubian Shield in the Eastern Desert [104,105] but are not yet exploited. Also **chromite** (ranging from high Cr to high Al spinels) deposits outcrop in these ophiolitic complexes, as small and irregularly shaped podiform chromitite masses, hosted in well-preserved mantle sequences consisting either of serpentinites or fresh lherzolite-harzburgite with subordinate dunite [106-109].

Barite is obtained (4,000 tpa on average) as byproduct of iron ore mining in the Baharya Oasis, formed by mixed seawater and hydrothermal sources within the Eocene Naqb Qazzun Formation [110]. Other barite mineralizations are known in the Arabian-Nubian Shield, e.g., as hydrothermal veins cutting Precambrian felsic volcanics [111].

Bentonite deposits are exploited (on average 6,000 tpa) in the north of Western Desert and in the Fayum Basin, where smectite-rich clays occur in Eocene, Miocene and Pliocene lagoonal-deltaic sedimentary sequences [112-116]. Further bentonite occurrences are in Sinai, within the Miocene (shallow marine) Nukhul Formation [117]; in the Sohag area, within the Pliocene (marine to fluvial) Madmoud Formation [118,119]; and in the Sinn El-Kaddab plateau (Aswan) as smectite-rich marine shales of the Eocene Dungul Formation [120,121].

Natural soda ash is recovered (from 40,000 to 130,000 tpa) from hypersaline lakes in the Wadi El-Natrun depression [122]. **Zeolites** are reported (thomsonite-chabazite-natrolite) within the Oligo-Miocene volcano-sedimentary sequence of the Abu Treifiya basin [123]. **Celestine** mineralization is found at Wadi Essel, as intercalation in Miocene clastic rocks in a Mississippi valley-type Pb-Zn deposit [124]. **Zirconium minerals**: black-sand placers containing zircon (Quaternary beach deposits) are known in the Nile Delta and northern Sinai [1].

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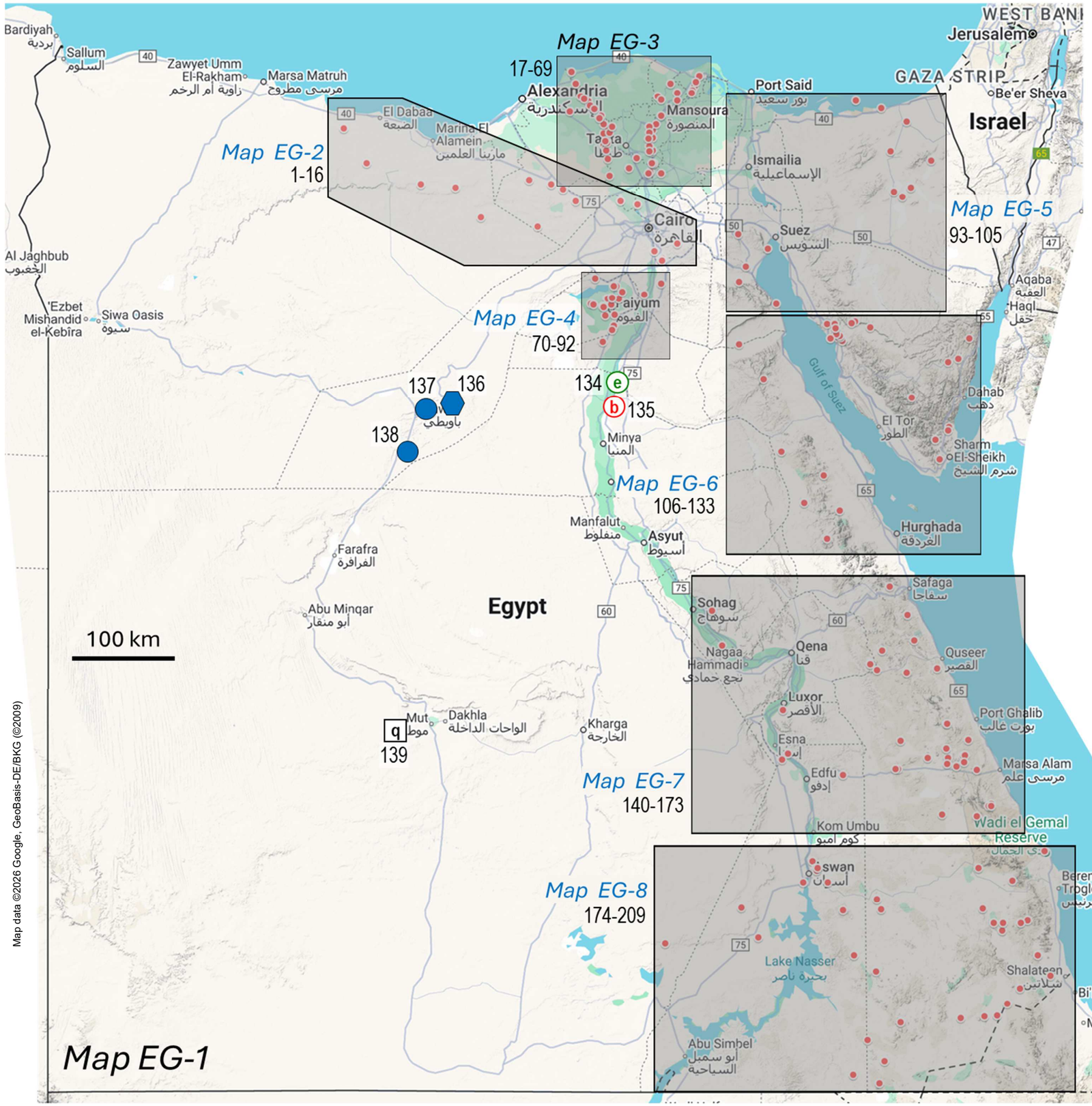
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active inactive

- ba
- be
- cr
- ec
- fd
- ka
- li
- mg
- na
- ol
- qf
- qs
- rc
- sc
- sr
- tc
- ze
- zr

Raw material

ba	barite
be	bentonite, smectitic clays
cr	chromite
ec	expanded clay
fd	feldspar, feldspathic rocks
ka	kaolin
ky	andalusite, kyanite
li	lithium minerals
mg	magnesite
na	natural soda ash
ol	olivine
qf	quartz-feldspathic sand
qs	silica sand
rc	red clays
sc	stoneware clays
sr	celestine (strontium)
tc	talc, steatite
ze	zeolites
zr	zirconium minerals

Status of deposit

A	active mine
I	inactive, mine closed
O	occurrence

Table EG-a: deposits of raw materials for the ceramic and glass industries in Egypt (*cluster of deposits).

#	raw material	st	deposit	governatorate
1	be	A	Deir El Moreir	Matruh
2	be	I	Deir Abul Hegif	Matruh
3	be	I	Deir El Harrah	Matruh
4	sc	O	Minqar El-Wahsh	Matruh
5	be	I	El Barkan	Matruh
6	be	I	Deir El Baramous	Buhayra
7	be	A	South El-Hammam	Buhayra
8	na	A	Wadi Natrun	Buhayra
9	sc	A	Wadi Natrun	Buhayra
10	qs	A	Wadi Natrun	Buhayra
11	rc	A	Ashmoun	Al-Manuffiyya
12	rc	Al	Al-Munira*	Al-Qalyubiyya
13	rc	I	El Badrashein*	Giza
14	rc	Al	El-Saf**	Giza
15	qs	A	El-Madi	Cairo
16	be	A	Gabal Hamza	Cairo
17	rc	A	Dimishli	Buhayra
18	rc	Al	Shibin El Kawm*	Al-Manuffiyya
19	rc	I	Amrus	Al-Manuffiyya
20	rc	I	Mahalah Ahmed*	Buhayra
21	rc	I	Kafr Izin*	Buhayra
22	rc	Al	Al Taufiqiya*	Buhayra
23	rc	Al	Kafr Al-Zaiyat*	Gharbiyya
24	rc	Al	Kafr Mogahed*	Buhayra
25	rc	Al	Kafr El-Shaikh Ali*	Gharbiyya
26	rc	Al	Abbij*	Gharbiyya
27	rc	Al	Hissat Abar*	Gharbiyya
28	rc	I	Jazirat Nikla*	Buhayra
29	rc	A	Mashal	Gharbiyya
30	rc	Al	San Al-Hajar*	Gharbiyya
31	rc	I	Mahallat Diyay*	Kafr El-Sheikh
32	rc	Al	As-Safija*	Kafr El-Sheikh
33	rc	I	Izbat Ad Daramalli	Buhayra
34	rc	Al	Kafr Ibrahim*	Kafr El-Sheikh
35	rc	A	Dirshabah*	Buhayra
36	rc	A	Al Lawiyyah*	Buhayra
37	rc	Al	Surumbay*	Buhayra
38	rc	Al	Al-Atf*	Buhayra
39	rc	Al	Izbat Simaydah*	Buhayra
40	rc	Al	Izbat Bahnasi*	Buhayra
41	rc	A	Kafr Al-Battih	Damietta
42	rc	A	Kafr Suleiman Al Bahari*	Damietta
43	rc	I	Gamasa	Daqahliyya
44	rc	Al	Kafr El-Arab*	Damietta
45	rc	A	Mit Abou Ghaleb*	Damietta
46	rc	A	Daqahlah	Daqahliyya
47	rc	A	Ayyadiyya	Daqahliyya
48	rc	I	Al-Masara*	Daqahliyya
49	rc	A	Bilqas	Daqahliyya
50	rc	I	Mahallat Inshaq	Daqahliyya
51	rc	Al	Takhla*	Daqahliyya
52	rc	I	Nawasa Al Bahr*	Daqahliyya
53	rc	A	Al-Nasseriya*	Gharbiyya
54	rc	I	Izbat Ad Dayris	Daqahliyya
55	rc	A	Busiri	Gharbiyya
56	rc	I	Kafr El-Mandara	Daqahliyya
57	rc	Al	Subra al-Yaman*	Gharbiyya
58	rc	Al	Kafr Sunbat*	Gharbiyya
59	rc	I	Sarnaja*	Daqahliyya
60	rc	Al	Mit Mohsen*	Daqahliyya
61	rc	I	Zefta*	Gharbiyya
62	rc	A	Mit Ghamr	Daqahliyya
63	rc	I	Kafr El-Hag Dawoud	Gharbiyya
64	rc	Al	Sahrajt Al Kubra*	Daqahliyya
65	rc	I	Mit Al Harun	Gharbiyya
66	rc	Al	Kafr Mit El-Ezz*	Daqahliyya
67	rc	I	Kafr Mit Al Abasi*	Al-Manuffiyya
68	rc	A	Mit Bera*	Al-Manuffiyya
69	rc	I	Izbat Zanati Khlifah*	Sharqiyya
70	rc	I	Askur**	Giza
71	be	I	Jirzah	al-Fayyum
72	be	I	Kom Oshim	al-Fayyum
73	qs	A	North Fayyum	al-Fayyum
74	be-sc	I	Qasr El Sagha	al-Fayyum
75	rc	A	Tamiah	al-Fayyum
76	rc	A	Jabalah	al-Fayyum
77	rc	Al	Tirsa*	al-Fayyum
78	rc	Al	Abhit*	al-Fayyum
79	rc	Al	Izbat Abu Naurah*	al-Fayyum
80	rc	I	Al Halfayah	al-Fayyum
81	rc	A	Al-Shawashna	al-Fayyum
82	rc	A	Izbat Jabal Sad	al-Fayyum
83	rc	Al	Izbat Radi Al Qibliyyah*	al-Fayyum
84	rc	I	Talat	al-Fayyum
85	rc	A	Izbat Harfush	al-Fayyum
86	rc	Al	Biyahmu*	al-Fayyum
87	rc	Al	Minshat Al Jazair*	al-Fayyum
88	rc	A	Izbat Halfah	al-Fayyum
89	rc	Al	Izbat Al Jabal*	al-Fayyum
90	be	A	Qalamshah	al-Fayyum
91	rc	A	Tutun	al-Fayyum
92	be	I	Shaklofa	Beni Suef
93	zr	O	El-Bardawil Lake	North Sinai
94	zr	O	El-Arish	North Sinai
95	sc	A	Al-Arish	Northern Sinai
96	qs	I	Gebel El-Manzoor	Northern Sinai
97	qs	I	Gebel El-Halal	Northern Sinai
98	qs	A	Gabal El-Minsherah	Northern Sinai
99	qs	A	Wadi Felly	Northern Sinai
100	qs	A	Gebel Yalk	Northern Sinai
101	ze	O	Abu Treifiya	Suez
102	qs	A	Abu El-Darag	Suez
103	rc	A	Wadi Badaa	Suez
104	qs	A	Wadi Araba	Suez
105	ka	A	Abu Darag	Suez
106	ka	A	Teeh	Southern Sinai

Map EG-2

active inactive

be
na
qs
rc
sc

30 km

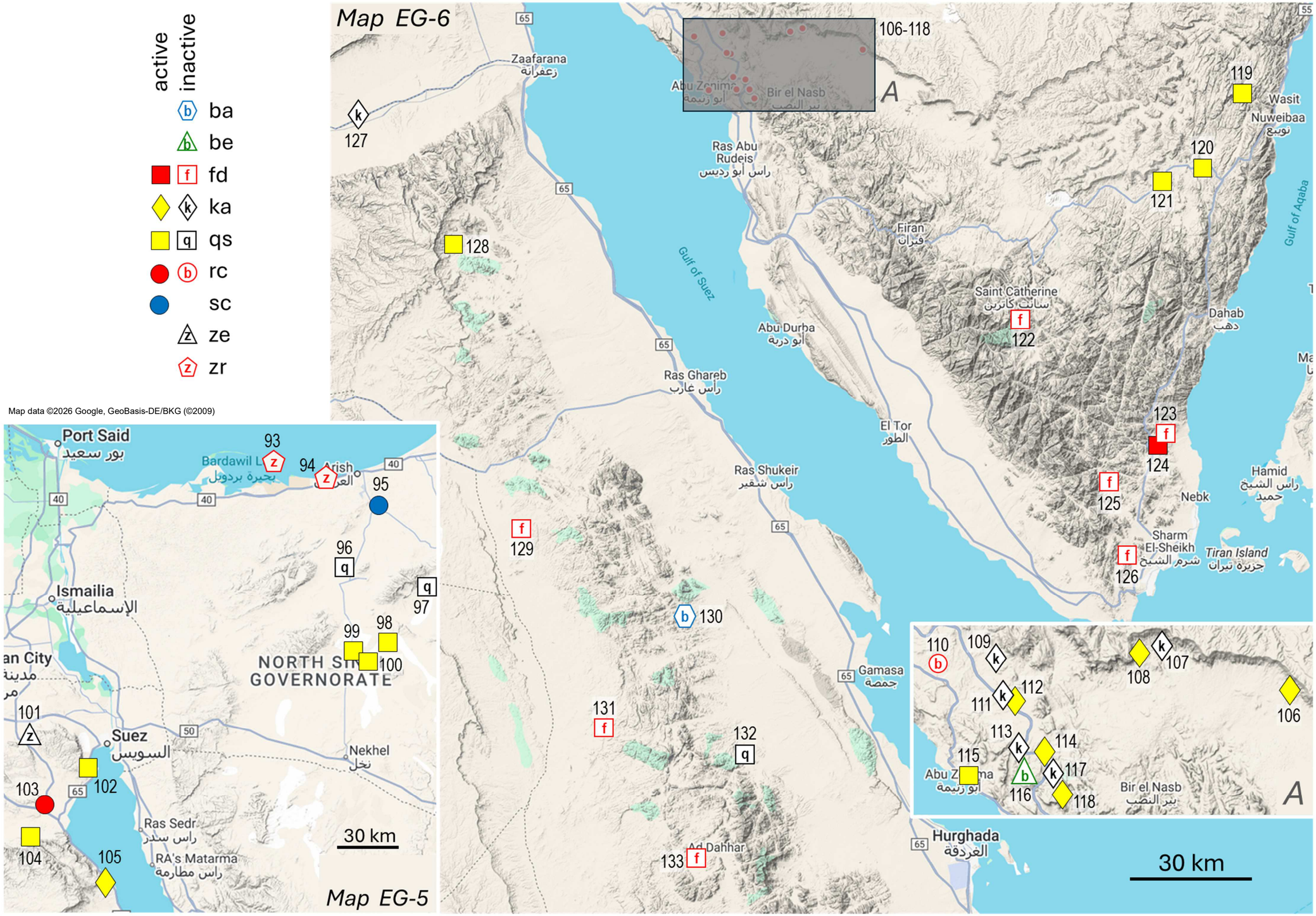
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20 km

Map EG-3

Map EG-4

10 km


active
inactive
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zr
Map EG-6
106-118
A
Zaafarana
زعفرانة
Abu Zenima
أبو زنيمة
Bir el Nasb
بير النصب
Ras Abu Rudeis
راس أبو رديس
Firan
فيران
Gulf of Suez
Gulf of Aqaba
Saint Catherine
سانت كاترين
Abu Durba
أبو دربة
Dahab
دهب
Ras Ghareb
راس غارب
El Tor
الطور
Ras Shukeir
راس شقير
Nebk
Hamid
راس الشيخ حميد
Sharm El-Sheikh
شرم الشيخ
Tiran Island
جزيرة تيران
Wasit
Nuweibaa
نويبع
Gamasa
جمصة
Hurghada
الغردقة
Ad Dahhar
Nekhel
نخل
Ras Sedr
راس سدر
RA's Matarma
راس مطارمة
Suez
السويس
Ismailia
الإسماعيلية
Port Said
بور سعيد
Bardawil L
بحيرة بردويل
NORTH SI
GOVERNORATE
30 km
Map EG-5
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)

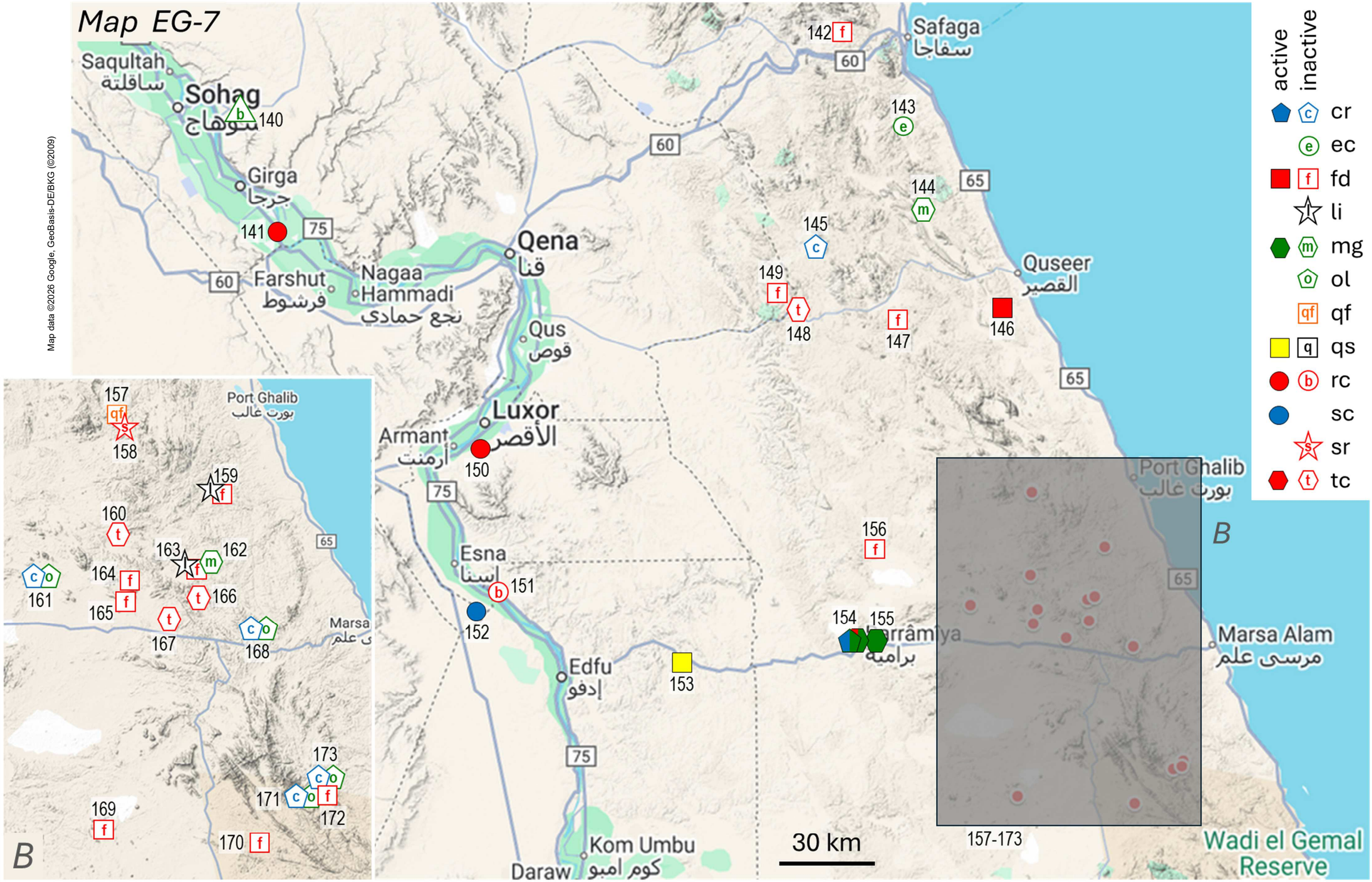
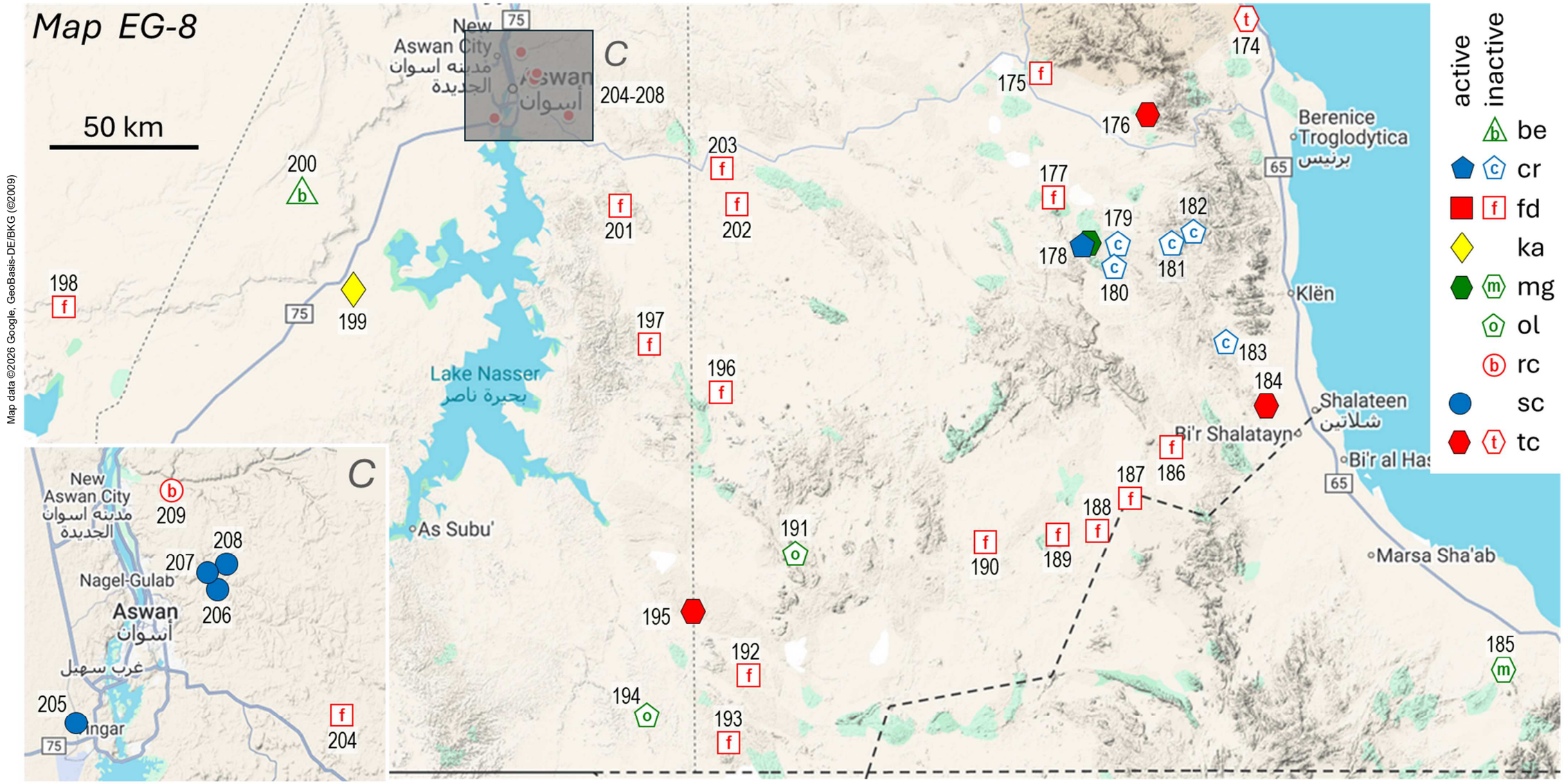
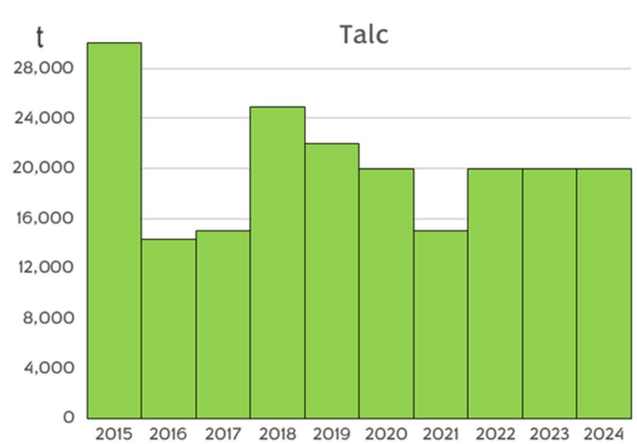
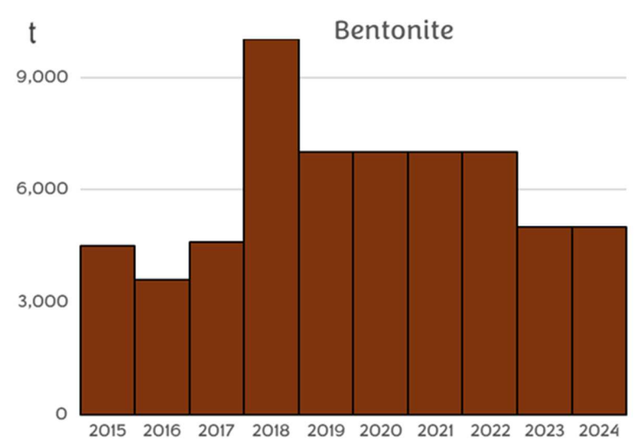

Map EG-7
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)
Saqultah
ساقلتة
Sohag
سوهاج
140
Girga
جرجا
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Farshut
فرشوط
Nagaa Hammadi
نجع حمادي
Qena
قنا
Qus
قوص
Luxor
الأقصر
Armant
أرمنت
150
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Esna
إسنا
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Edfu
إدفو
153
Kom Umbu
كوم امبو
Daraw
Marsa
ى علم
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Safaga
سفاجا
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Port Ghalib
بورت غالب
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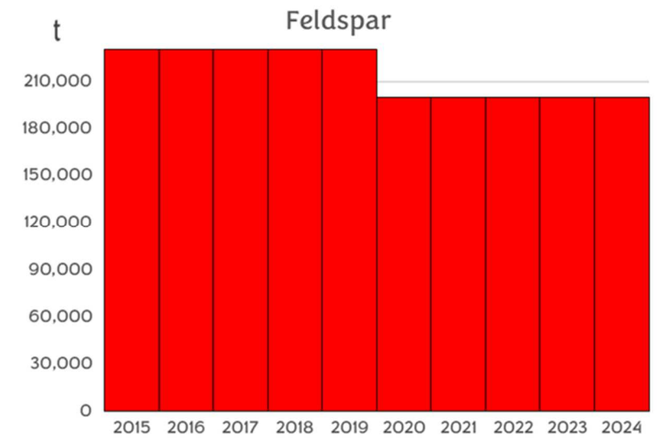
Table EG-b: deposits of raw materials for the ceramic and glass industries in Egypt.

#	rm	st	deposit	governatorate
107	ka	I	Gebel Rueikna-Gebel Salia	Southern Sinai
108	ka	A	Shushet Abu El-Nimran	Southern Sinai
109	ka	I	Kheel	Southern Sinai
110	rc	O	Wadi Tal	Southern Sinai
111	ka	I	Wadi Abansakar	Southern Sinai
112	ka	A	Esela	Southern Sinai
113	ka	I	Mosabaa	Southern Sinai
114	ka	A	Khaboba	Southern Sinai
115	qs	A	Abu Zneima	Southern Sinai
116	be	O	Wadi Taiyba	Southern Sinai
117	ka	I	Hasbar	Southern Sinai
118	ka	A	Abu Natash	Southern Sinai
119	qs	A	Wadi Watir	Southern Sinai
120	qs	A	Katherine-Newbie road	Southern Sinai
121	qs	A	El-Gunna	Southern Sinai
122	ns	O	Gebel Katherina	Southern Sinai
123	fd	O	Wadi Samra	Southern Sinai
124	fd	A	Wadi Tarr	Southern Sinai
125	fd	O	Wadi Mandar	Southern Sinai
126	fd	O	Ras Umm Sid	Southern Sinai
127	ka	I	Wadi Araba	Suez
128	qs	A	Wadi El-Dakl	Red Sea
129	fd	O	Ras Ghareb	Red Sea
130	ba	I	Urn Monqul	Red Sea
131	ns	O	Wadi Dib	Red Sea
132	qs	I	Wadi Qena	Red Sea
133	fd	O	Hmrat El Sorwhyia	Red Sea
134	ec	O	Jabal Qarārah	El-Minya
135	rc	I	Goset Abu Khashier	El-Minya
136	ba	A	El-Gedida	Giza
137	sc	A	Naqb El-Sillim	Giza
138	sc	A	Heiz	Giza
139	qs	I	El-Wadi El-Geded	Wadi al-Jadid
140	be	I	Sohag	Sohag
141	rc	A	Al Balyana	Qena
142	fd	O	Ras Al-Baroud	Red Sea
143	ec	O	Um El Hueitat	Red Sea
144	mg	O	Gebel El-Rubshi	Red Sea
145	cr	O	Gebel El-Rabshi	Red Sea
146	fd	A	Wadi Zirib	Red Sea
147	fd	O	Gabal Umm Shaghir	Red Sea
148	tc	I	Wadi Atalla	Red Sea
149	fd	O	Umm Had	Qena
150	rc	A	Luxor	Luxor
151	rc	I	Al Sharauna	Aswan
152	sc	A	Sebaya	Wadi al-Jadid
153	qs	A	East Edfu	Aswan
154	tc-mg-cr-ol	A	El-Barramiya	Red Sea
155	mg	A	Umm Salatit	Red Sea
156	fd	O	Um Naggat	Red Sea
157	qf	O	Gabal Homrit Waggat	Red Sea
158	sr	O	Wadi Essel	Red Sea
159	fd-li	O	Abu Dabbab	Red Sea
160	mg	O	Gebel El-Maiyit	Red Sea
161	cr-ol	O	Wadi Bezah	Red Sea
162	tc	O	Gebel El-Maiyit	Red Sea
163	fd-li	O	Nuweibi	Red Sea
164	fd	O	Kadabora-Abou Dob	Red Sea
165	fd	O	Wadi El-Yatima-Wadi El-Tuleia	Red Sea
166	tc	O	Wadi Thamil	Red Sea
167	tc	O	Rod Umm El-Farag	Red Sea
168	cr-ol	O	Um Huitate	Red Sea
169	ns	O	Abū Khurūq	Red Sea
170	fd	O	Wadi Hafafit	Red Sea
171	cr-ol	O	Wadi El-Zarka	Red Sea
172	fd	O	Wadi Nugrus	Red Sea
173	cr-ol	O	Wadi El-Lawi	Red Sea
174	tc	I	Hamata-Atshan	Red Sea
175	ns	O	El-Kahfa	Red Sea
176	tc	A	Darhib-Abu Gurdi	Red Sea
177	ns	O	Zargat Naam	Red Sea
178	cr-mg	A	Gebel Arays	Red Sea
179	cr	O	Gebel Belamhandeit	Red Sea
180	cr	O	El-Galala	Red Sea
181	cr	O	Gebel Abu Siayil	Red Sea
182	cr	O	Abu Dahr	Red Sea
183	cr	O	Gebel Umm Thagar	Red Sea
184	tc	A	Shalatin	Red Sea
185	mg	O	Malo Grim	Red Sea
186	ns	O	Nigrub El-Tahtani	Red Sea
187	ns	O	Nigrub El-Fogani	Red Sea
188	ns	O	Maladob	Red Sea
189	ns	O	Mishbeh	Red Sea
190	ns	O	El-Naga	Red Sea
191	ol	O	Jabal Shilman	Red Sea
192	ns	O	El-Gezira	Red Sea
193	ns	O	El-Mansouri	Red Sea
194	ol	O	Jabal Moqsim	Aswan
195	tc	A	Wadi Allaqi	Red Sea
196	ns	O	Hadayib	Red Sea
197	ns	O	Um Risha	Red Sea
198	ns	O	Gara El Hamra	Wadi al-Jadid
199	ka	A	Wadi Kalabsha	Aswan
200	be	O	Kurkur	Aswan
201	fd	O	Um Hibal	Aswan
202	ns	O	Tarbtie South	Red Sea
203	ns	O	Tarbtie North	Red Sea
204	fd	O	El-Hudi	Aswan
205	sc	A	Aswan Airport	Aswan
206	sc	A	Wadi Abu Agag 2	Aswan
207	sc	A	Wadi Abu Agag 1	Aswan
208	sc	A	Wadi Abu Sobeira	Aswan
209	rc	I	Al Khattara	Aswan


Map EG-8
50 km
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)
New Aswan City مدينه اسوان الجديدة
Aswan أسوان
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204-208
Lake Nasser بحيرة ناصر
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Berenice Troglodytica برنيس
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Talc
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28,000
24,000
20,000
16,000
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8,000
4,000
0
2015 2016 2017 2018 2019 2020 2021 2022 2023 2024


Bentonite
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9,000
6,000
3,000
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2015 2016 2017 2018 2019 2020 2021 2022 2023 2024


Feldspar
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210,000
180,000
150,000
120,000
90,000
60,000
30,000
0
2015 2016 2017 2018 2019 2020 2021 2022 2023 2024

Estonia

Estonia is mining red clays and silica sands to feed the domestic glass and ceramic industries. Raw materials are obtained from Pleistocene and Paleozoic sediments with distinctive characteristics for clay bricks and lightweight aggregates.

Estonia is situated on the southern buried slope of the Baltic Shield, where a sedimentary sequence – extending from Cambrian (north) to Devonian (south) – overlies the Precambrian crystalline basement [1]. This Paleozoic sequence has increasing thickness from 150–200 m to 700–800 m heading south [2,3] and is overlain by fairly widespread Quaternary glaciolacustrine sediments.

Red clay has been extracted at an average rate of 72,000 tpa (2015–2024) from two main sources: Cambrian epicontinental marine deposits (up to 100 m-thick) of the Lontova Formation [4–9] and Pleistocene glaciolacustrine deposits, up to 70 m-thick [4,10]. Cambrian clays are used in brickmaking [4,8,11] while glacial clays are utilized for lightweight aggregates [4,12,13]. Devonian clays of deltaic to marine origin are no longer employed [4]. Reserves are estimated to be around 68 million tonnes [14].

Quartz sand is currently mined (40,000 tpa, mean 2015–2024) in southeastern Estonia from Pleistocene glacio-fluvial sediments, with minor aeolian and glacio-lacustrine deposits [15,16].

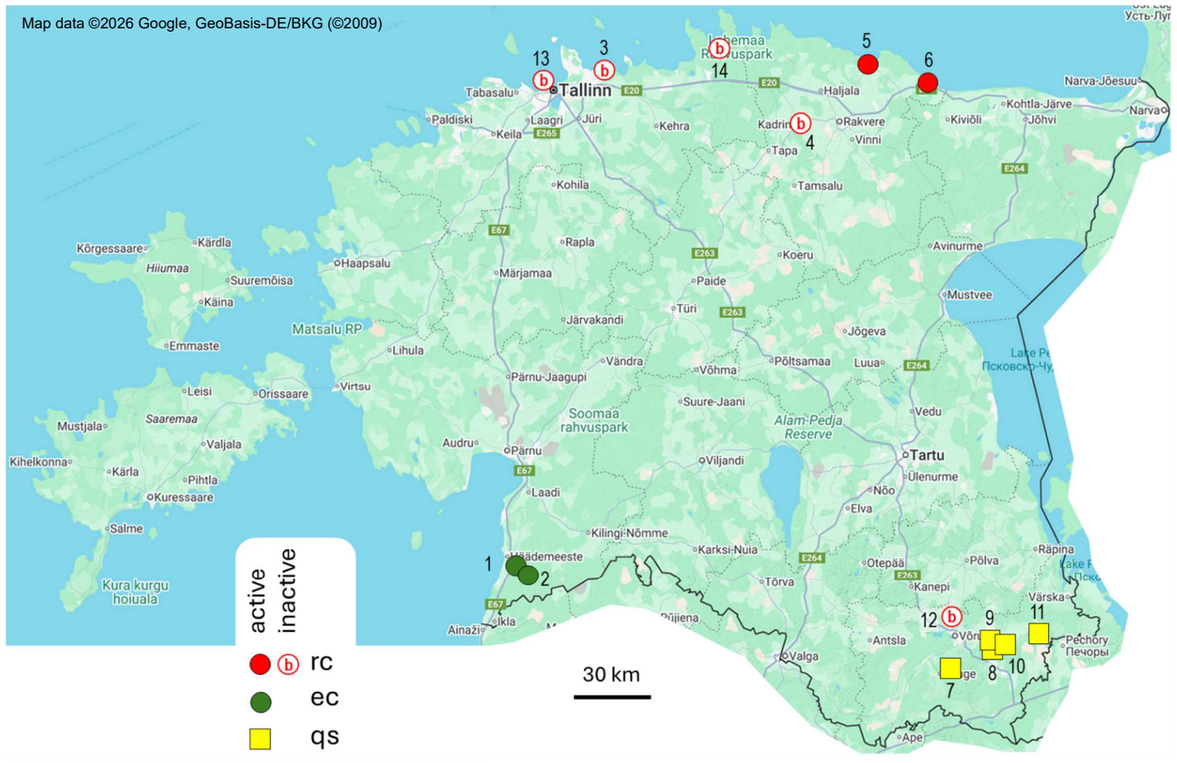
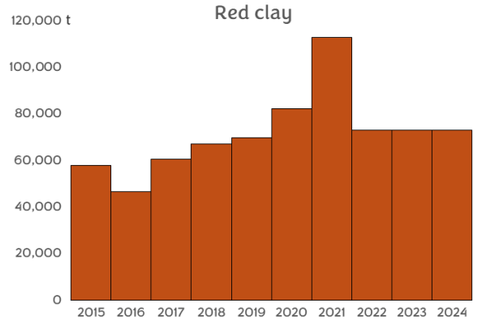


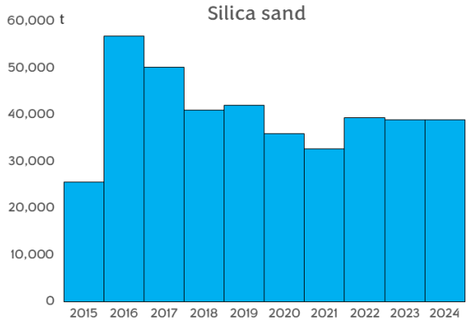
Table EE-a: deposits of raw materials for the ceramic and glass industries in Estonia.

#	raw material	st	deposit	region
1	ec	A	Arumetsa	Häädemeeste
2	ec	A	Urissaare	Häädemeeste
3	rc	I	Kallavere	Lääne-Virumaa
4	rc	O	Kadrina	Lääne-Virumaa
5	rc	A	Kunda	Lääne-Virumaa
6	rc	A	Aseri	Lääne-Virumaa
7	qs	A	Rasva	Võru
8	qs	A	Loosi	Võru
9	qs	A	Kaku	Võru
10	qs	A	Tabina	Võru
11	qs	A	Piusa	Põlva
12	rc	I	Loosu	Võru
13	rc	I	Kopli	Harju
14	rc	I	Kolgaküla	Harju

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Finland

Finland is the second largest supplier of talc, chromite, and wollastonite in the Euro-Mediterranean region, alongside the production of feldspar, magnesite, quartz, and red clays. In addition, deposits of kaolin, lithium minerals, nepheline syenite, and kyanite are distributed throughout the Proterozoic Svecofennian Shield (which extends into southwestern Finland) and the Archean-Paleoproterozoic province (Kola and Karelian Domains) which occupies the eastern and northern parts of the country [1-4].

Talc: several deposits are concentrated in the Paleoproterozoic Karelian Domain, in a belt ~300 km-long and nearly oriented NS, where ophiolitic metasomatized dunites and peridotites occur [1,4-6]. The main deposits are Punasuo and Uutela (Kainuu region) as well as Karnukkapuro and Horsmanaho (northern Karelia), which produce talc (295,000 tpa, declining in the last period) with fairly high iron contents. **Magnesite** (mostly ferroan) is produced, together with talc, in the Horsmanaho deposit (on average 146,000 tpa). Reserves are estimated at over 13 million tonnes and 3.6 million tonnes for talc and magnesite, respectively [7].

Wollastonite is produced (10,500 tpa, mean 2015-2024) as a by-product of calcite mining in Ihalainen near Lappeenranta, where a highly metamorphosed marble is exploited [4,8,9]. Further deposits are known, and total reserves amount to 420,000 tonnes [7].

Chromite is extracted at the Kemi mine in Lapland, with production of 2,100,000 tpa (average over the last decade) and reserves of 38 million tonnes [7]. The chromitite deposit occurs into an Early Proterozoic ultramafic-gabbroic layered intrusion [10,11].

Feldspar is obtained (on average 35,000 tpa of concentrates) by exploiting various deposits on the island of Kemiö, where are present different types of pegmatite: beryl, albite, and REE (rare earths elements) groups [1,4]. However, there are many other feldspathic deposits, some already exploited in the past, in south-west Finland [4,12,13]: the main pegmatite concentrations are in the Seinäjoki-Kuortane field (southern Ostrobothnia) and the Orivesi field (Pirkanmaa). **Anorthosite** is mined at Lapinlahti (Upper Savonia) and Joutsenenlampi (Lapland) for the production of stone wool, among other applications [4]. Furthermore, at Iivaara occurs **nepheline syenite** (the westernmost intrusion of the Archean Shield alkaline magmatic province) or better an ijolite (nepheline and augite-bearing rock) with fairly high calcium and iron levels [4].

Industrial silica is mainly produced by Jatulian metasedimentary rocks (quartzite), even though the total production (140,000 tpa, mean 2015-2024) include quartz as feldspar by-product from the island of Kemiö [4,14].

Red clay is taken from Quaternary glacio-lacustrine sediments on southern side of *Salpausselkä*, an extensive bar ridge system in southern Finland. The end-users are brick and lightweight aggregate industries [15,16].

Kaolin deposits are known in two main areas: the first is located in a NW-trending, 20 km long and 5 km wide zone across southern Savonia (the Virtasalmi area) where kaolin lenses have thickness of 20-40 m (up to 100 m) and took origin by weathering of granitoids and gneisses [16-19]; additionally, halloysite deposits of hydrothermal origin are reported in the same area [4]. The second is in Lapland (the Kainuu area) where big kaolin deposits were formed by cool weathering of lower Paleoproterozoic arkoses and sericite quartzites, but exploitation is hampered by a 20-30 m-thick Quaternary overburden [16,19-21]. Total reserves of kaolinitic clays amount approximately to 37 million tonnes [7].

Lithium minerals: two LCT (Lithium-Cesium-Tantalum) pegmatite provinces are being thoroughly explored [22-24] in light of total reserves of approximately 161,000 tonnes of lithium oxide [7]. The Ullava-Kaustinen area (spodumene) that covers ~500 km² in the Paleoproterozoic Pohjanmaa schist belt in Ostrobothnia, and the Somero-Tammela area, ~400 km² in size, located in the Häme belt in southern Finland (spodumene in Kietyönmäki and petalite in Hirvikallio).

Deposits of **sillimanite group minerals** have undergone various exploitation attempts, whose development has proven uneconomical, for example at Kapteeninautio (andalusite and kyanite) and Kivisuo (Paleoproterozoic kyanite quartzite). Together with further kyanite deposits, reserves sum up to 15 million tonnes [4,7].

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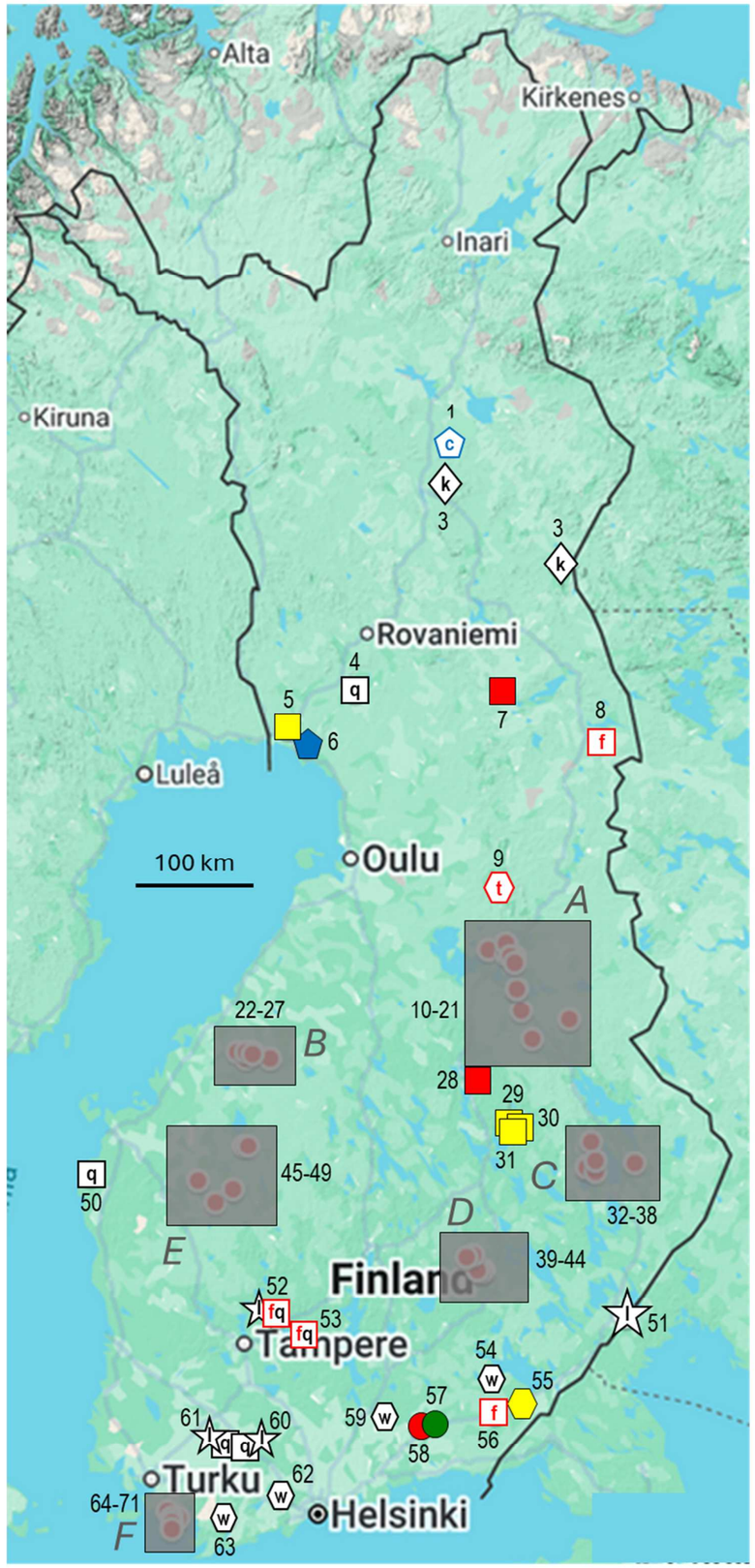
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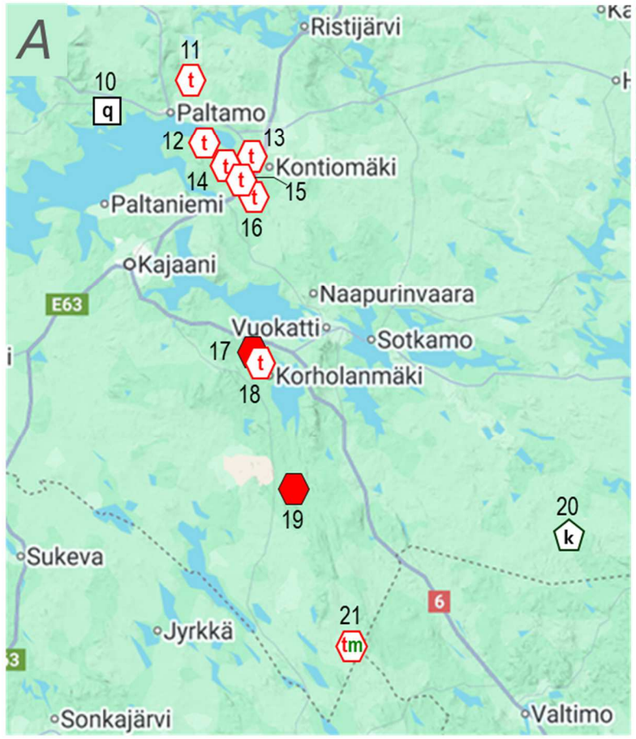
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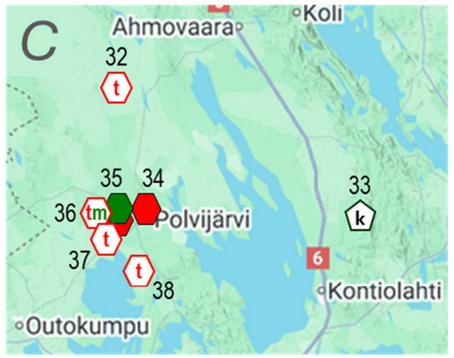
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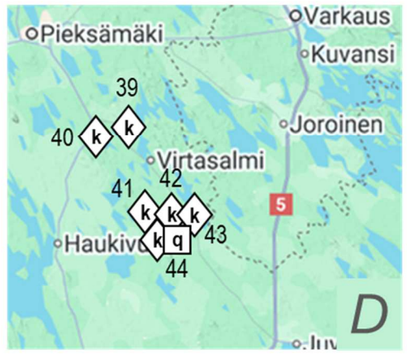
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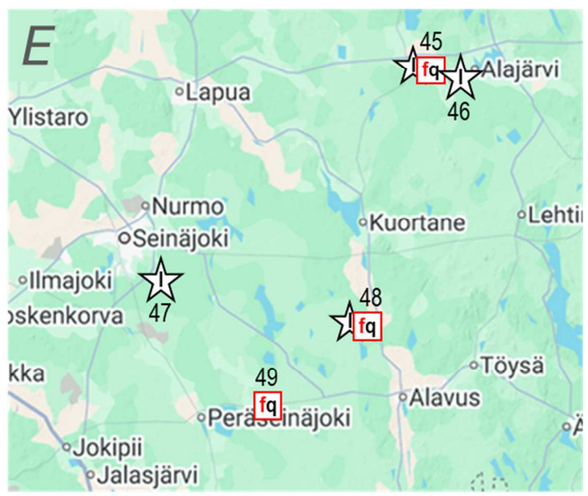


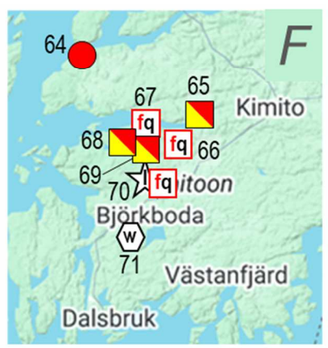












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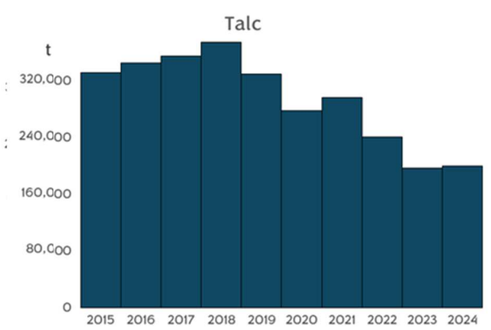
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- ky
- li

Raw material

an	anorthosite
ba	barite
cr	chromite
ec	expanded clay
fd	feldspar
ka	kaolin
ky	andalusite, kyanite
li	lithium minerals
mg	magnesite
ns	nepheline syenite
qz	quartz
rc	red clays
tc	talc, steatite
wo	wollastonite

Status of deposit

A	active mine
I	inactive mine
O	occurrence



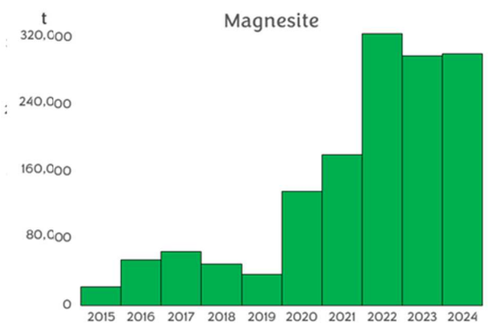
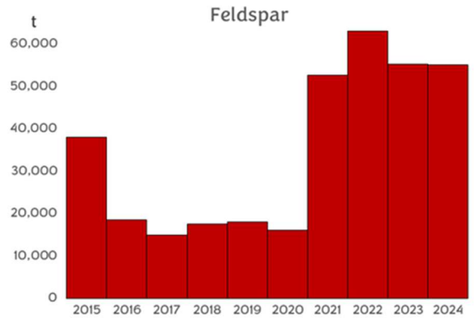
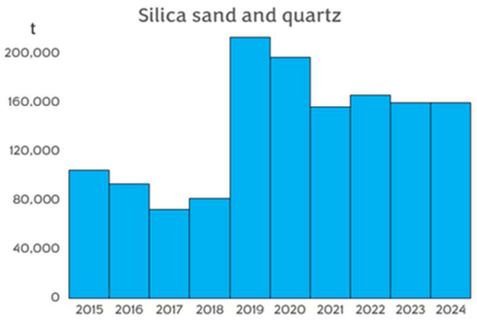
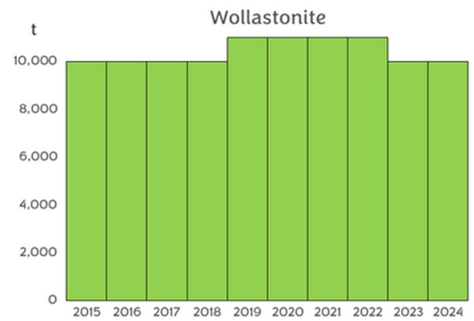


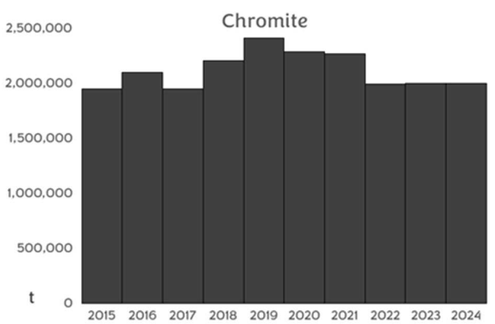
Table FI-a: deposits of raw materials for the ceramic and glass industries in Finland.

#	r.m.	st	deposit	province
1	cr	O	Koitelainen	Lapland
2	ka	O	Siurunmaa	Lapland
3	ka	O	Vittajänkä	Lapland
4	qz	O	Reutuaapa	Lapland
5	qz	A	Ristimaa	Lapland
6	cr	A	Kemi	Lapland
7	an	A	Joutsenenlampi	Lapland
8	ns	O	Iivaara	North Ostrobothnia
9	tc	O	Pihlajavaara	Kainuu
10	qz	O	Melalahti	Kainuu
11	tc	O	Vasikkakangas	Kainuu
12	tc	O	Maailmankorpi	Kainuu
13	tc	I	Mieslahti-Pitkäperä	Kainuu
14	tc	O	Tiittolanvaara	Kainuu
15	tc	O	Tyynelä	Kainuu
16	tc	I	Jormua	Kainuu
17	tc	A	Punasuo	Kainuu
18	tc	I	Lahnaslampi	Kainuu
19	tc	A	Uutela	Kainuu
20	ky	O	Kivisuo	Kainuu
21	tc-mg	O	Alanen	Kainuu
22	li	O	Emmes	Ostrobothnia
23	li	O	Outovesi	Central Ostrobothnia
24	li	O	Syväjärvi	Central Ostrobothnia
25	li	O	Rapasaaret	Central Ostrobothnia
26	li	O	Leviäkangas	Central Ostrobothnia
27	li-qz	O	Länttä	Central Ostrobothnia
28	an	A	Lapinlahti	Upper Savonia
29	qz	A	Kihnami	Northern Savonia
30	qz	A	Hiekkamäki	Northern Savonia
31	qz	A	Nilsiä	Northern Savonia
32	tc	I	Lipasvaara	North Karelia
33	ky	I	Kapteeninautio	North Karelia
34	tc	A	Karnukkapuro	North Karelia
35	tc-mg	A	Horsmanaho	North Karelia
36	tc-mg	I	Vasarakangas-Kamukka	North Karelia
37	tc	I	Pehmytkivi	North Karelia
38	tc	I	Repovaara	North Karelia
39	ka	O	Kahdeksaisiensuo	Southern Savonia
40	ka	O	Montola-Niittylampi	Southern Savonia
41	ka	O	Litmanen	Southern Savonia
42	ka	O	Vuorijoki	Southern Savonia
43	ka	O	Eteläkylä	Southern Savonia
44	ka-qz	O	Ukonkangas	Southern Savonia
45	fd-li-qz	O	Heikinkangas	Southern Ostrobothnia
46	li	O	Seppälä	Southern Ostrobothnia
47	li	O	Puoliväinkalliot-Tervasmäki	Southern Ostrobothnia
48	fd-li-qz	I	Kaatiala	Southern Ostrobothnia
49	fd-qz	I	Haapaluoma	Southern Ostrobothnia
50	qz	O	Korsnäs	Ostrobothnia
51	li	O	Saarenkylä	South Karelia
52	fd-li-qz	O	Juurakko	Pirkanmaa
53	fd-qz	I	Viitaniemi	Pirkanmaa
54	wo	O	Kaihtula	South Karelia
55	wo	A	Ihalainen	South Karelia
56	fd	O	Kännätsalo	South Karelia
57	ec	A	Kouvola	Kymenlaakso
58	rc	A	Koria	Kymenlaakso
59	wo	O	Perheniemi	Päijät-Häme
60	li-qz	O	Kietyönmäki	Tavastia Proper
61	li-qz	O	Hirvikallio	Tavastia Proper
62	wo	O	Remo-Kalkkimäki	Uusimaa
63	wo	O	Kuovila	Southern Finland
64	rc	A	Mjösund	Southern Finland
65	fd-qz	A	Kyrkoberget	Southern Finland
66	fd-qz	I	Sälpä	Southern Finland
67	fd-qz	O	Lövböle	Southern Finland
68	fd-qz	A	Lemnästräsk	Southern Finland
69	fd-qz	A	Ala-Aunis	Southern Finland
70	fd-li-qz	O	Rosendal	Southern Finland
71	wo	O	Genböle	Southern Finland









France

France plays an important role on the Euro-Mediterranean market of glass and ceramic raw materials: leading producer of talc and andalusite as well as second supplier of silica sand; fourth largest producer of feldspar and soda ash; fifth for red clays; sixth for alumina and white clays. In addition, the French mining industry is producing kaolin and bentonite. Lithium resources are being extensively explored [1-4].

Talc is produced from the Trimouns deposit near Luzenac in the eastern Pyrenees (~400,000 tpa on average) which is the most important in Europe [4]. The ore is a talc-chlorite mixture, originating through hydrothermal action at the contact between micaschist, migmatite and doloma [5-7].

Silica sands are excavated in around forty quarries (11,200,000 tpa, 2015-2024 average) with the highest concentrations in the *Bassin Parisien* (Oligocene sands of Fontainebleau [8] and Eocene sands of Beauchamp) and in the *Bassin Aquitaine* (Holocene sediments of aeolian and fluvial origin). Other important mining poles exploit Pliocene alluvial sands (Alsace) and Cretaceous marine sands in the Vaucluse [1,9-11]. Reserves exceed 110 million tonnes [11].

Andalusite is mined from the Glomel deposit (Brittany) where contact metamorphism gave rise to dark andalusitic schists, with reserves as high as 1.5 million tonnes of raw andalusite [12,13]. On average, 65,000 tpa of marketable andalusite are obtained from a tout-venant of 1,300,000 tonnes [13].

Red clays and shales are extracted in around 130 quarries, located throughout France [1]. Average production is 4,213,000 tpa, which is directed towards the manufacture of roof tiles, bricks and blocks, vitrified drainage pipes, and lightweight aggregates. A wide range of clay sediments are used, from marine to continental environments (including loess and glaciolacustrine deposits), with geological ages ranging from Triassic to Pleistocene [14,15].

Ball clays and **refractory clays** are extracted in around thirty mines, which exploit mostly fluvio-lacustrine sediments, of various geological ages [1,16-21]: Eocene-Oligocene in Charente (essentially refractory clays) and Provins-Sézanne, Dordogne and Velay basins (both ball clay and fireclay); Paleocene-Eocene in the Indre Basin and Miocene-Pliocene in the Cher Basin (both high plasticity ball clays); Pliocene-Quaternary of the Allier-Limagne Basin (ball clays). Overall production can be estimated at around 600,000 tpa; no data are available on reserves

Feldspar is mined (about 500,000 tpa) in the eastern Pyrenees and the Massif Central [1,2,4]. In the first area, numerous bodies of metasomatic albitite occur, of which only the Saint-Arnac deposit remains active [22-24]. In the Massif Central, a greisenized granite is exploited in Montebras [25], while a nepheline phonolite is quarried in Roche-en-Régnier [26]. The extraction of granitic pegmatites, more or less extensively albitized, has recently been abandoned in Étang-sur-Arroux [26] and Saint-Chély-d'Apcher [27,28], as well as in Roussillon [29], but industrial interest seems revitalized by lithium research.

Kaolin is obtained from a dozen mines that extract approximately 2 million tonnes of raw ore, from which ~290,000 tpa (average 2015-2024) of marketable kaolin is achieved [3,4]. The various mining poles exploit different geological sources [17,18,30]: granitoids with extensive kaolinization (Eocene in age) of the Armorican Massif in Brittany [31-34] and of the Massif Central, where the major deposit is in Echassières [35]. Furthermore, the kaolinized arkosic sandstones of Drôme (Hostun, Larnage) and Nièvre (Livry) are exploited, as well as weathered metamorphics of the eastern Armorican Massif [17,18], while the halloysite of Périgord is no longer excavated [36]. The amount of reserves is not known.

Bentonite is produced at an average rate of 83,000 tpa, but with a clearly increasing trend in recent years [4]. The deposits (mainly Jurassic to Cenozoic in age) are distributed between the Bassin Parisien, Dordogne and Haute-Loire [1,37-39].

Soda ash is being manufactured (approximately 1 million tpa) at two plants in Meurthe-et-Moselle [3].

Alumina is produced at three plants located in Savoie, Bouches-du-Rhone, and Hautes-Pyrenees [3,40].

Lithium minerals are being intensively explored: the main resources are in evolved rare-metals granites, greisen and pegmatites [41,42]. Among rare-metals granites, the greatest potential (overall estimated at 436,000 tonnes of Li_2O) is in Beauvoir (where kaolin is being mined), while for greisen it is in Montebras (where feldspar is being extracted). The pegmatites with the greatest potential (lepidolite) are those of LCT-type in Haute-Vienne [41,42].

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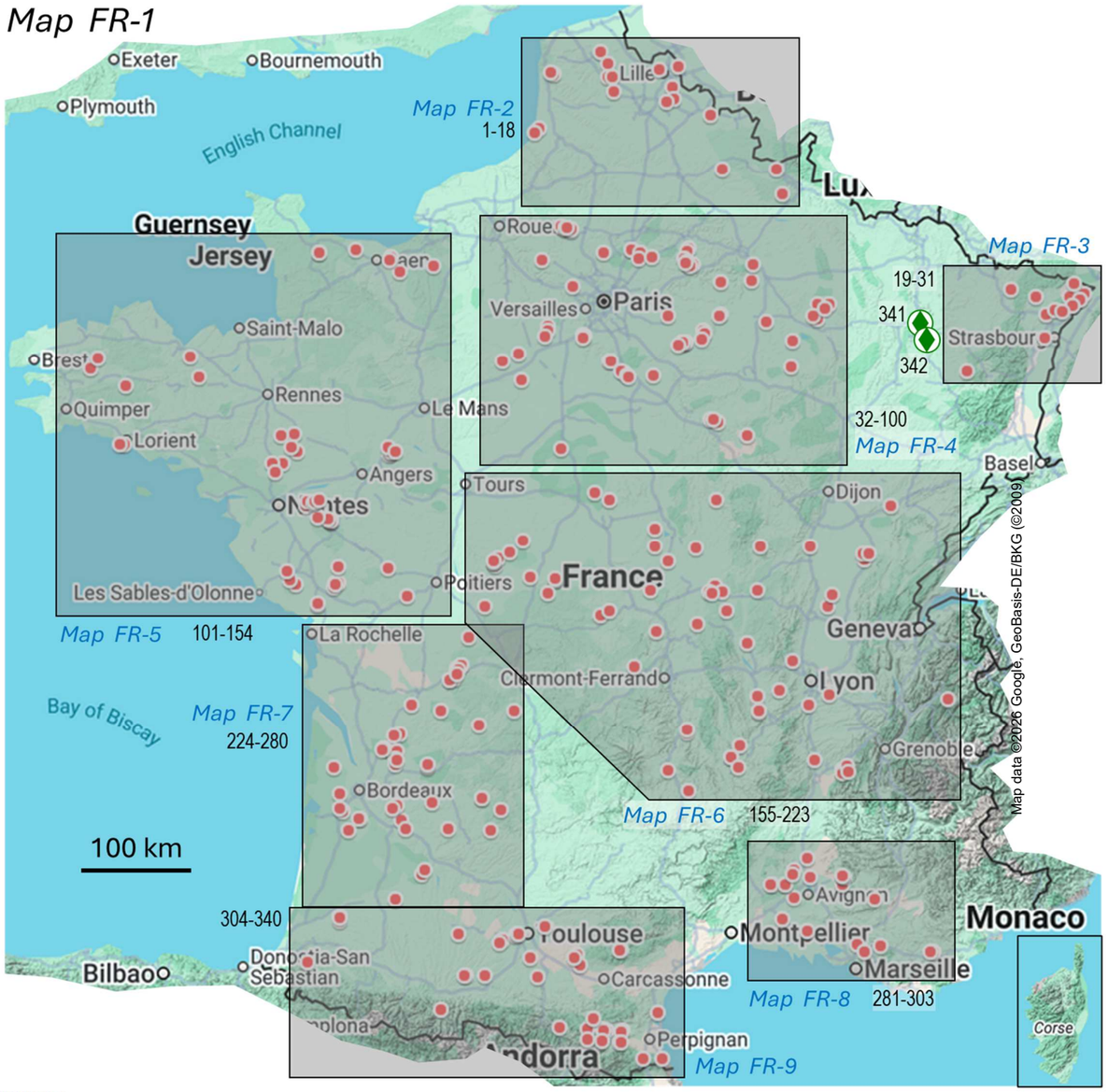
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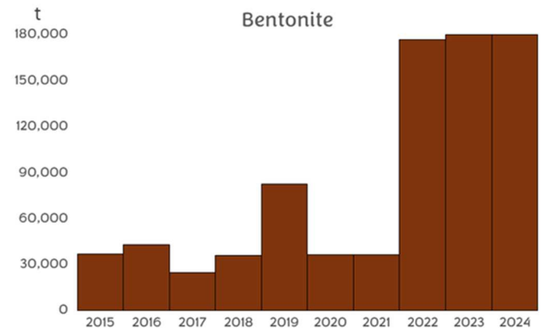
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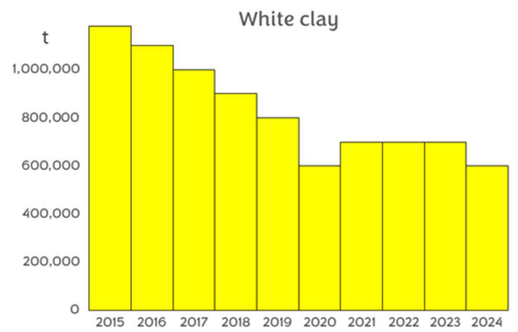
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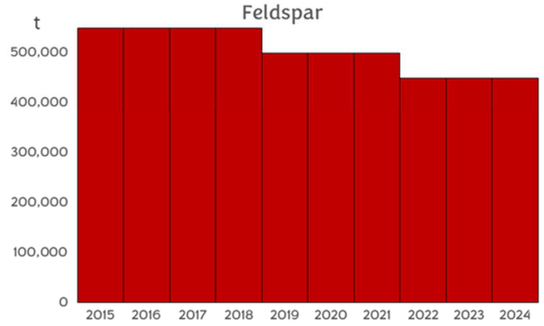
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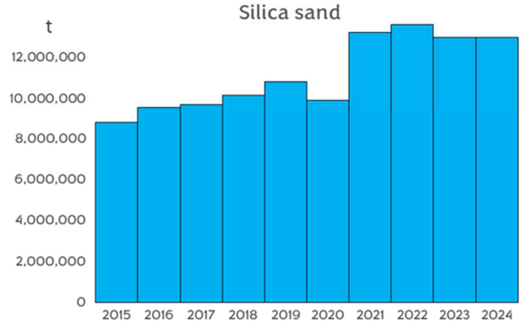
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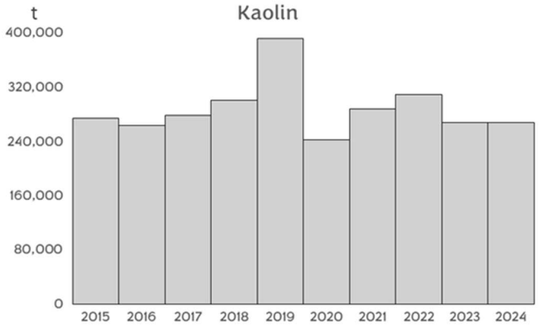


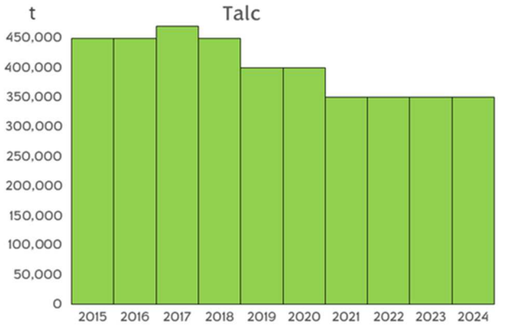












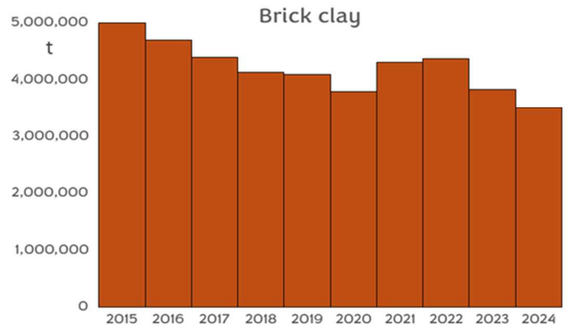
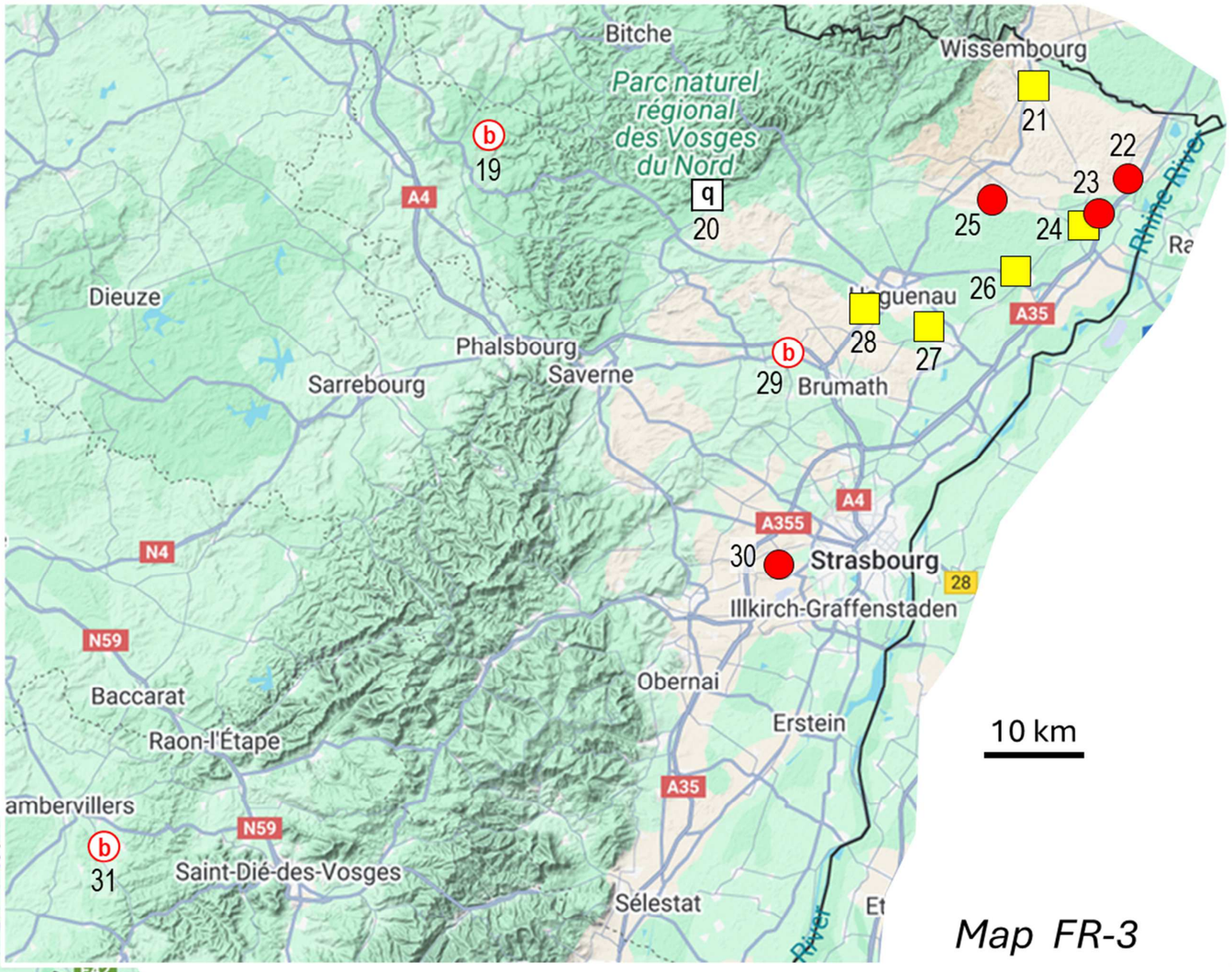
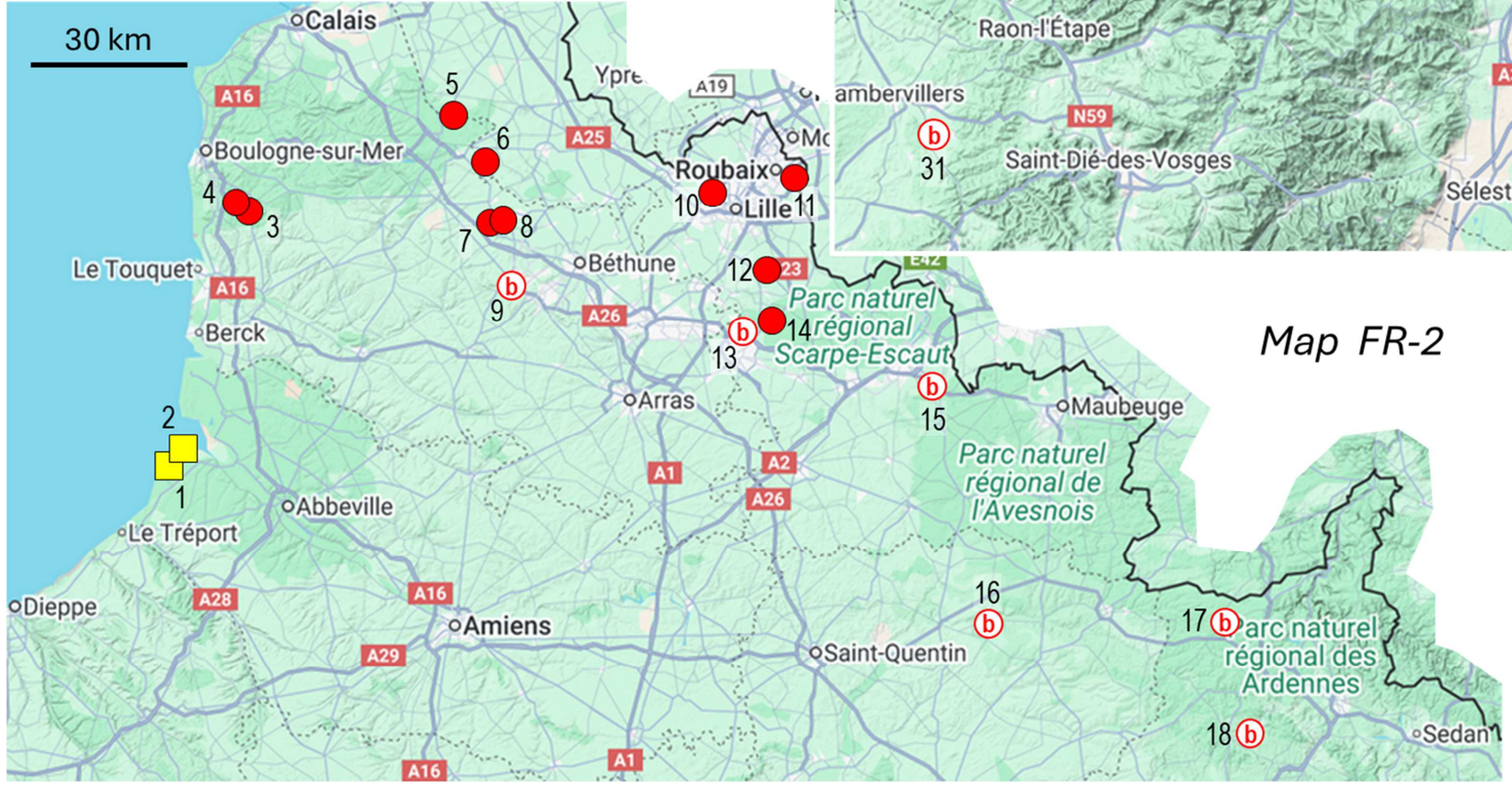


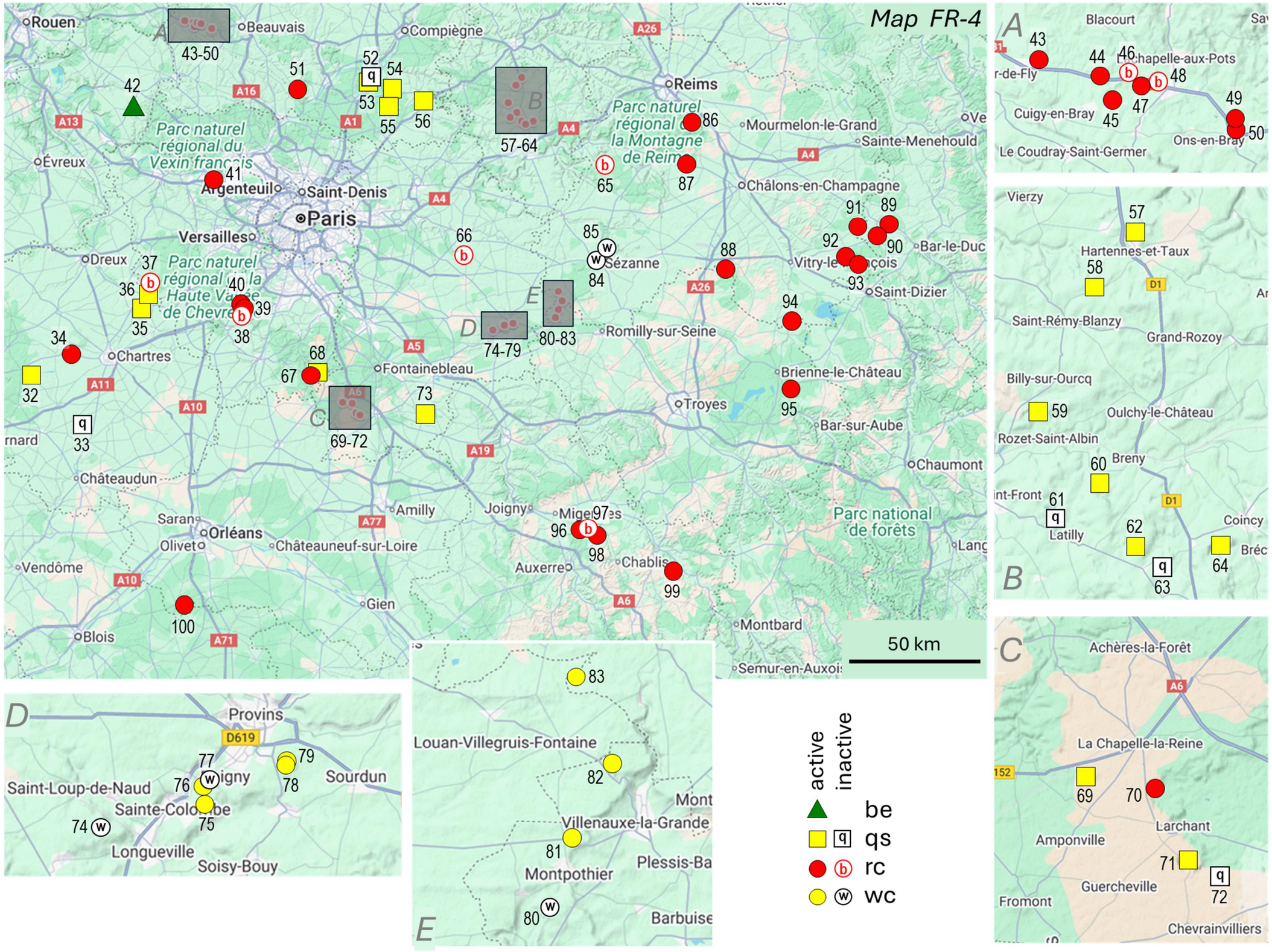
Table FR-a: deposits of raw materials for the ceramic and glass industries in France.

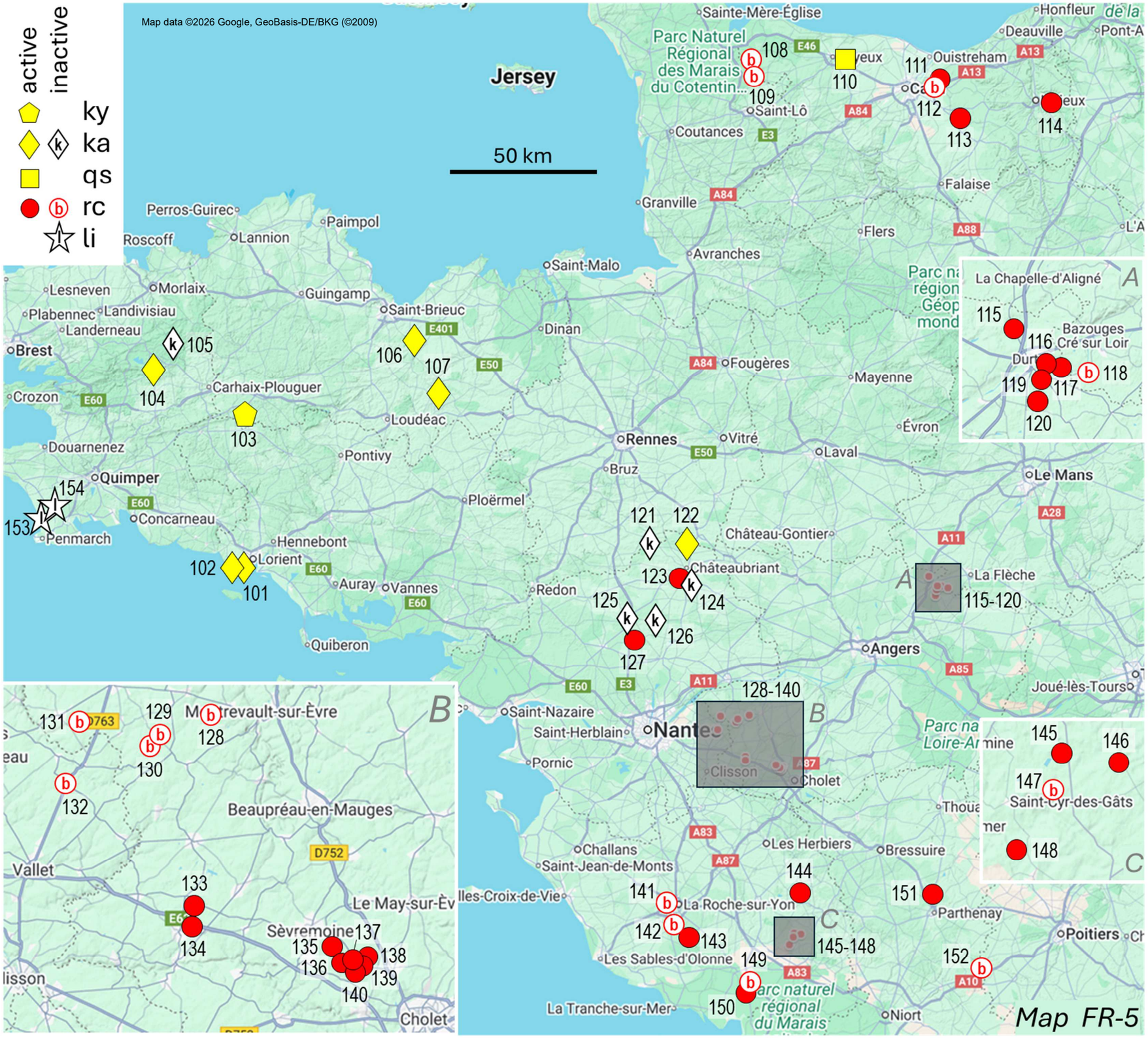
#	r.m.	st	deposit	département
1	qs	A	Cayeux-sur-Mer	Somme
2	qs	A	Le Hourdel	Somme
3	rc	A	Tingry	Pas-de-Calais
4	rc	A	Verlincthun	Pas-de-Calais
5	rc	A	Nieurlet	Nord
6	rc	A	Blaringhem	Nord
7	rc	A	Rombly	Pas-de-Calais
8	rc	A	Mazinghem	Pas-de-Calais
9	rc	I	Cauchy-à-la-Tour	Pas-de-Calais
10	rc	A	Lomme	Nord
11	rc	A	Leers	Nord
12	rc	A	Templeuve	Nord
13	rc	I	Auby	Nord
14	rc	A	Dhainaut	Nord
15	rc	I	Curgies	Nord
16	rc	I	Éteignières	Ardennes
17	rc	I	Thin-le-Moutier	Ardennes
18	rc	I	Proisy	Aisne
19	rc	I	Butten	Bas-Rhin
20	qs	I	Rothbach	Bas-Rhin
21	qs	A	Wissembourg	Bas-Rhin
22	rc	A	Schaffhouse-près-Seltz	Bas-Rhin
23	rc	A	Kesseldorf	Bas-Rhin
24	qs	A	Hatten	Bas-Rhin
25	rc	A	Betschdorf	Bas-Rhin
26	qs	A	Soufflenheim	Bas-Rhin
27	qs	A	Kaltenhouse	Bas-Rhin
28	qs	A	Batzendorf	Bas-Rhin
29	rc	I	Mommenheim	Bas-Rhin
30	rc	A	Achenheim	Bas-Rhin
31	rc	A	Housseras	Vosges
32	qs	A	Le Thieulin	Eure-et-Loire
33	qs	I	Alluyes	Eure-et-Loire
34	rc	A	Fontaine-la-Guyon	Eure-et-Loire
35	qs	A	Hanches sud	Eure-et-Loire
36	qs	A	Hanches nord	Eure-et-Loire
37	rc	I	Mittainville	Yvelines
38	rc	I	Le Val-Saint-Germain sud	Essonne
39	rc	A	Le Val-Saint-Germain nord	Essonne
40	rc	A	Angervilliers	Essonne
41	rc	A	Chapet-Les Mureaux	Yvelines
42	be	A	Tourny	Eure
43	rc	A	Blacourt	Oise
44	rc	A	Saint-Germer-de-Fly	Oise
45	rc	A	Les Eaux Ouïes	Oise
46	rc	I	Les Landrons	Oise
47	rc	A	Les Landrons Est	Oise
48	rc	I	Les Fontainettes	Oise
49	rc	A	Ons-en-Bray nord	Oise
50	rc	A	Ons-en-Bray sud	Oise
51	rc	A	Cires-lès-Mello	Oise
52	qs	I	Villeneuve-sur-Verberie nord	Oise
53	qs	A	Villeneuve-sur-Verberie sud	Oise
54	qs	A	Trumilly	Oise
55	qs	A	Beaulieu-le-Neuf	Oise
56	qs	A	Crépy-en-Valois	Oise
57	qs	A	Hartennes-et-Taux	Aisne
58	qs	A	Parcy	Aisne
59	qs	A	Rozet-Saint-Albin	Aisne
60	qs	I	Latilly	Aisne
61	qs	A	Montgru-Saint-Hilaire	Aisne
62	qs	A	La Croix-sur-Ourcq	Aisne
63	qs	I	Grisolles	Aisne
64	qs	A	Brécy	Aisne
65	rc	I	Igny	Marne
66	rc	I	Beautheil-Saints	Seine-et-Marne
67	qs	A	Maisse	Essonne
68	qs	A	Milly-la-Forêt	Essonne
69	qs	A	La Chapelle-la-Reine	Seine-et-Marne
70	rc	A	Larchant	Seine-et-Marne
71	qs	A	Bonnevault	Seine-et-Marne
72	qs	I	Gordonnière	Seine-et-Marne
73	qs	A	Saint-Ange-le-Viel	Seine-et-Marne
74	wc	I	Saint-Loup de Naud	Seine-et-Marne
75	wc	A	Le Midi de la Croix	Seine-et-Marne
76	wc	A	Septveilles	Seine-et-Marne
77	wc	I	Poigny-Beaujard	Seine-et-Marne
78	wc	A	Chalautre-la-Petite	Seine-et-Marne
79	wc	A	Montbron	Seine-et-Marne
80	wc	I	La Saulsotte	Aube
81	wc	A	La Grange Guillaume Villenauxe-la-Grande	Aube
82	wc	A	Les Gloitre Villenauxe-la-Grande	Aube
83	wc	A	Le Chatelet/Louan	Aube
84	wc	I	Sezanne	Aube
85	wc	I	Lachy	Aube
86	rc	A	Verzenay	Marne
87	rc	A	Athis	Marne
88	rc	A	Poivre	Aube
89	rc	A	Fontenoy	Meuse
90	rc	A	Revigny-sur-Ornain	Meuse
91	rc	A	Bettancourt-la-Longue	Marne
92	rc	A	Maurupt-le-Montois	Marne
93	rc	A	Cheminon	Marne
94	rc	A	Etang des Grandes Couées	Marne
95	rc	A	Petit-Mesnil	Aube
96	rc	A	Seignelay	Yonne
97	rc	I	Le Baudières	Yonne
98	rc	A	Pointigny	Yonne
99	rc	A	Vireaux	Yonne
100	rc	A	Ligny-le-Ribault	Loiret
101	ka	A	Kerbrient	Morbihan
102	ka	A	Lanvrian	Morbihan
103	and	A	Glomel	Côtes-d'Armor
104	ka	A	Loqueffret	Finistère
105	ka	I	Berrien	Finistère
106	ka	A	Meudon	Côtes-d'Armor
107	ka	A	Kerrouet	Côtes-d'Armor
108	rc	I	Lison	Calvados
109	rc	I	La Poterie	Calvados
110	qs	A	Bessin	Calvados
111	rc	A	Bavent	Calvados
112	rc	I	Touffréville	Calvados
113	rc	A	Cesny-aux-Vignes	Calvados
114	rc	A	Glos	Calvados




Bitche
Wissembourg
Parc naturel régional des Vosges du Nord
Rhine River
Dieuze
Phalsbourg
Saverne
Sarrebourg
Brumath
Strasbourg
Illkirch-Graffenstaden
Obernai
Erstein
Baccarat
Raon-l'Étape
Saint-Dié-des-Vosges
Sélestat
A4
A35
A355
N4
N59
A25
A19
A26
A1
A2
A16
A28
A29
10 km
Map FR-3


Map data ©2026 Google, GeoBasis-DE/BKG (©2009)
30 km
Calais
Boulogne-sur-Mer
Le Touquet
Berck
Béthune
Roubaix
Lille
Arras
Maubeuge
Abbeville
Le Tréport
Dieppe
Amiens
Saint-Quentin
Parc naturel régional Scarpe-Escaut
Parc naturel régional de l'Avesnois
Parc naturel régional des Ardennes
Sedan
Map FR-2
active
inactive
qs
rc


Map FR-4
Rouen
Beauvais
Compiègne
Reims
Évreux
Argenteuil
Saint-Denis
Paris
Versailles
Dreux
Chartres
Fontainebleau
Romilly-sur-Seine
Sézanne
Mourmelon-le-Grand
Sainte-Menehould
Châlons-en-Champagne
Vitry-le-François
Bar-le-Duc
Saint-Dizier
Brienne-le-Château
Troyes
Bar-sur-Aube
Chaumont
Châteaudun
Orléans
Olivet
Saran
Amilly
Châteauneuf-sur-Loire
Joigny
Migennes
Auxerre
Chablis
Vendôme
Blois
Gien
Montbard
Semur-en-Auxois
Parc national de forêts
Parc naturel régional du Vexin français
Parc naturel régional de la Haute Vallée de Chevreuse
Parc naturel régional de la Montagne de Reims
A
43-50
B
57-64
C
69-72
D
74-79
E
80-83
A1
A4
A5
A6
A10
A11
A13
A16
A19
A26
A71
A77
50 km
Blacourt
Cuigy-en-Bray
Le Coudray-Saint-Germer
Ons-en-Bray
Vierzy
Hartennes-et-Taux
Saint-Rémy-Blanzy
Grand-Rozoy
Billy-sur-Ourcq
Oulchy-le-Château
Rozet-Saint-Albin
Breny
Latilly
Coincy
Bréc
D1
Provins
D619
Saint-Loup-de-Naud
Sourdun
Sainte-Colombe
Longueville
Soisy-Bouy
Louan-Villegruis-Fontaine
Villenauxe-la-Grande
Montpothier
Plessis-Ba
Barbuise
Achères-la-Forêt
La Chapelle-la-Reine
Amponville
Larchant
Guercheville
Fromont
Chevrainvilliers
active
inactive
be
qs
rc
wc



Raw material

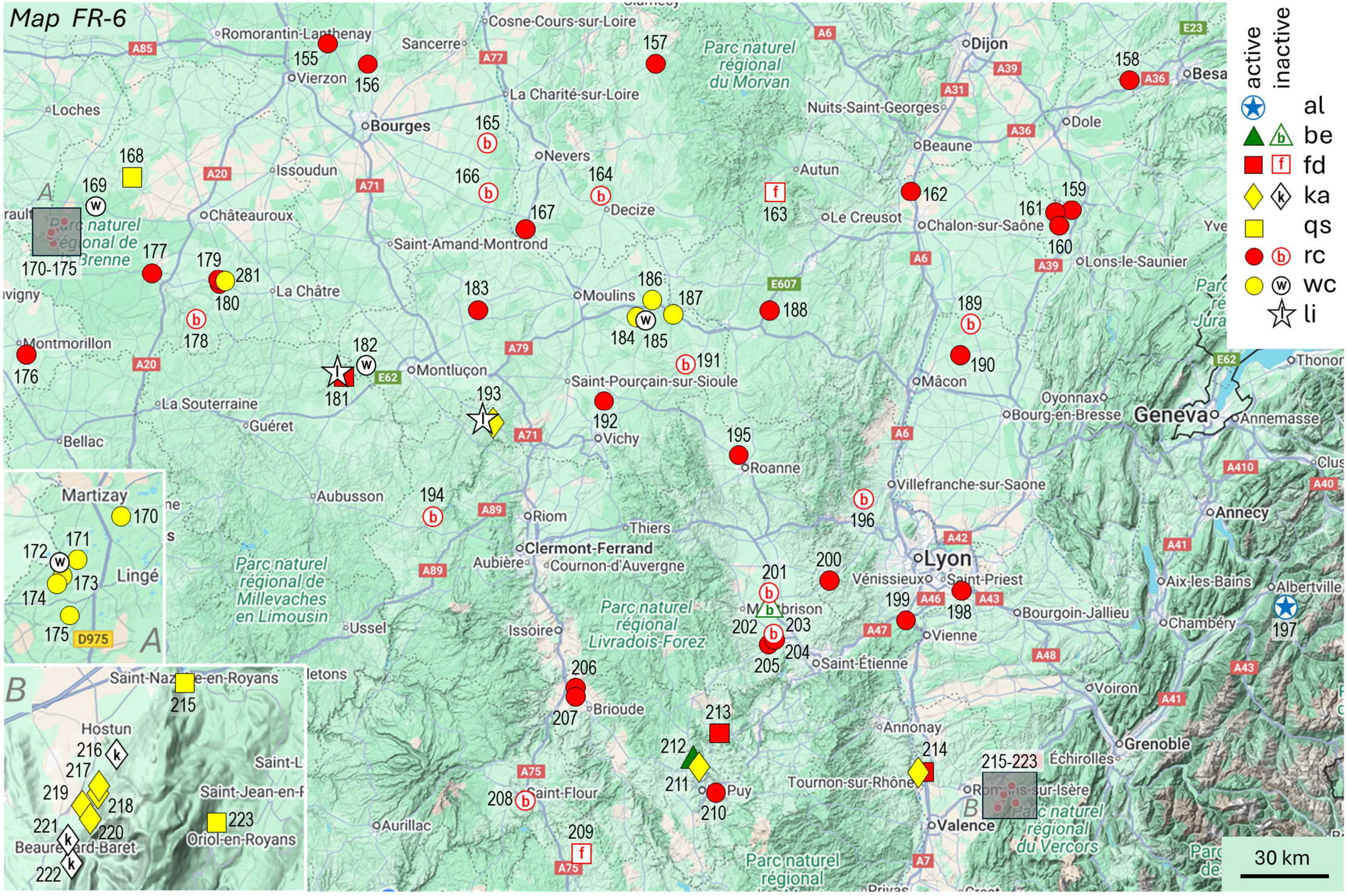
al	alumina (artificial)
be	bentonite
ec	expanded clay
fd	feldspar
ka	kaolin
ky	andalusite
li	lithium minerals
mg	magnesite
ns	nepheline phonolite
qs	silica sand, quartz
rc	red clays
sa	soda ash
tc	talc
wc	white clays

Status of deposit

A	active mine
I	inactive mine
O	occurrence

Table FR-b: deposits of raw materials for the ceramic and glass industries in France.

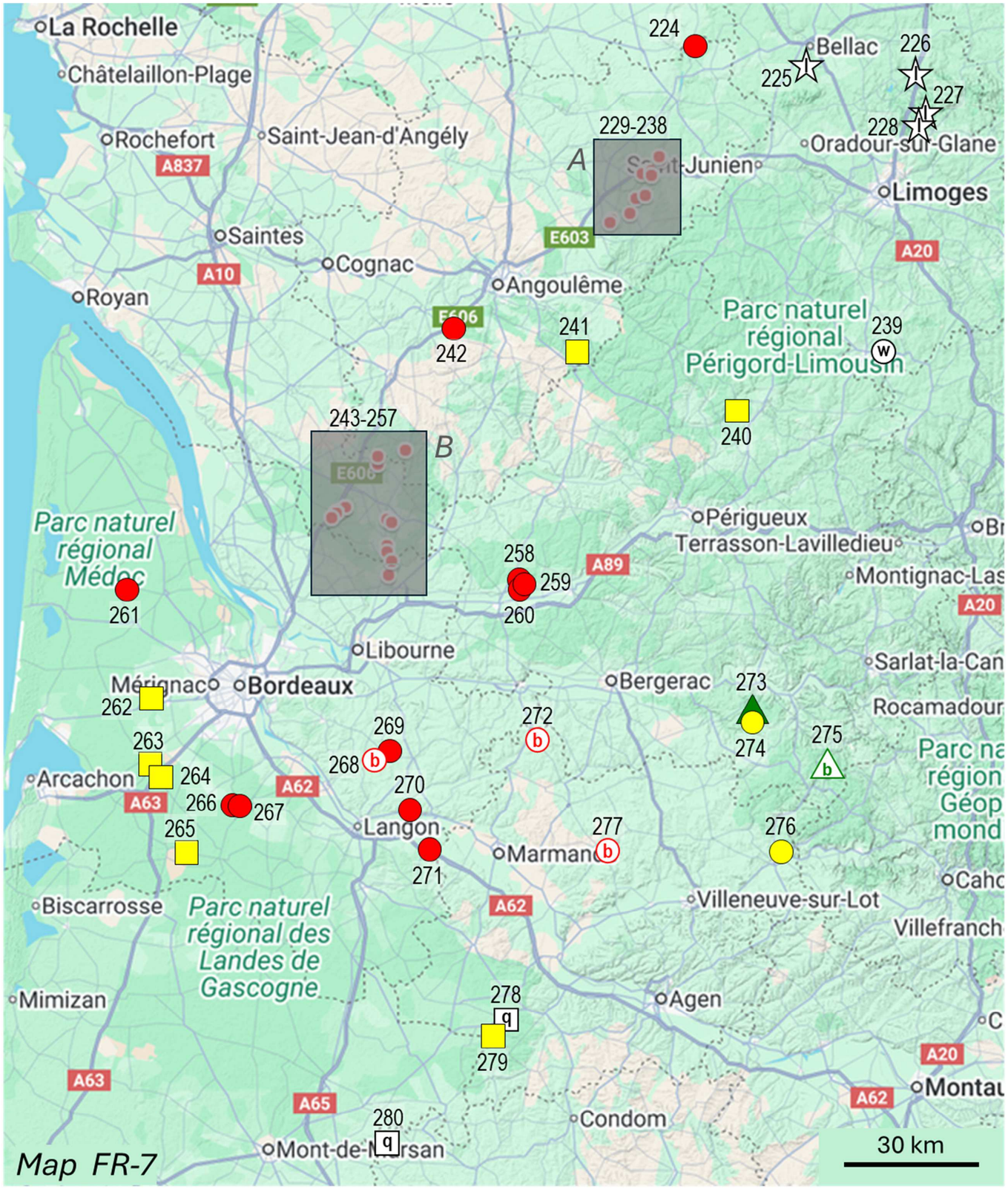
#	r.m.	st	deposit	département
115	rc	A	Durtal-la Petite Pâquerie	Maine-et-Loire
116	rc	A	Durtal-la Carrière	Maine-et-Loire
117	rc	A	Chalou	Maine-et-Loire
118	rc	I	Bazouges Cré sur Loir	Maine-et-Loire
119	rc	A	Les Rairies-Jugé	Maine-et-Loire
120	rc	A	Les Rairies	Maine-et-Loire
121	ka	I	Teillay	Ille-et-Vilaine
122	ka	A	Rougé	Loire-Atlantique
123	rc	A	Saint-Aubin-des-Châteaux	Loire-Atlantique
124	ka	O	Croix des Landelles	Loire-Atlantique
125	ka	O	La Martrie	Loire-Atlantique
126	ka	O	Mérel	Loire-Atlantique
127	rc	A	Puceul	Loire-Atlantique
128	rc	I	Saint-Rémy-en-Mauges	Maine-et-Loire
129	rc	I	La Caradière	Maine-et-Loire
130	rc	I	Le Buté	Maine-et-Loire
131	rc	I	Landemont	Maine-et-Loire
132	rc	I	La Remaudière	Loire-Atlantique
133	rc	A	La Touche	Maine-et-Loire
134	rc	A	La Colassière	Maine-et-Loire
135	rc	A	Saint-André-de-la-Marche	Maine-et-Loire
136	rc	A	La Séguinière	Maine-et-Loire
137	rc	A	La Balandière	Maine-et-Loire
138	rc	A	La Bifomoine	Maine-et-Loire
139	rc	A	L'Epinette	Maine-et-Loire
140	rc	A	L'Etablère	Maine-et-Loire
141	rc	I	La Roche-sur-Yon	Vendée
142	rc	I	Aubigny-Les Clouzeaux	Vendée
143	rc	A	La Bretaudière	Vendée
144	rc	A	Tallud-Sainte-Gemme	Vendée
145	rc	A	Saint-Cyr-des-Gâts 1	Vendée
146	rc	A	Saint-Cyr-des-Gâts 2	Vendée
147	rc	I	Saint-Cyr-des-Gâts 3	Vendée
148	rc	A	Saint-Martin-des-Fontaines	Vendée
149	rc	I	La Malinière	Vendée
150	rc	A	Moreilles	Vendée
151	rc	A	Viennay	Deux-Sèvres
152	rc	I	La Boulinière	Deux-Sèvres
153	li	O	Tréguennec - Prat-ar-Hastel	Finistère
154	li	O	Tréguennec - Tréluan	Finistère
155	wc	A	Nançay	Cher
156	rc	A	Saint-Palais	Cher
157	rc	A	Corbigny	Nièvre
158	rc	A	Lantenne-Vertière	Doubs
159	rc	A	Bois-de-Gand	Jura
160	rc	A	Commenaille	Jura
161	rc	A	La Réchassière	Jura
162	rc	A	Chagny	Saone-et-Loire
163	fd	I	Montguichot	Saone-et-Loire
164	rc	I	Sougy-sur-Loire	Nièvre
165	rc	I	Torteron	Cher
166	rc	I	Grossouvre	Cher
167	wc	A	La Baravelle	Nièvre
168	qs	A	Saint-Genou	Indre
169	wc	I	Paulnay	Indre
170	wc	A	Martizay (les Hautes-Maisons)	Indre
171	wc	A	La Bordellerie/Lureuil	Indre
172	wc	I	La Cabane	Indre
173	wc	A	Pazeraux/Lureuil	Indre
174	wc	A	Renardières/Tournon-St-Martin	Indre
175	wc	A	Blinerie/Tournon-St-Martin	Indre
176	rc	A	Saulgé	Vienne
177	rc	A	Chasseneuil	Indre
178	rc	I	Bethenet	Indre
179	rc	A	Montipeneau	Indre
180	rc	A	Pontgaudron	Indre
181	fd-li	A	Montebras	Creuse
182	wc	I	La Baudre	Allier
183	rc	A	Louroux-Bourbonnais	Allier
184	wc	A	Thiel-sur-Acolin	Allier
185	wc	I	Thiel-sur-Acolin/le Demeuriers	Allier
186	wc	A	Beaulon/l'Hautmoucheron	Allier
187	wc	A	Diou/les Charbonnières	Allier
188	rc	A	Les Baraques	Saone-et-Loire
189	rc	I	Saint-Trivier-de-Courtes	Ain
190	rc	A	Saint-Étienne-sur-Reyssouze	Ain
191	rc	I	Le Donjon	Allier
192	rc	A	Billy	Allier
193	ka-li	A	Beauvoir	Allier
194	rc	I	Laschamp	Puy-de-Dome
195	rc	A	Mably	Loire
196	rc	I	Val d'Oingt	Rhône
197	al	A	La Bathie	Savoie
198	rc	A	Saint-Pierre-de-Chandieu	Rhône
199	rc	A	Givors	Rhône
200	rc	A	Haute-Rivoire	Rhône
201	rc	I	Chalain-le-Comtal	Loire
202	be	I	Grézieux-le-Fromental	Loire
203	rc	I	Sury-le-Comtal nord	Loire
204	rc	A	Sury-le-Comtal sud	Loire
205	rc	A	Sury-le-Comtal L'Echaud	Loire
206	rc	A	Vergongheon	Haute-Loire
207	rc	A	Laroche Trandon	Haute-Loire
208	rc	I	Saint-Flour	Cantal
209	fd	I	Vareilles	Lozère
210	rc	A	Saint-Germain-Laprade	Haute-Loire
211	ka	A	Saint-Paulien	Haute-Loire
212	be	A	Saint-Paulien	Haute-Loire
213	ns	A	Roche-en-Régnier	Haute-Loire
214	ka-fd	A	Larnage	Drôme
215	qs	A	Saint-Laurent-en-Royans	Drôme
216	ka	I	Naire/Hostun	Drôme
217	ka	A	Les Combes/Hostun	Drôme
218	ka	A	Les Tampards/Hostun	Drôme
219	ka	A	Les Merles/Hostun	Drôme
220	ka	A	Paué-Beauregard	Drôme
221	ka	I	Pascalière/Beauregard	Drôme
222	ka	I	Reynaux/Beauregard	Drôme
223	qs	A	Oriol-en-Royans	Drôme
224	rc	A	Abzac	Charente
225	li	O	Richemont	Haute-Vienne
226	li	O	Chanteloupe	Haute-Vienne
227	li	O	Larmont	Haute-Vienne
228	li	O	Chèdeville	Haute-Vienne

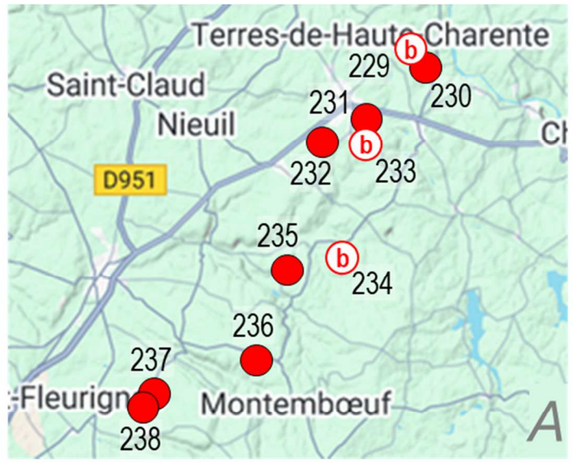


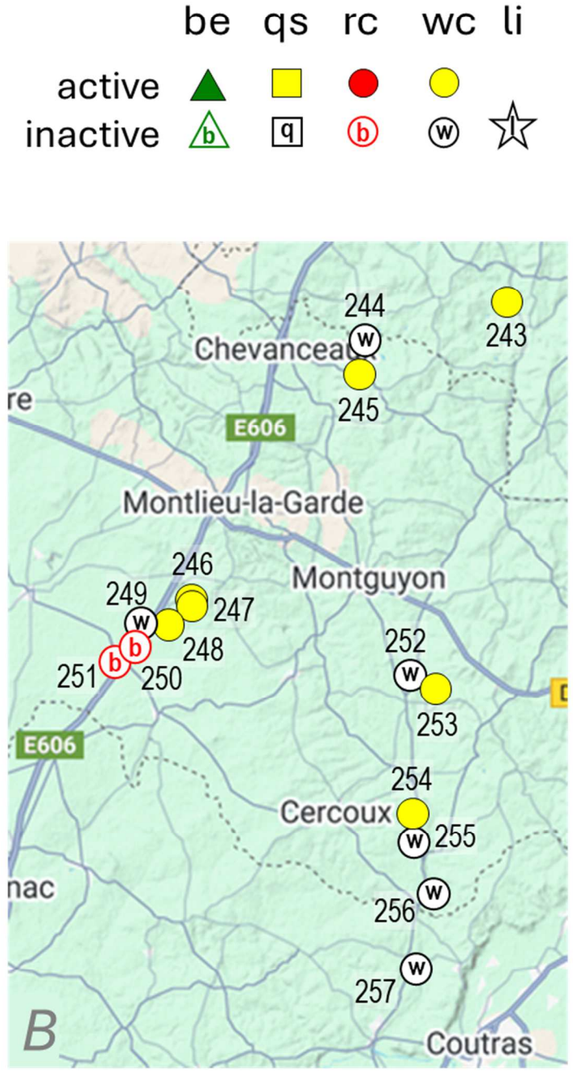
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Table FR-c: deposits of raw materials for the ceramic and glass industries in France.

#	r.m.	st	deposit	département
229	rc	I	Laplaud	Charente
230	rc	A	La Mas-Moreau	Charente
231	rc	A	Pont Sigoulant	Charente
232	rc	A	Roumazières	Charente
233	rc	I	Près-de-Peyrac	Charente
234	rc	I	Mazières	Charente
235	rc	A	Cherves-Châtelars	Charente
236	rc	A	Le Breuil	Charente
237	rc	A	Saint-Adjutory	Charente
238	rc	A	La Grenouille	Charente
239	wc	I	Marcognac	Haute-Vienne
240	qs	A	Saint-Jean-de-Côle	Dordogne
241	qs	A	Combiers	Charente
242	rc	A	Saint-Estèphe	Charente
243	wc	A	Les Cartaud/Guizengeard	Charente
244	wc	I	Bors-de-Baignes	Charente Maritime
245	wc	A	Bois de Rentes	Charente Maritime
246	wc	A	Vrignon Sud	Charente Maritime
247	wc	A	Le Planton	Charente Maritime
248	wc	A	Chierzac	Charente Maritime
249	wc	I	Domaine de la Poste	Charente Maritime
250	rc	I	Domaine de la Poste	Charente Maritime
251	rc	I	Le Jarculet	Charente Maritime
252	wc	A	Les Combes	Charente Maritime
253	wc	I	La Motte-Bonnin	Charente Maritime
254	wc	A	Quittière-Le Marronnier	Charente Maritime
255	wc	I	La Peyrière	Charente Maritime
256	wc	I	Le Chevalier	Charente Maritime
257	wc	I	Lagorce	Gironde
258	rc	A	Saint-Barthélemy-de-Bellegarde	Dordogne
259	rc	A	Montpon	Dordogne
260	rc	A	Saint-Laurent-des-Hommes	Dordogne
261	rc	A	Brach	Gironde
262	qs	A	Saint-Jean-d'Illac	Gironde
263	qs	A	Marcheprime	Gironde
264	qs	A	Le Barp	Gironde
265	qs	A	Belin-Béliet	Gironde
266	rc	A	Saucats	Gironde
267	rc	A	La Tuilerie	Gironde
268	rc	I	Cantois	Gironde
269	rc	A	Boissonneau	Gironde
270	rc	A	Gironde-sur-Dropt	Gironde
271	rc	A	Noaillac	Gironde
272	rc	I	Saint-Astier	Lot-et-Garonne
273	be	A	Salle	Dordogne
274	wc	A	Bessède/Cadouin	Dordogne
275	be	O	Besse	Dordogne
276	wc	A	Brétou/Fumel	Lot-et-Garonne
277	rc	I	Tombebœuf	Lot-et-Garonne
278	qs	I	Durance	Lot-et-Garonne
279	qs	A	Boussés	Lot-et-Garonne
280	qs	I	Mauléon-d'Armagnac	Gers
281	wc	A	Gorday/Pongautron	Indre
282	qs	I	La Boscarasse	Gard
283	wc	I	Serviers	Gard
284	rc	A	Bellegarde	Gard
285	rc	I	Saint-Hippolyte-de-Montaigu 2	Gard
286	rc	A	Saint-Hippolyte-de-Montaigu 1	Gard
287	rc	A	Fournès	Gard
288	qs	A	Tresques-Gea	Gard
289	qs	A	Bagnols-sur-Cèze	Gard
290	wc	I	Bollène	Vaucluse
291	qs	A	Bois Feulleit	Vaucluse
292	rc	A	Boussard	Bouches-du-Rhone
293	qs	A	Bédoin-Menèque	Vaucluse
294	qs	I	Bédoin-Crans	Vaucluse
295	qs	A	Bédoin-Deffends	Vaucluse
296	wc	A	Mormoiron	Vaucluse
297	qs	A	Arnauds	Vaucluse
298	rc	A	Viens	Vaucluse
299	rc	A	Les Milles	Bouches-du-Rhone
300	al	A	Gardanne	Bouches-du-Rhone
301	rc	A	Puyloubier	Bouches-du-Rhone
302	rc	I	Cabasse	Var
303	rc	I	Le Thoronet	Var
304	fd	A	Isturitz	Saint-Esteben
305	rc	A	Montfort-en-Chalosse	Landes
306	rc	I	St-Geours-d'Auribat-Lauga	Landes
307	rc	A	St-Geours-d'Auribat-Arbagea	Landes
308	al	A	Beyrede	Hautes-Pyrenees
309	rc	A	Blajan 2	Haute-Garonne
310	rc	A	Blajan 1	Haute-Garonne
311	rc	A	Boussan	Haute-Garonne
312	rc	I	Pavie	Gers
313	rc	A	Empeaux	Haute-Garonne
314	rc	A	Auradé	Gers
315	rc	A	Léguevin	Haute-Garonne
316	rc	A	Colomiers	Haute-Garonne
317	rc	A	Le Perget	Haute-Garonne
318	rc	A	Bonrepos-Riquet	Haute-Garonne
319	rc	A	Grepiac	Haute-Garonne
320	rc	I	Sauverdun	Ariège
321	rc	A	Saint-Papoule	Aude
322	rc	A	La Pomarède	Aude
323	wc	A	La Perrière	Aude
324	rc	I	Rieussequel	Tarn
325	rc	A	Albine	Tarn
326	fd	I	Métairie des Perdraux	Aude
327	rc	A	Laval	Aude
328	tc	A	Trimouns	Ariège
329	fd	I	Bessèdes	Aude
330	fd	I	Quérigut	Ariège
331	fd	I	Les Fontaneilles Hautes	Pyrénées-Orientales
332	fd	I	Salvezines	Aude
333	fd	I	Carru	Aude
334	fd	I	La Nadulle	Pyrénées-Orientales
335	fd	I	Tarerach	Pyrénées-Orientales
336	fd	O	Roupidière	Pyrénées-Orientales
337	fd	I	Lansac	Pyrénées-Orientales
338	fd	A	Saint-Arnac	Pyrénées-Orientales
339	rc	A	Saint-Jean-Pla-de-Corts	Pyrénées-Orientales
340	fd	I	Valmy	Pyrénées-Orientales
341	sa	A	Laneuveville-devant-Nancy	Meurthe-et-Moselle
342	sa	A	Dombasle-sur-Meurthe	Meurthe-et-Moselle

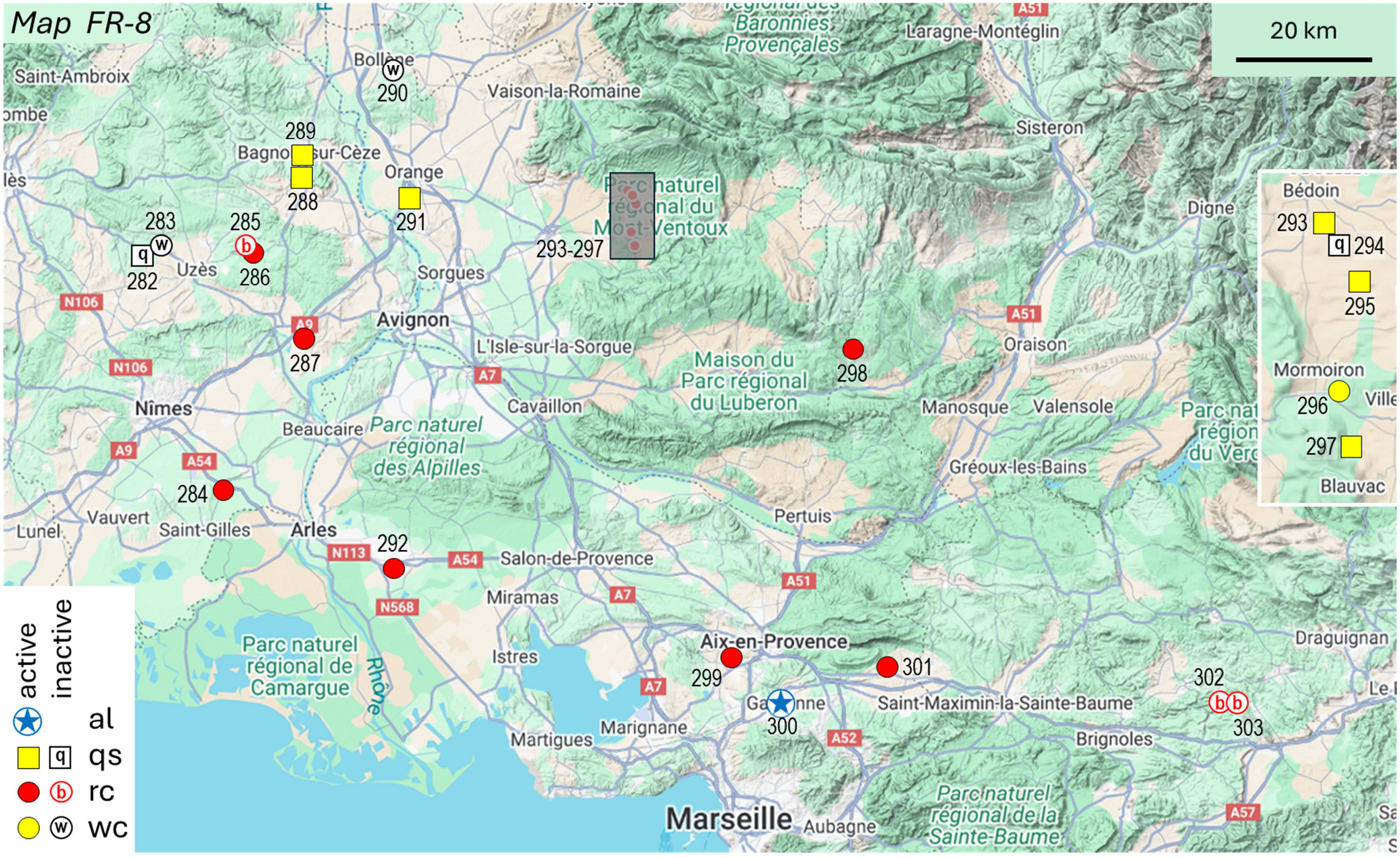




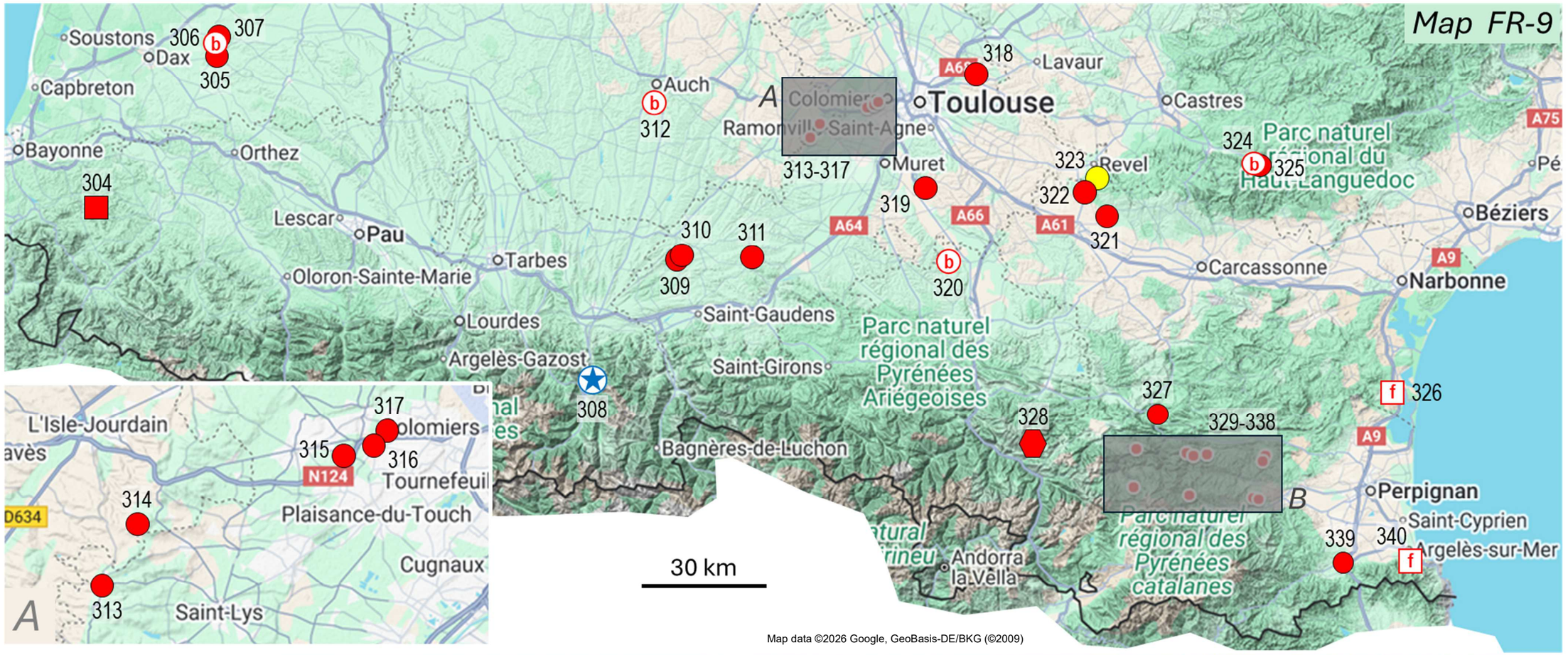


be qs rc wc li
active
inactive

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Map FR-9
Soustons
Dax
Capbreton
Bayonne
Orthez
Lescar
Pau
Oloron-Sainte-Marie
Tarbes
Lourdes
Argelès-Gazost
Auch
Colomiers
Ramonville-Saint-Agne
Toulouse
Lavaur
Castres
Muret
Revel
Parc naturel régional du Haut-Languedoc
Béziers
Carcassonne
Narbonne
Saint-Gaudens
Saint-Girons
Parc naturel régional des Pyrénées Ariégeoises
Bagnères-de-Luchon
Andorra la Vella
Parc naturel régional des Pyrénées catalanes
Perpignan
Saint-Cyprien
Argelès-sur-Mer
L'Isle-Jourdain
Tournefeuille
Plaisance-du-Touch
Cugnaux
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30 km
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)
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rc
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Rodome
Bessède-de-Sault
Lapradelle-Puilaurens
Lesquerde
Fenouillet
Le Vivier
Ansignan
Montfort-sur-Boulzane
Roquefort-de-Sault
Escouloubre
Counozouls
Mijanès
Quérigut
Rabouillet
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Georgia

The Georgian industry exploits a range of glass and ceramic raw materials: zeolites and perlite (second and eighth major producer in the Euro-Mediterranean ranking, respectively) and bentonite. Further commodities are apparently mined, but their amounts are not disclosed: barite, white clays, quartz-feldspathic sand, talc and red clays [1-4].

Zeolite deposits are found in both volcano-sedimentary and sedimentary sequences (Jurassic, Cretaceous, and Paleogene in age). Currently, production of clinoptilolite-rich tuff (on average 127,000 tpa in the last decade) is carried out at the Khekordzula mine in the Mtskheta-Mtianeti region [5,6]. Further occurrences of zeolitized tuffs are reported in the Lesser Caucasus, characterised by clinoptilolite with minor phillipsite [7] or by laumontite [8]. Reserves for 22 million tonnes have been indicated [1].

Bentonite is extracted in two mining districts, with a total output of 59,000 tpa as 2015-2024 mean [2]. The Askana (Ozurgeti-Guria region) deposits were formed by hydrothermal alteration of Eocene andesite-trachyte tuffs, while those around Gumbra (Imereti region) exploit Cretaceous sediments [1,9]. Reserves are in total 12 million tonnes [9].

Perlite: large deposits of volcanic glass, originated during Neogene-Quaternary volcanism, are known on the Akhalkalaki plateau and in the Akhaltsikhe valley in southern Georgia [10,11]. In the former area, perlite is mined (34,000 tpa on average) at the Paravani Lake [2], while the Toloshi deposit is inactive in the latter zone [11].

White clay deposits (some locally referred to as "kaolin") have been identified in three main areas: around Kutaisi in the Imereti region (where there is the only active mine in Shrosha), northeast of Batumi (Ozurgeti-Guria) and in the Lesser Caucasus [12]. There are deposits of sedimentary origin (e.g., Jurassic and Paleocene fluvio-lacustrine shales) or due to hydrothermal alteration of volcanic breccias and tuffs of Jurassic or Cretaceous age [12,13].

Red clays are mainly extracted in the Kartli Basin, around Tbilisi, and used in the manufacture of bricks and potteries. Main sources are the Neogene molasse (marine/continental sediments) and Quaternary alluvial deposits [14,15]. **Quartz-feldspathic sands** are mined in the Imereti region [16]. **Barite**: many occurrences have been reported in the Jurassic volcano-sedimentary sequences of Western Caucasus and Lesser Caucasus, with 8 million tonnes of reserves [1]. The active mines (Kvaisa and Madneuli) obtain barite as byproduct of polymetallic (Cu-Pb-Zn) deposits [17]. **Talc** deposits are known in the Chorchana-Utsleui complex (serpentinites, meta-volcanic and phyllitic rocks) within the Dzirula massif (central Georgia) where several mines operated in the Chorchana district [1,3].

Table GE-a: deposits of raw materials for the ceramic and glass industries in Georgia.

#	raw material	st	deposit	region
1	rc	A	Ajakhu	Gudauta
2	ba	O	Patsihkvara	Apkhazeti
3	ba	O	Khaishi	Mestia
4	wc	I	Tsetskhlauri	Kobuleti, Ajaria
5	rc	I	Khvarbeti	Guria
6	wc	I	Makvaneti	Ozurgeti-Guria
7	be	A	Askana (Tsikhis-Ubani)	Ozurgeti-Guria
8	ba	O	Ghvedi	Kutaisi
9	be	I	Kumistavi	Imereti
10	be	A	Gumbra	Imereti
11	wc	I	Rioni	Imereti
12	wc	I	Jvarisa-Tkibuli	Kutaisi, Imereti
13	wc	A	Shrosha	Imereti
14	qf	A	Darkveti	Imereti
15	ba	O	Chordi	Oni
16	ba	A	Kvaisa	Shida Kartli
17	tc	A	Chorchana	Khashuri
18	ze	O	Akhaltsikh	Samtskhe-Javakheti
19	pe	I	Toloshi-Aspindza	Samtskhe-Javakheti
20	pe	A	Paravani Lake	Samtskhe-Javakheti
21	ze	O	Tedzami River	Kvemo Kartli
22	wc	I	Darbazi	Kvemo Kartli
23	ba	A	Madneuli	Bolnisi
24	wc	I	Dambludi	Kvemo Kartli
25	rc	A	Kaspi	Kaspi
26	ze	I	Dzegvi	Mtshketa
27	rc	A	Gardabani	Rustavi
28	rc	A	Sagarejo	Kakheti
29	rc	I	Akhasheni	Gurjaani
30	rc	A	Kvareli	Kakheti
31	ze	A	Khekordzula	Mtskheta-Mtianeti
32	ze	O	Chkherimela River	Imereti
33	ze	O	Gupta	Shida Kartli
34	ze	O	Ateni Sioni	Shida Kartli
35	be	A	Vaniskedi	Ozurgeti-Guria
36	wc	I	Ochkhamuri	Ozurgeti-Guria
37	wc	O	Macharula	Imereti
38	wc	I	Jvari	Kvemo Svaneti
39	rc	I	Miriani	Agara
40	rc	A	Kvemo Teleti	Kvemo Kartli
41	rc	I	Metekhi	Tbilisi

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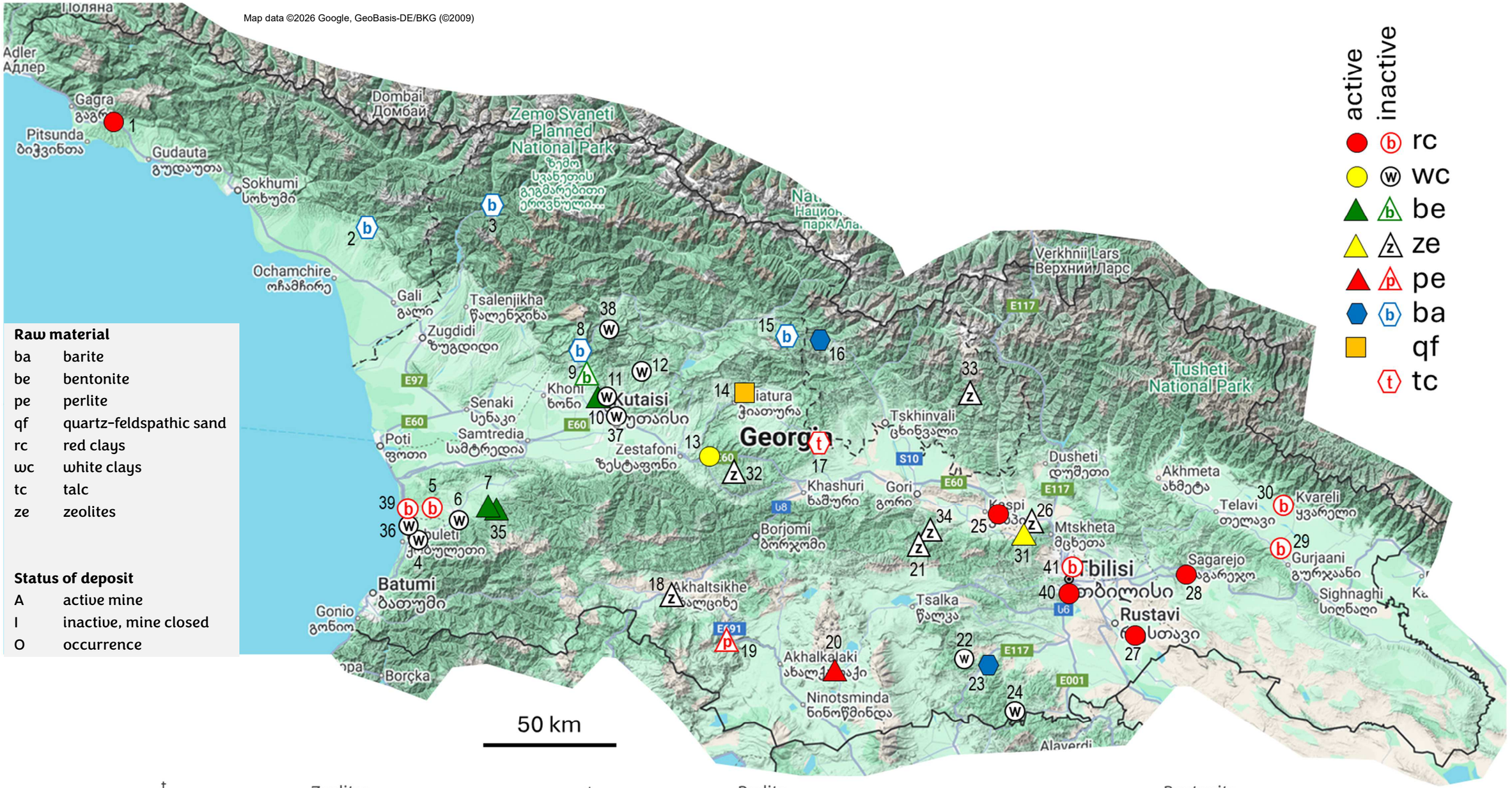
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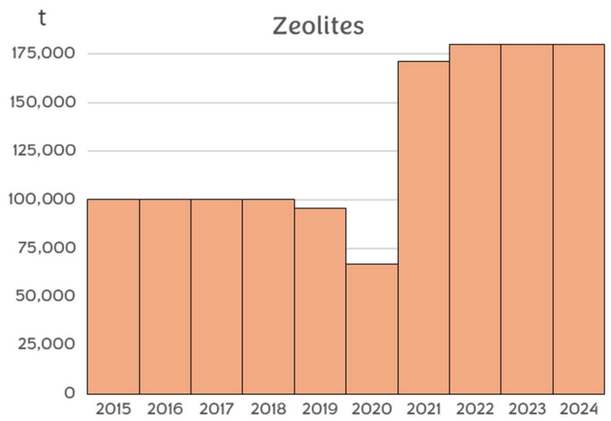


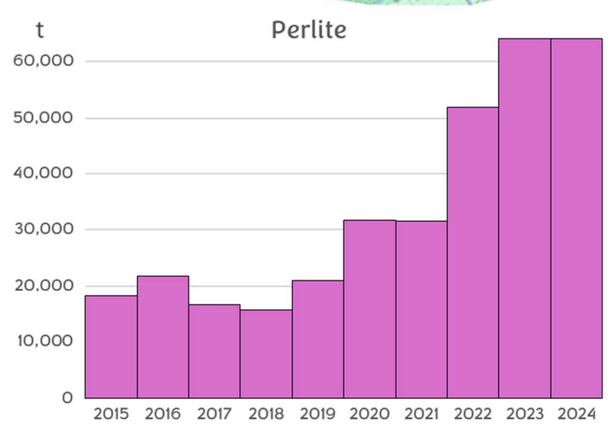
Raw material

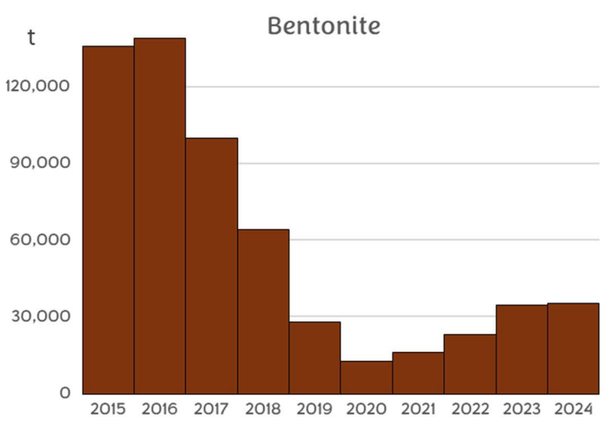
ba	barite
be	bentonite
pe	perlite
qf	quartz-feldspathic sand
rc	red clays
wc	white clays
tc	talc
ze	zeolites

Status of deposit

A	active mine
I	inactive, mine closed
O	occurrence







Germany

The German mining industry is a major player in the clay materials supply chain: leading producer of red clays and third largest supplier of kaolin, bentonite and ball clay in the Euro-Mediterranean area. In addition, Germany produces synthetic soda ash (second place in Europe), silica sand and synthetic alumina (both third position), feldspar and barite. Further resources are no longer being exploited (bauxite) or are being explored (lithium minerals). No data on the amount of reserves are provided [1-5].

Kaolin is mined from around thirty mines (4,520,000 tpa of raw ore, from which 870,000 tpa of marketable product is obtained, as an average of 2015-2024) distributed in three main areas [1,2]: Saxony, along a "kaolin belt" in the north of the Erzgebirge and Lausitz mountains (*Map DE-4*); northern Bavaria, along the southern flank of the Erzgebirge or around the Bayerischer Wald (*Map DE-7*); throughout the Rheinisches Schiefergebirge (*Map DE-3*). These mines exploit a very wide range of deposits, which include [2,6-18]: Triassic fluvial fan deposits (e.g., Hirschau-Schnaittenbach) and weathering of granite (Tirschenreuth and Ockrilla), granodiorite (Caminau), diorite (Radeburg), rhyolite (Kemmlitz), obsidian (Seilitz), and arkose (Roßbach and Röblingen).

Ball clays and fireclays are extracted (3,530,000 tpa on average) essentially in Westerwald (*Map DE-3E*) where around fifty mines are active in an area of approximately 30x20 km² [1,2,19]. The deposits are fluvio-lacustrine (Eocene-Oligocene) and derive from the alteration and erosion of Devonian graywackes, shales and quartzites [20,21]. Both ball clays (addressed essentially to whiteware) and red clays (for stoneware tiles and pottery, vitrified drainage pipes, and roof tiles), predominantly of illitic-kaolinitic composition, are exploited [22].

Red clays: German industry is manufacturing bricks, roof tiles, floor tiles, vitrified drainage pipes, and lightweight aggregates, consuming on average 11,300,000 tpa of clay materials extracted from around 140 quarries, distributed throughout the country [1,2]. There is a broad spectrum of geological origin of raw materials, including clays, loams, shales and slates [3,23-25]: Pleistocene glacial deposits (mainly loess and minor fluvioglacial and glaciolacustrine sediments); Pliocene to Upper Oligocene continental sediments (fluvial, lacustrine and palustrine); Jurassic to Lower Oligocene marine clays (mainly platform); Permo-Triassic continental to paralic deposits (fluvial, lagoonal, brackish and evaporitic); Ordovician to Carboniferous marine beds (claystones to slates).

Bentonite: most German production (354,000 tpa on average) is obtained from half a dozen mines in a 40 x 10 km² wide belt (*Map DE-6*) around Landshut in Bavaria [1,2], where the deposits were formed by alteration of rhyolitic tuffs in a fluvio-lacustrine environment and are hosted in the Miocene Upper Freshwater Molasse [26,27]. Other deposits are under exploitation, located within the Oligocene sequence of kaolinitic clays and volcanics in Hesse and Rhineland-Palatinate [28].

Quartzous raw materials are extracted in around forty quarries, which ensure an average production of around 10 million tpa [1,2,29]. The main resources are silica sands (distributed mainly in central Germany) and Paleozoic quartzites (Rhenish Massif). Geological sources are represented by a wide range of sands and sandstones, of marine or continental origin, ranging in age from Triassic to Quaternary [2].

Feldspar is obtained (258,000 tpa, average 2015-2024, of which 28,000 tpa is pegmatite-sand) from different sources [1,2]. Potassium feldspar is a by-product of kaolin processing in the North Bavaria district, both from kaolinized *Pegmatit-sand* (e.g., Hirschau) [14,18] or weathered granites, as at Tirschenreuth [11]. Feldspathic materials, with potassic character, are extracted in the pegmatitic province of Oberpfalz in Bavaria [30,31] and from rhyolite affected by hydrothermal alteration (e.g., Türkismühle) in the Saarland [32]. Further occurrences – e.g., rhyolite in Saxony [33] or nepheline phonolite in the Eifel [2] – are currently not exploited as feldspathic flux.

Barite is mined (33,000 tpa on average) in two hydrothermal vein-type deposits, like the polymetallic mineralization, mainly Jurassic to Cretaceous, of Grube Clara in the Black Forest [34]. In the Dreislar deposit, Alpine in age, Lower Carboniferous slates and graywackes are mineralized [35].

Soda ash is produced at three plants in Sachsen-Anhalt, Nordrhein-Westfalien and Baden-Württemberg, for a total of 2,540,000 tpa on average [3]. **Alumina** is manufactured (approximately 1 million tpa) at five plants located in Rheinland-Pfalz, Sachsen-Anhalt, and Niedersachsen [3,36].

Bauxite was extracted until 2023, with 299,000 tonnes of peak production in 1986 [4], from a Miocene lateritic deposit in central Germany [37].

Lithium minerals are being explored in the Eastern Erzgebirge lithium province, where greisen-hosted resources are linked to small intrusions of Li-F granites and associated deposition of Sn-W-Li ore [38,39]. At the Zinnwald deposit, it is planned to extract around 500,000 tpa of ore to produce 5,000 tonnes of battery grade LiF [40].

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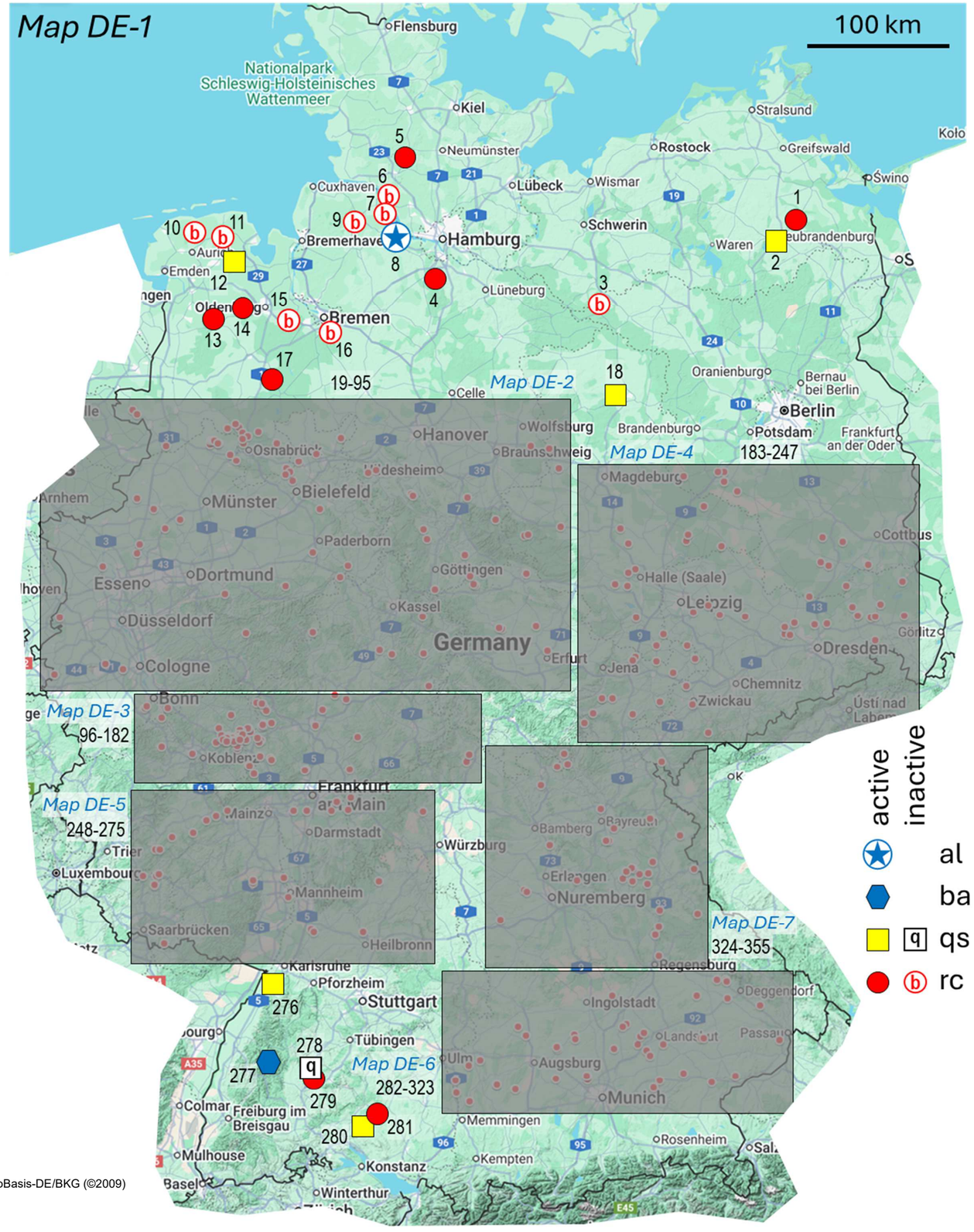
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Raw material

al	alumina (artificial)
ba	barite
be	bentonite
ec	expanded clay
fd	feldspar
ka	kaolin
li	lithium minerals
mg	magnesite
na	soda ash
ns	nepheline phonolite
qf	quartz-feldspathic sand
qs	silica sand
rc	red clays
wc	white clays

Status of deposit

A	active mine
I	inactive mine
O	occurrence

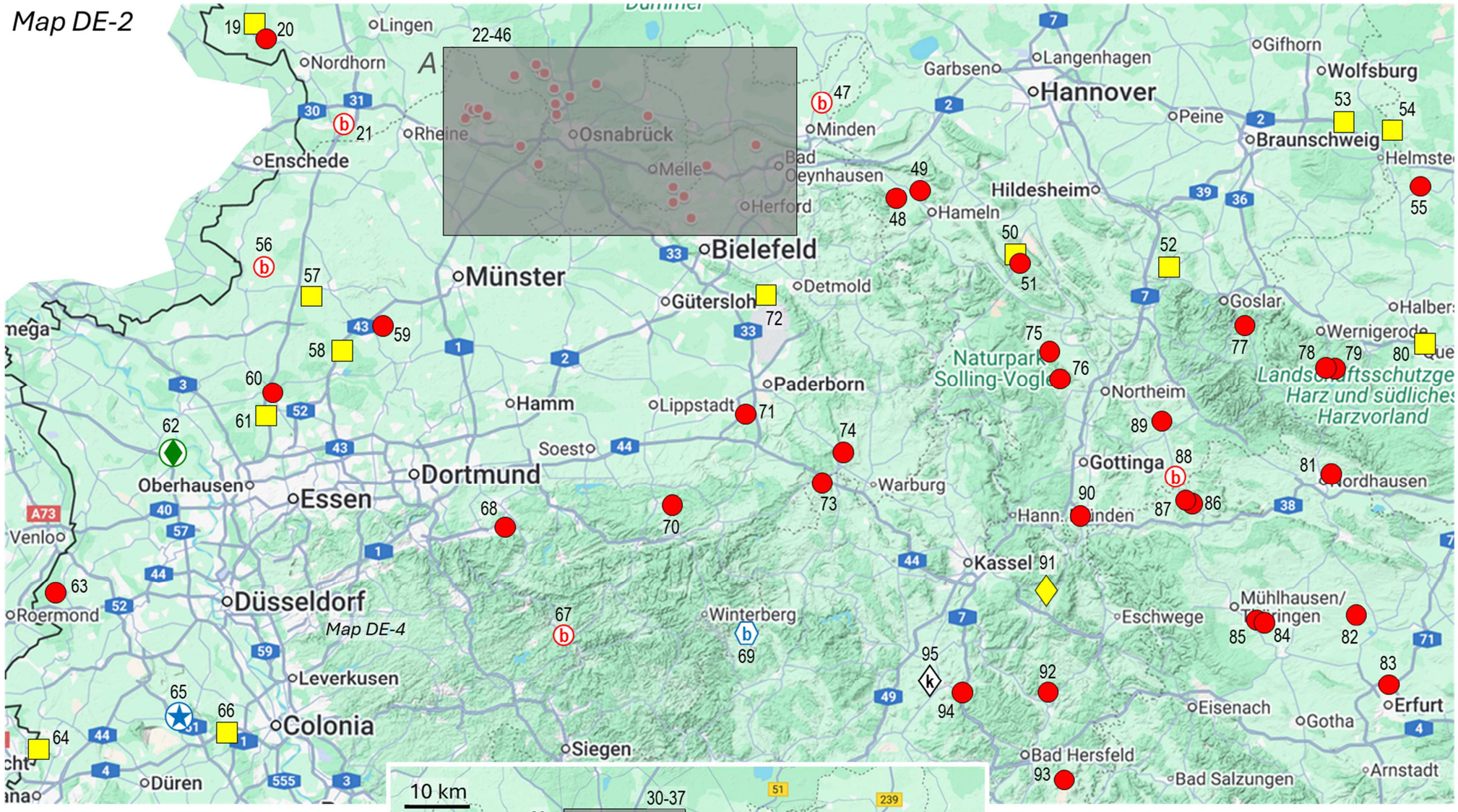


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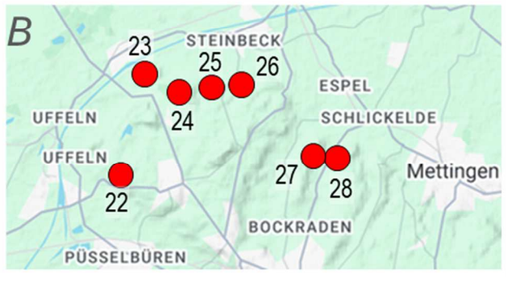
Table DE-a: deposits of raw materials for the ceramic and glass industries in Germany.

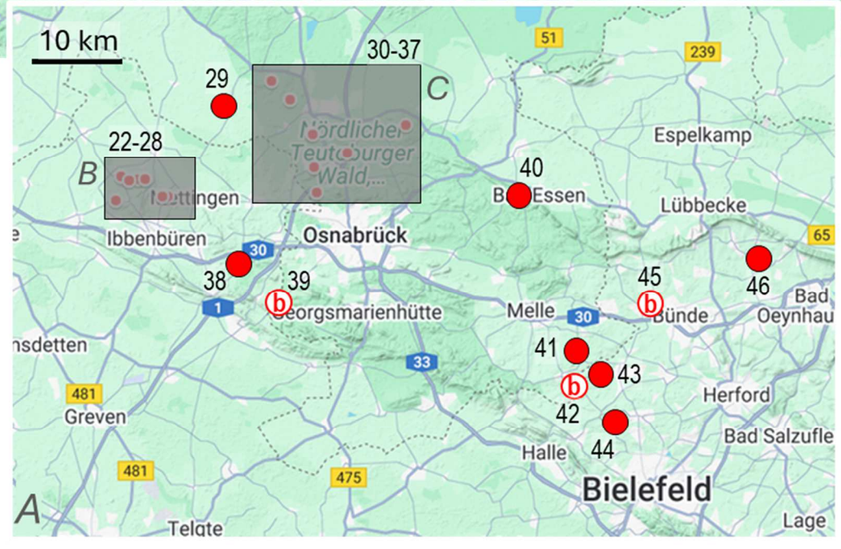
#	r. m.	st	deposit	land
1	rc	A	Friedland	Mecklenburg-Vorpommern
2	qs	A	Fritscheshof	Mecklenburg-Vorpommern
3	rc	I	Streesow	Mecklenburg-Vorpommern
4	rc	A	Buchholz	Niedersachsen
5	rc	A	Peißen	Schleswig-Holstein
6	rc	I	Glückstadt	Schleswig-Holstein
7	rc	I	Drochtersen (Rusch)	Niedersachsen
8	al	A	Stade	Niedersachsen
9	rc	I	Lamstedt	Niedersachsen
10	rc	I	Neuschoo	Niedersachsen
11	rc	I	Isums	Niedersachsen
12	qs	A	Marx-Barge	Niedersachsen
13	rc	A	Scharrel	Niedersachsen
14	rc	A	Querenstede	Niedersachsen
15	rc	I	Kirchkimmen	Niedersachsen
16	rc	I	Weyhe	Niedersachsen
17	rc	A	Hagen	Niedersachsen
18	qs	A	Kläden	Sachsen-Anhalt
19	qs	A	Wilsum	Niedersachsen
20	rc	A	Hilten	Niedersachsen
21	rc	I	Suddendorf	Niedersachsen
22	rc	A	Dickenberg	Nordrhein-Westfalen
23	rc	A	Kälberberg-I	Nordrhein-Westfalen
24	rc	A	Kälberberg-III	Nordrhein-Westfalen
25	rc	A	Kälberberg-II	Nordrhein-Westfalen
26	rc	A	Steinbeck	Nordrhein-Westfalen
27	rc	A	Up de Gadde	Nordrhein-Westfalen
28	rc	A	Querenberg I-III	Nordrhein-Westfalen
29	rc	A	Neuenkirchen	Niedersachsen
30	rc	A	Ueffeln	Niedersachsen
31	rc	A	Achmer-I (Feldhaus)	Niedersachsen
32	rc	A	Achmer-II (Büchter)	Niedersachsen
33	rc	A	Pente	Niedersachsen
34	rc	A	Kalkrieser Berg	Niedersachsen
35	rc	A	Wallenhorst	Niedersachsen
36	rc	I	Hollage	Niedersachsen
37	rc	A	Pye	Niedersachsen
38	rc	A	Velpe I-II	Niedersachsen
39	rc	I	Natrup-Hagen	Niedersachsen
40	rc	A	Wehrendorf	Niedersachsen
41	rc	A	Riemsloh	Niedersachsen
42	rc	I	Bardüttingdorf	Nordrhein-Westfalen
43	rc	A	Wallenbrück	Nordrhein-Westfalen
44	rc	A	Jöllenbeck	Nordrhein-Westfalen
45	rc	I	Holsen	Nordrhein-Westfalen
46	rc	A	Bröderhausen	Nordrhein-Westfalen
47	rc	I	Petershagen	Nordrhein-Westfalen
48	rc	A	Hesslingen	Niedersachsen
49	rc	A	Fischbeck	Niedersachsen
50	qs	A	Duingen	Niedersachsen
51	rc	A	Dörentrup-Bock	Niedersachsen
52	qs	A	Bodenstein	Niedersachsen
53	qs	A	Uhry	Niedersachsen
54	qs	A	Weferlingen	Niedersachsen
55	rc	A	Wefensleben	Sachsen-Anhalt
56	rc	I	Stadtlohn	Nordrhein-Westfalen
57	qs	A	Coesfeld	Nordrhein-Westfalen
58	rc	A	Buldern	Nordrhein-Westfalen
59	qs	A	Haltern am See	Nordrhein-Westfalen
60	rc	A	Gahlen	Nordrhein-Westfalen
61	qs	A	Dorsten	Nordrhein-Westfalen
62	na	A	Ossenberg	Nordrhein-Westfalen
63	rc	A	Brüggen	Nordrhein-Westfalen
64	qs	A	Herzogenrath	Rheinland-Pfalz
65	al	A	Bergheim	Rheinland-Pfalz
66	qs	A	Frechen	Rheinland-Pfalz
67	rc	I	Grevenbrück	Nordrhein-Westfalen
68	rc	A	Hemer	Nordrhein-Westfalen
69	ba	I	Dreislar	Nordrhein-Westfalen
70	rc	A	Kallenhardt	Nordrhein-Westfalen
71	rc	A	Alfen	Nordrhein-Westfalen
72	qs	A	Augustdorf	Nordrhein-Westfalen
73	rc	A	Orpethal	Hessen
74	rc	A	Bonenburg	Nordrhein-Westfalen
75	rc	A	Wellersen	Niedersachsen
76	rc	A	Fredelsloh	Niedersachsen
77	rc	A	Huneberg	Niedersachsen
78	rc	A	Elbingerode	Sachsen-Anhalt
79	rc	A	Rübeland	Sachsen-Anhalt
80	qs	A	Quedlinburg	Sachsen-Anhalt
81	rc	A	Nordhausen	Thuringen
82	rc	A	Lützensömmern	Thuringen
83	rc	A	Gispersleben	Thuringen
84	rc	A	Altengottern	Thuringen
85	rc	A	Bollstedt	Thuringen
86	rc	A	Ferna	Thuringen
87	rc	A	Teistungen	Thuringen
88	rc	I	Duderstadt (Jacobi)	Niedersachsen
89	rc	A	Strohkrug	Niedersachsen
90	rc	A	Friedland	Niedersachsen
91	ka	A	Faulbach	Hessen
92	rc	A	Schwarzenhasel	Hessen
93	rc	A	Schenklengsfeld	Hessen
94	rc	A	Remsfeld	Hessen
95	ka	I	Lembach	Hessen
96	qs	A	Flerzheim	Rheinland-Pfalz
97	qs	A	Witterschlick	Nordrhein-Westfalen
98	rc	A	Witterschlick	Nordrhein-Westfalen
99	fd	O	Siebengebirge	Nordrhein-Westfalien
100	ka	A	Ödingen	Nordrhein-Westfalien
101	ns	A	Brenk	Rheinland-Pfalz
102	rc	A	Mühlheim-Kärlich	Rheinland-Pfalz
103	be	A	Mülheim-Kärlich	Rheinland-Pfalz
104	wc-rc	A	Glockenschächte	Rheinland-Pfalz
105	wc-rc	A	Goddert	Rheinland-Pfalz
106	ka	A	Alpenrod	Rheinland-Pfalz
107	ka	A	Oberdresselndorf	Nordrhein-Westfalien
108	wc-rc	A	Langenaubach	Hessen
109	wc-rc	A	Haus Marianne	Hessen
110	wc-rc	A	Iphigenie	Hessen
111	wc-rc	A	Gusternhain	Hessen
112	be	A	Jungbecker	Hessen
113	be	A	Allendorf	Hessen
114	wc-rc	A	Arborn	Hessen
115	wc-rc	A	Wimpsfeld I	Hessen
116	wc-rc	A	Wimpsfeld II	Hessen
117	wc-rc	I	Maienburg	Hessen
118	wc-rc	A	Karl	Hessen
119	wc-rc	I	Beselich	Hessen
120	wc-rc	A	Langweiden	Hessen

Map DE-2



	al	ba	fd	ka	qs	rc	sa
active	★		■	◆	■	●	◆
inactive		⬡ b	f	k		b	





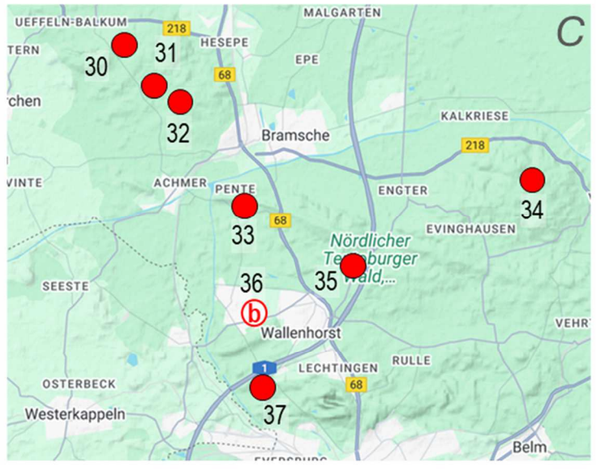
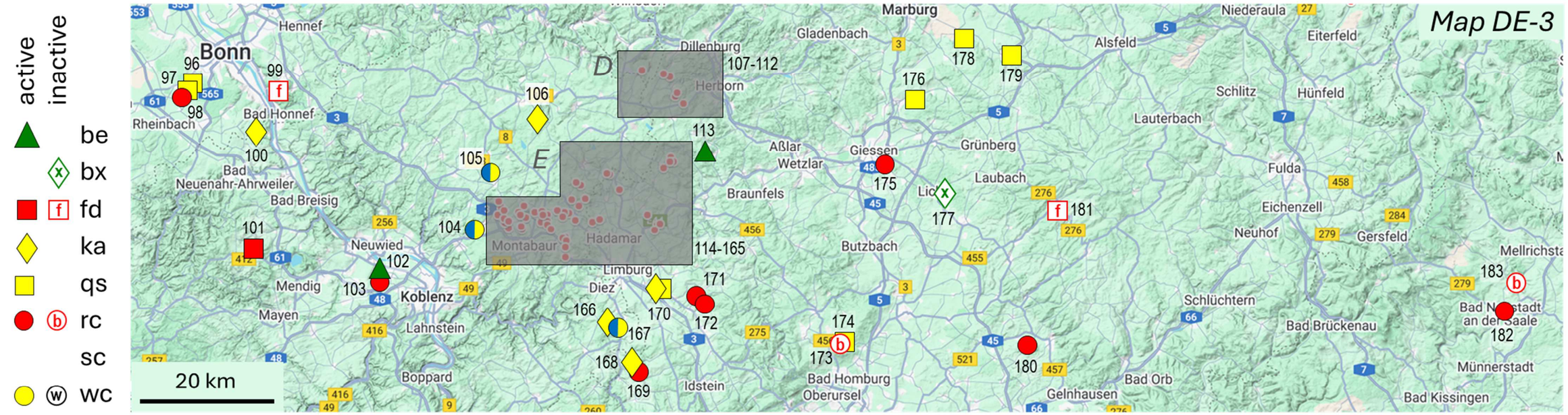
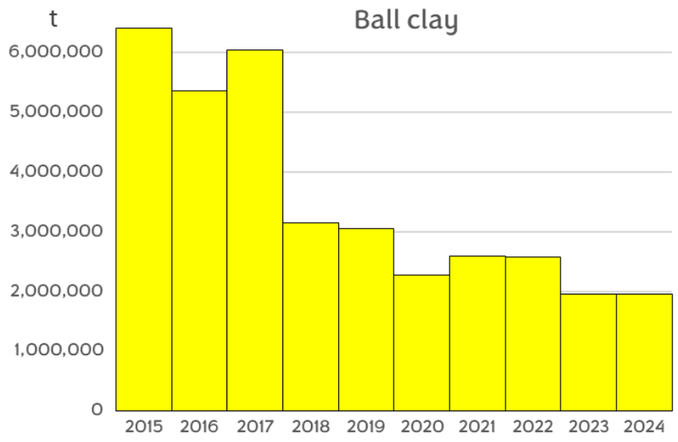


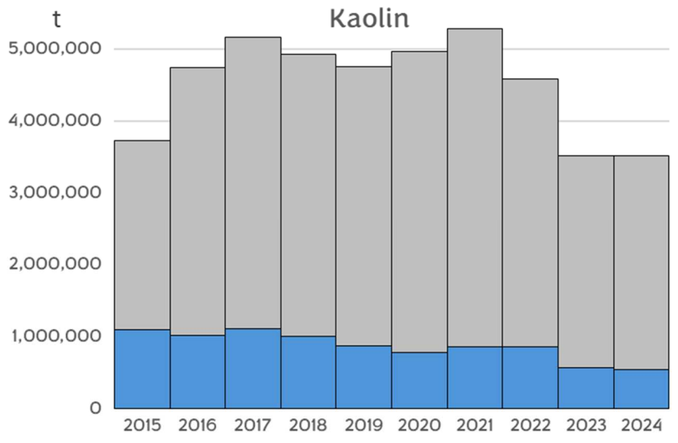
Table DE-b: deposits of raw materials for the ceramic and glass industries in Germany.

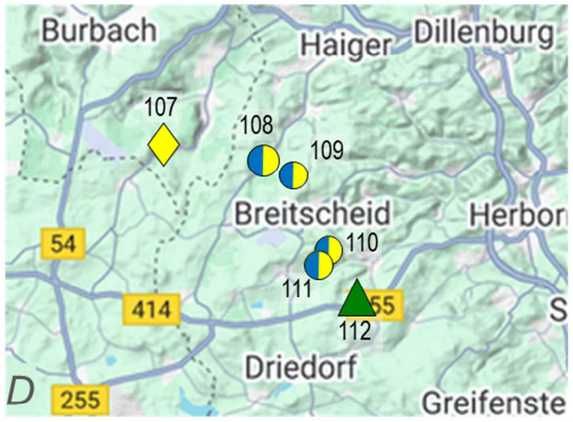
#	r.m.	st	deposit	land
121	wc-rc	A	Hintermeilingen	Hessen
122	wc-rc	A	Birkenheck	Hessen
123	wc-rc	A	Weiss	Hessen
124	wc-rc	I	Hölzbach	Rheinland-Pfalz
125	wc-rc	A	Thalheim	Hessen
126	wc-rc	I	Seiferbach	Hessen
127	wc-rc	A	Salz	Rheinland-Pfalz
128	wc-rc	A	Elbbach	Rheinland-Pfalz
129	wc-rc	A	Otterbach	Rheinland-Pfalz
130	wc-rc	A	Wahnscheid	Rheinland-Pfalz
131	wc-rc	A	Schafbach	Rheinland-Pfalz
132	wc-rc	A	Richard	Rheinland-Pfalz
133	wc-rc	A	Anton	Rheinland-Pfalz
134	wc-rc	A	Berod	Rheinland-Pfalz
135	wc-rc	A	Meudt	Rheinland-Pfalz
136	wc-rc	I	Mendterbach	Rheinland-Pfalz
137	wc-rc	I	Beckershaid	Rheinland-Pfalz
138	wc-rc	A	Stemmer	Rheinland-Pfalz
139	wc-rc	A	Maria	Rheinland-Pfalz
140	wc-rc	A	Ruppach-Glückauf	Rheinland-Pfalz
141	wc-rc	A	Pfeul	Rheinland-Pfalz
142	wc-rc	I	Niederahr	Rheinland-Pfalz
143	wc-rc	I	Anna	Rheinland-Pfalz
144	wc-rc	A	Esther	Rheinland-Pfalz
145	wc-rc	A	Guterborn	Rheinland-Pfalz
146	wc-rc	A	Petschmorgen	Rheinland-Pfalz
147	wc-rc	A	Bannberscheid	Rheinland-Pfalz
148	wc-rc	A	Aubach	Rheinland-Pfalz
149	wc-rc	A	Lämmersberg	Rheinland-Pfalz
150	wc-rc	I	Hostenerbach	Rheinland-Pfalz
151	wc-rc	A	Geigenflur	Rheinland-Pfalz
152	wc-rc	A	Mogendorf	Rheinland-Pfalz
153	wc-rc	A	Hub	Rheinland-Pfalz
154	wc-rc	A	Hambergsflur	Rheinland-Pfalz
155	wc-rc	I	Müller	Rheinland-Pfalz
156	wc-rc	I	Eintracht	Rheinland-Pfalz
157	wc-rc	I	Silbersee	Rheinland-Pfalz
158	wc-rc	I	Moritz	Rheinland-Pfalz
159	wc-rc	A	Zimmermann II	Rheinland-Pfalz
160	wc-rc	I	Zimmermann I	Rheinland-Pfalz
161	wc-rc	A	Girod	Rheinland-Pfalz
162	wc-rc	A	Barbara	Rheinland-Pfalz
163	wc-rc	A	Sedan	Rheinland-Pfalz
164	wc-rc	A	Christel	Rheinland-Pfalz
165	wc-rc	A	Mehl	Rheinland-Pfalz
166	ka	A	Lohrheim	Rheinland-Pfalz
167	wc-rc	A	Silberfeld	Rheinland-Pfalz
168	rc	A	Kettenbach	Hessen
169	ka	A	Kettenbach	Hessen
170	ka-qs	A	Brechen	Hessen
171	rc	A	Brechen	Hessen
172	rc	A	Selters	Hessen
173	rc	I	Saalburg	Hessen
174	qzt	A	Köppern	Rheinland-Pfalz
175	rc	A	Schiffenberger Forst	Hessen
176	qs	A	Treis	Hessen
177	bx	I	Eiserne Hose	Hessen
178	qs	A	Rauischholzhausen	Hessen
179	qs	A	Homberg	Hessen
180	rc	A	Orleshausen	Hessen
181	fd	O	Hohen Vogelsberg	Hessen
182	rc	A	Bad Neustadt	Bayern
183	rc	I	Unsleben	Bayern
184	rc	I	Unterloquiz	Thuringen
185	rc	A	Kamsdorf	Thuringen
186	qf	O	Langenorla	Thuringen
187	qf	O	Altendorf	Thuringen
188	qs	A	Lausnitz	Thuringen
189	rc	A	Tegau	Thuringen
190	rc	A	Tschirma	Thuringen
191	fd	O	Blauenthal	Sachsen
192	rc	A	Niederplanitz	Sachsen
193	rc	A	Crimmitschau	Sachsen
194	rc	I	Pleiße	Sachsen
195	rc	A	Untschen	Thuringen
196	rc	A	Aga	Thuringen
197	rc	A	Saasa	Thuringen
198	rc	A	Königshofen	Thuringen
199	ka	A	Grana	Sachsen-Anhalt
200	qs	A	Nobitz	Thuringen
201	rc	A	Haselbach	Thuringen
202	ka	A	Profen	Sachsen-Anhalt
203	ka	A	Roßbach	Sachsen-Anhalt
204	al	A	Teutschenthal	Sachsen-Anhalt
205	ka	A	Röblingen	Sachsen-Anhalt
206	ka	I	Salzmünde	Sachsen-Anhalt
207	ka	A	Möderau	Sachsen-Anhalt
208	ka	I	Gerlebogk	Sachsen-Anhalt
209	na	A	Bernburg	Sachsen-Anhalt
210	rc	A	Reetz	Brandenburg
211	qs	A	Ziezow	Brandenburg
212	qs	A	Linthe	Brandenburg
213	qs	A	Rietz	Brandenburg
214	ka	A	Frohnsdorf	Brandenburg
215	qs	A	Nudersdorf	Sachsen-Anhalt
216	rc	A	Jüdenberg	Sachsen-Anhalt
217	al	A	Zschornewitz	Sachsen-Anhalt
218	rc	I	Bad Schmiedeberg	Sachsen-Anhalt
219	rc	A	Liebertwolkwitz	Sachsen
220	rc	A	Brandis	Sachsen
221	ka	A	Hohnstädt-Grimma	Sachsen
222	ka	A	Gröppendorf	Sachsen
223	ka	A	Canitz	Sachsen
224	fd	I	Dobritzer	Sachsen
225	li	O	Sadisdorf	Sachsen
226	li	I	Altenberg	Sachsen
227	li	I	Zinnwald	Sachsen
228	ka	A	Seilitz	Sachsen
229	ka	A	Ockrilla	Sachsen
230	ka	A	Radeburg	Sachsen
231	qs	A	Laussnitz	Sachsen
232	qs	A	Haida-Strauch	Sachsen
233	rc	A	Poley	Brandenburg
234	rc	A	Lichterfeld	Brandenburg
235	rc	I	Crinitz	Brandenburg
236	rc	A	Buchwäldchen	Brandenburg
237	rc	A	Welzow	Brandenburg
238	qs	A	Hohenbocka	Brandenburg
239	ka	A	Cunnersdorf	Sachsen
240	ka	A	Wiesa	Sachsen

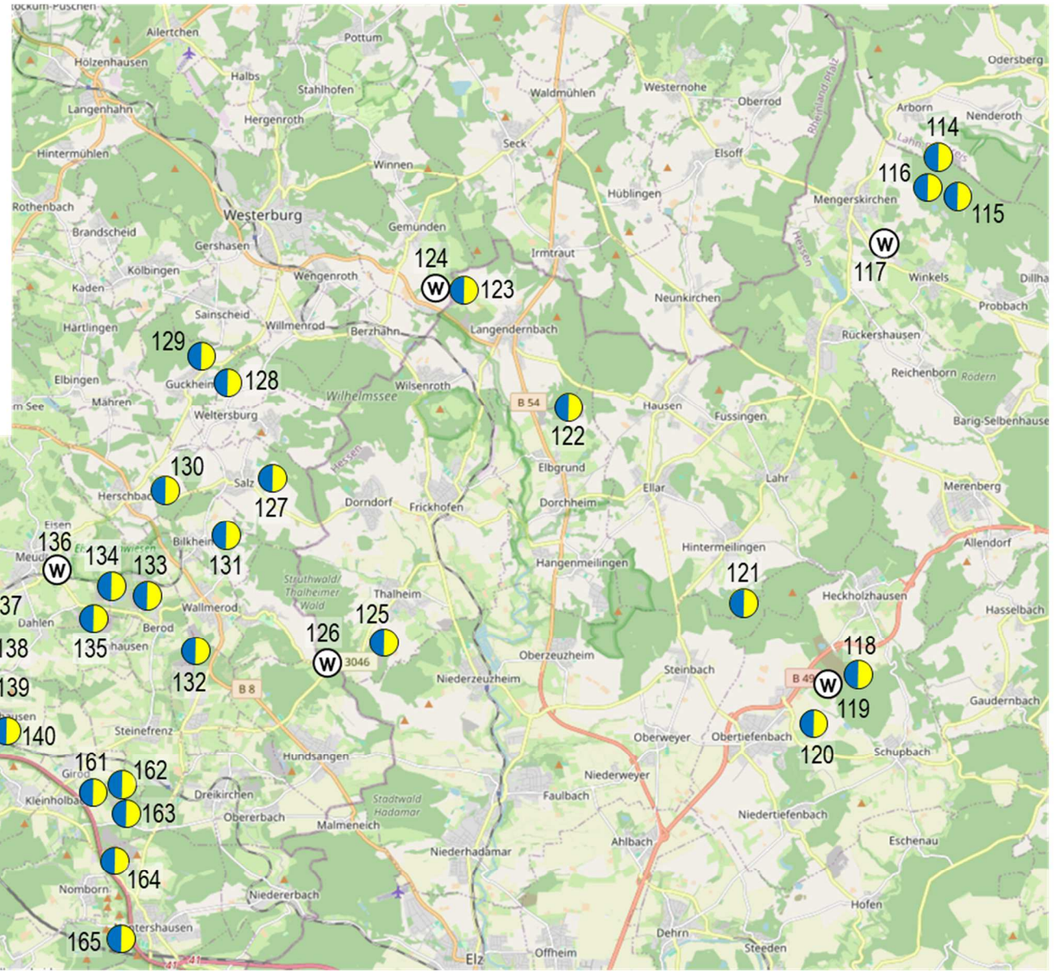
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)







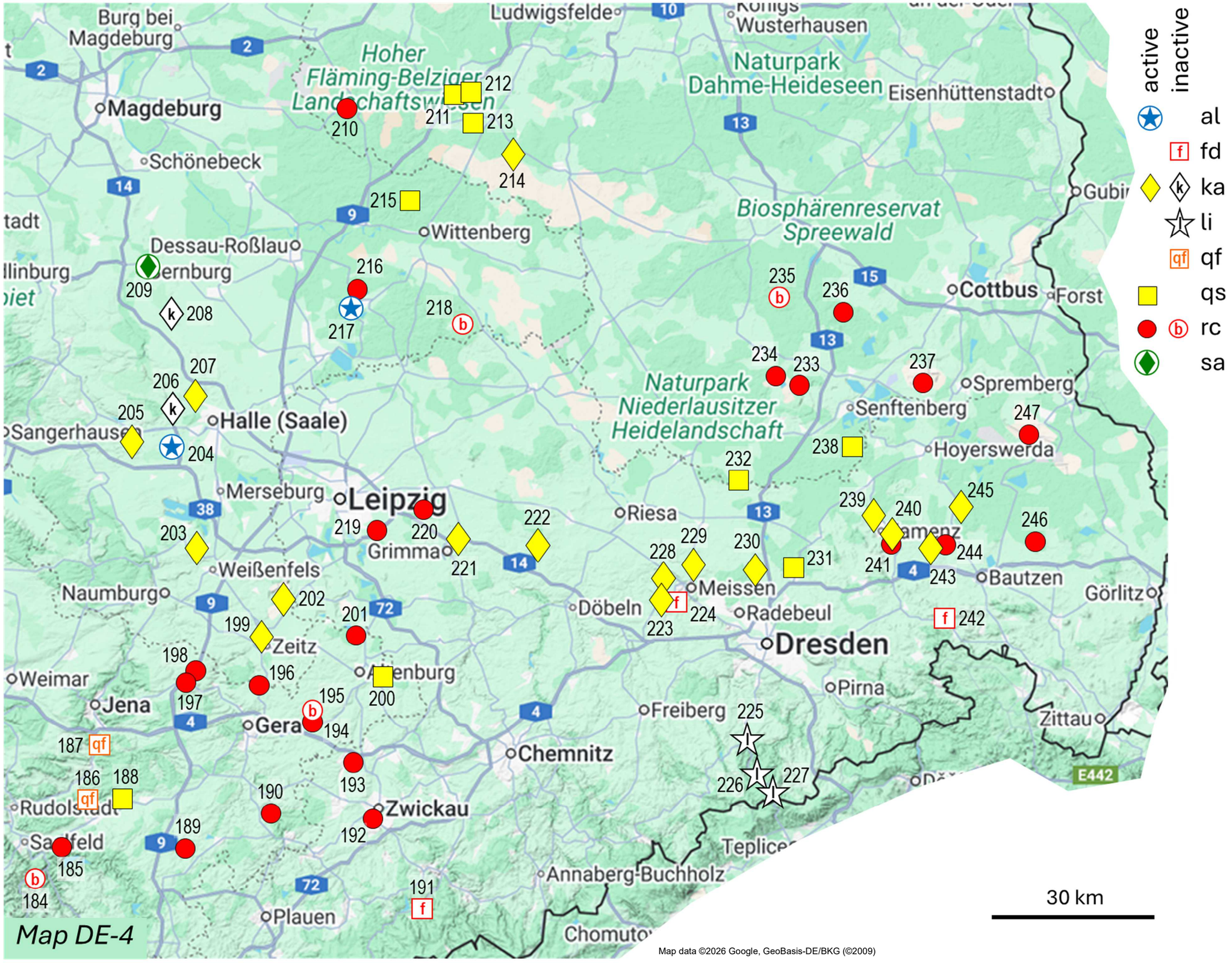


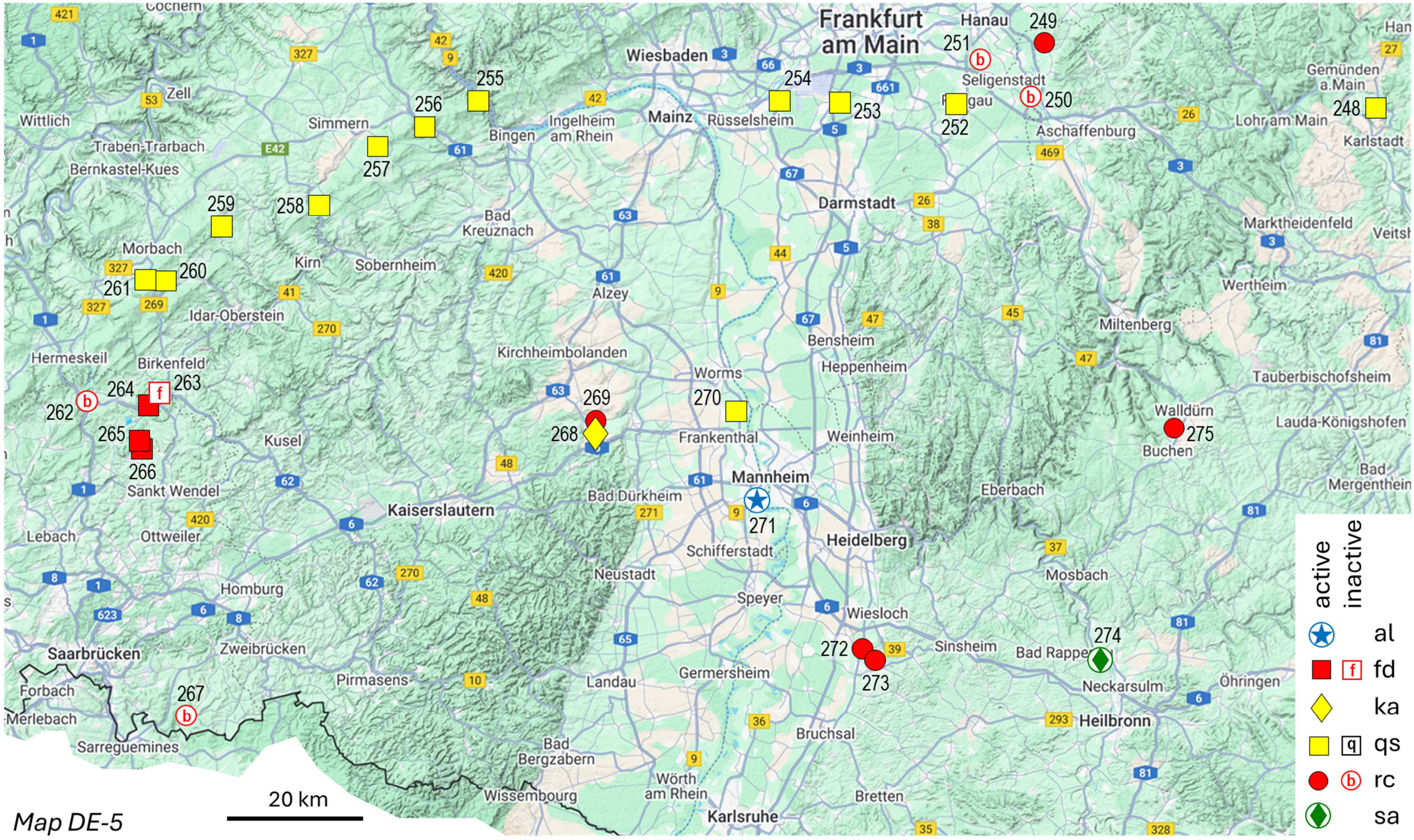


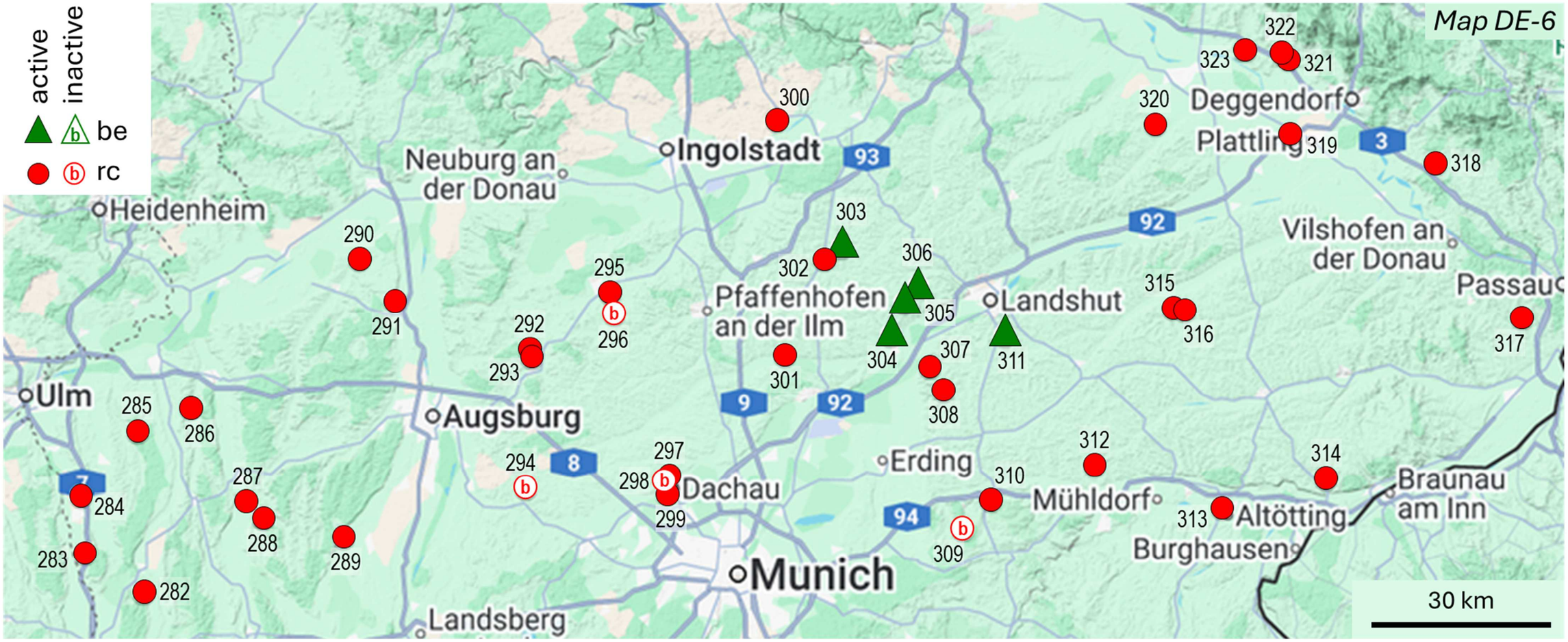
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Table DE-c: deposits of raw materials for the ceramic and glass industries in Germany.

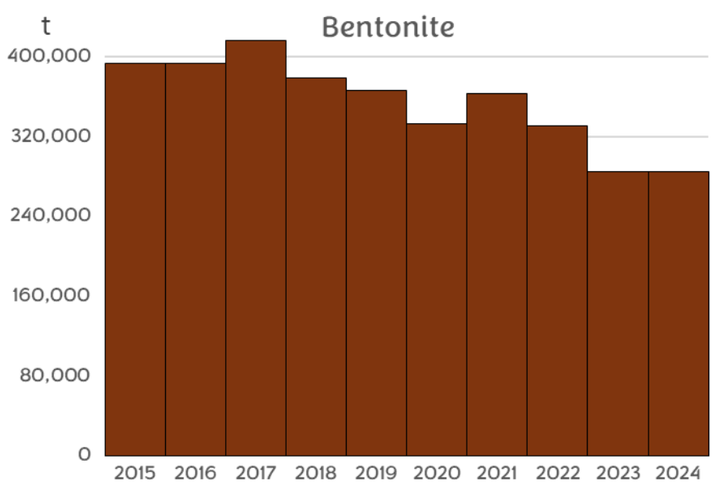
#	r.m.	st	deposit	Land
241	rc	A	Wiesa (Bautznerstr.)	Sachsen
242	fd	O	Lausitz	Sachsen
243	ka	A	Jessnitz	Sachsen
244	rc	A	Wetro	Sachsen
245	ka	A	Caminau	Sachsen
246	rc	A	Guttau	Sachsen
247	rc	A	Nochten	Sachsen
248	qs	A	Gambach	Bayern
249	rc	A	Alzenau	Bayern
250	rc	I	Mainflingen	Hessen
251	rc	I	Hainstadt	Hessen
252	qs	A	Rodgau	Hessen
253	qs	A	Langen	Hessen
254	qs	A	Raunheim	Hessen
255	qz	A	Sooneck	Rheinland-Pfalz
256	qz	A	Alexandra	Rheinland-Pfalz
257	qz	A	Argenthal	Rheinland-Pfalz
258	qz	A	Henau	Rheinland-Pfalz
259	qz	A	Stipshausen	Rheinland-Pfalz
260	qz	A	Wirschweiler	Rheinland-Pfalz
261	qz	A	Morscheid	Rheinland-Pfalz
262	rc	I	Mariahütte	Saarland
263	fd	I	Ellweiler	Rheinland-Pfalz
264	fd	A	Türkismühle	Saarland
265	fd	A	Steinberg-Deckenhart	Saarland
266	fd	A	Güdesweiler	Saarland
267	rc	I	Gersheim	Saarland
268	ka	A	Eisenberg	Rheinland-Pfalz
269	rc	A	Kerzenheim	Rheinland-Pfalz
270	qs	A	Worms	Rheinland-Pfalz
271	al	A	Ludwigshafen	Rheinland-Pfalz
272	rc	A	Malschenberg	Baden-Württemberg
273	rc	A	Rettigheim	Baden-Württemberg
274	na	A	Bad Wimpfern	Baden-Württemberg
275	rc	A	Hainstadt	Baden-Württemberg
276	qs	A	Malsch	Baden-Württemberg
277	ba	A	Grube Clara	Baden-Württemberg
278	rc	A	Wittershausen	Baden-Württemberg
279	qz	I	Brittheim	Baden-Württemberg
280	qs	A	Rengetsweiler	Baden-Württemberg
281	rc	A	Mengen	Baden-Württemberg
282	rc	A	Klosterbeuren	Bayern
283	rc	A	Untereichen	Bayern
284	rc	A	Bellenberg	Bayern
285	rc	A	Autenried	Bayern
286	rc	A	Wettenhausen	Bayern
287	rc	A	Balzhausen	Bayern
288	rc	A	Kirrberg	Bayern
289	rc	A	Königshausen	Bayern
290	rc	A	Buttenwiesen	Bayern
291	rc	A	Langenreichen	Bayern
292	rc	A	Oberbernbach	Bayern
293	rc	A	Aichach	Bayern
294	rc	I	Baindlkirch	Bayern
295	rc	A	Ried	Bayern
296	rc	I	Aresing	Bayern
297	rc	A	Webling	Bayern
298	rc	I	Webling-II	Bayern
299	rc	A	Mitterndorf	Bayern
300	rc	A	Ettling	Bayern
301	rc	A	Lumbach	Bayern
302	rc	A	Puttenhausen	Bayern
303	be	A	Sandelzhausen	Bayern
304	be	A	Moosburg	Bayern
305	be	A	Gammelsdorf	Bayern
306	be	A	Eggersdorf	Bayern
307	rc	A	Buch am Erlbach	Bayern
308	rc	A	Vatersdorf	Bayern
309	rc	I	Isen	Bayern
310	rc	A	Dorfen	Bayern
311	be	A	Siegerstetten-Zweikirchen	Bayern
312	rc	A	Oberbergkirchen	Bayern
313	rc	A	Neuötting	Bayern
314	rc	A	Gesteig	Bayern
315	rc	A	Marklkofen	Bayern
316	rc	A	Mullerod	Bayern
317	rc	A	Fürstenzell	Bayern
318	rc	A	Dingstetten	Bayern
319	rc	A	Plattling	Bayern
320	rc	A	Hirschkofen	Bayern
321	rc	A	Lindforst	Bayern
322	rc	A	Gaißing	Bayern
323	rc	A	Bogen	Bayern
324	rc	A	Pentlhof	Bayern
325	rc	A	Teublitz	Bayern
326	wc	A	Klardorf	Bayern
327	rc	A	Hermannsdorf	Bayern
328	rc	A	Deiselkühn	Bayern
329	rc	A	Ansbach	Bayern
330	rc	A	Langenzenn-I	Bayern
331	rc	A	Langenzenn-II	Bayern
332	rc	A	Großbellhofen	Bayern
333	rc	A	Schonlind	Bayern
334	rc	I	Vilseck	Bayern
335	qs	A	Gebenbach*	Bayern
336	rc	A	Freihungsand	Bayern
337	qs	A	Freihungsand	Bayern
338	ka-qz-fd	A	Thansüß	Bayern
339	ka-qz-fd	A	Hirschau-Schnaitterberg	Bayern
340	ka-qz-fd	I	Schlemm	Bayern
341	fd-li	A	Silbergrube	Bayern
342	li	O	Cornelia-Hagendorf	Bayern
343	ka-qz-fd	A	Ruppreschtsreuth	Bayern
344	ka-qz-fd	A	Creussen	Bayern
345	rc	A	Bühl	Bayern
346	ec	A	Buttenheim	Bayern
347	ka-qz-fd	A	Tirschenreuth	Bayern
348	ka-qz	A	Waldershof	Bayern
349	rc	A	Troschenreuth	Bayern
350	rc	A	Pechgraben	Bayern
351	rc	A	Großheirath	Bayern
352	ka-qz	A	Wellmersdorf	Bayern
353	qf	I	Neuhaus-Schierschnitz	Thuringen
354	rc	A	Hüttengrund	Thuringen
355	fd	O	Bergen	Sachsen

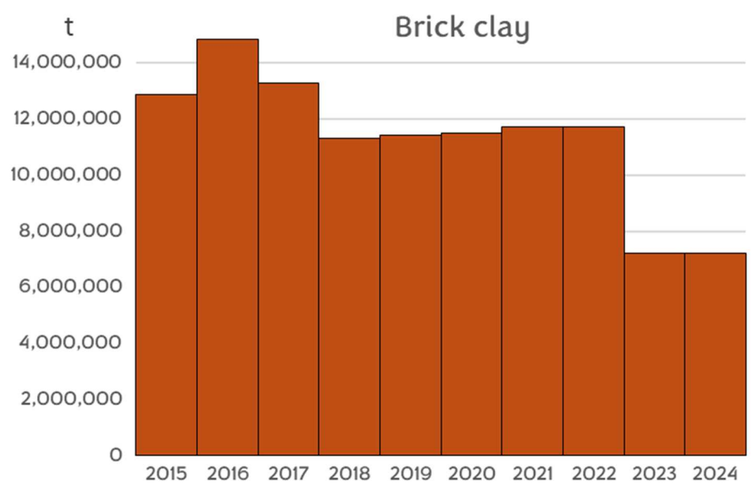

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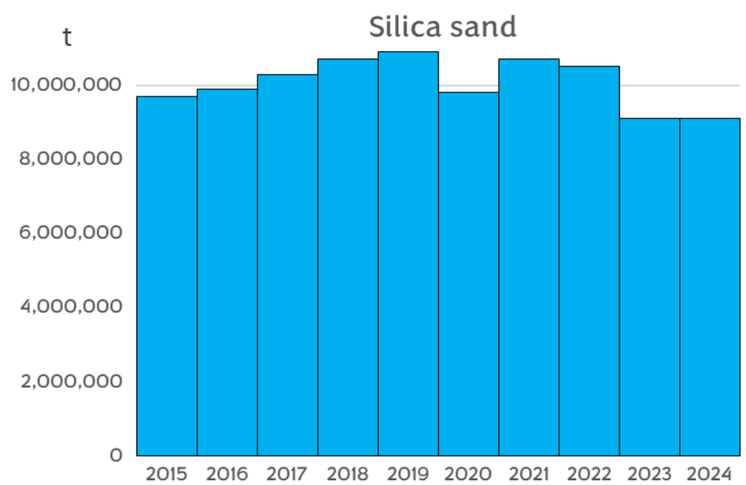

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Kirn
Sobernheim
Idar-Oberstein
Morbach
Simmern
Traben-Trarbach
Bernkastel-Kues
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Weinheim
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Marktheidenfeld
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Gemünden a.Main
Karlstadt
Tauberbischofsheim
Lauda-Königshofen
Walldürn
Buchen
Eberbach
Mosbach
Neckarsulm
Heilbronn
Öhringen
Bad Rappenau
Sinsheim
Bruchsal
Bretten
Karlsruhe
Wörth am Rhein
Bad Bergzabern
Landau
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Speyer
Wiesloch
Schifferstadt
Neustadt
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Wissembourg
Sankt Wendel
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Map DE-5
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)



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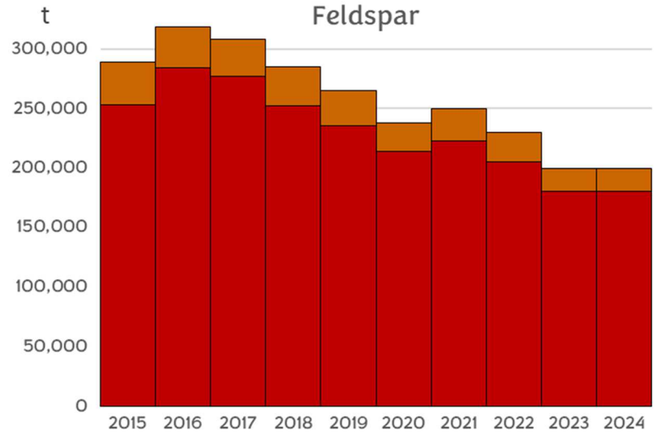


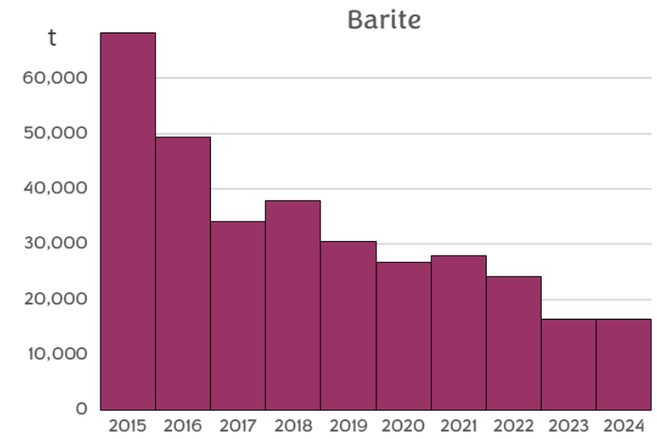


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Map DE-7

Greece

Greece is a major player in the glass and ceramic raw materials sector: the second largest producer in the Euro-Mediterranean area of bentonite, bauxite, and perlite; the fifth largest of alumina and chromite; the sixth largest of magnesite. Red clays and zeolites are also extracted, as well as minor amounts of kaolin, quartz, olivine, huntite, and volcanics for stone wool. Moreover, occurrences of feldspar, fireclay, barite, borates, celestine, kyanite, talc and wollastonite are reported [1-5].

Bentonite: Plio-Pleistocene deposits are extensively mined (1,146,000 tpa, average 2015-2024). They took origin from either the alteration of volcaniclastics under submarine conditions in the island of Milos (*Map GR-4*) [6-9] or the transformation of sediments derived from ultrabasic rocks in the Ventzia basin [10,11]. Other bentonites, in Thrace and the islands of Chios and Samos, are not currently exploited [12].

Bauxite is extracted (1,455,000 tpa on average) by several mines operating in three main districts in Central Greece (*Map GR-3*): Mount Parnassos, Mount Ghiona, and Mount Koromilia. Bauxite karst deposits occur as three horizons that are hosted within Upper Jurassic to Late Cretaceous shallow water limestones [13,14]. These important resources have given rise to an aluminium manufacturing chain with plant in Aghios Nikolaos, which has produced an average of 838,000 tpa of **alumina** [5]. Further occurrences of karstic bauxite are known in central-southern Greece but are not being exploited [2,14].

Perlite: large deposits formed during the Pliocene in the Aegean volcanic arc, where they are actively exploited on the Island of Milos (34,700 tpa, mean 2015-2024) and, in the past, also on the Kimolos island [15]. Reserves are indicated to be around 180 million tonnes [16].

Magnesite is obtained (366,000 tpa on average) from two mining poles, both exploiting ophiolites of the Chalkidiki Peninsula, where deposits (Vavdos, Gerakini) pertain to the Vardar Zone [17,18], and the Evia island (*Map GR-2*), where various mines are active [19]. The genesis of magnesite veins is by transformation of dunites and serpentinites under the action of hydrothermal [17] or meteoric [19] fluids. Reserves are estimated to be around 280 million tonnes [16]. In addition, **huntite**-hydromagnesite assemblages are the object of mining (16,600 tpa on average) in Western Macedonia [20].

Chromite is mined (6,900 tpa on average) from the Vourinos ophiolite complex, where chrome ore bands occur in harzburgite tectonite in the Xerolivado mine [21] and surrounding deposits [22]. Chromite is also found, in similar settings, in the East Othris ophiolite (Eretria) and in the Chalkidiki peninsula [2,23]. **Olivine** is also extracted at Vourinos, as dunite (17,300 tpa on average) while analogous occurrences are reported in the Pindos and Othris ophiolite complexes, for a substantial amount of reserves [1].

Red clays are being excavated (quantity undisclosed) to feed the domestic bricks and roof tiles industry in a dozen quarries, mostly located in the Athens, Thessaloniki, and Patras surroundings, while at least as many have been abandoned in the last decade. Quaternary alluvial and lacustrine deposits are exploited in Attica and Macedonia, where Neogene red beds are also quarried [24,25]; in northern Peloponnese, Plio-Pleistocene marine (shallow-water) marls are the main target of the brick industry [26-28]. **Fireclay** horizons, occurring within Neogene continental successions, could constitute by-products of lignite excavation in the Florina and Servia basins, in western Macedonia [29-31].

Zeolites occur in altered pyroclastic rocks, with large deposits in Thrace and the Aegean region [32], which are currently mined (the amount is not disclosed). In the western Aegean, zeolitic tuffs (predominantly mordenite) were deposited during Pliocene in the islands of Kimolos and Poliegos, in nearshore and continental environment, respectively [32-35]. Zeolitized deposits are present in shallow marine basins with Oligocene pyroclastic rocks in Thrace [32,36-38]: Metaxades-Petrota (heulandite) and Lefkimi-Ferrai (clinoptilolite and mordenite) or with Neogene tuffs in Limnos island [1]. In the eastern Aegean, zeolites (clinoptilolite and analcime) occur in a Miocene lacustrine-evaporitic sequence (Karlovasi basin, Samos island) together with **borates** [32,39,40].

Kaolin: Greek production peaked at 202,000 tonnes in 1992, then declined until it ceased in 2009 [4] although the Kastriani pit (Milos Island) still appears to be in operation. The deposits originated from the hydrothermal alteration of Plio-Pleistocene rhyolitic pyroclastics on the islands of Kimolos and Milos [41-42] or of Miocene andesites and latites on the islands of Lesbos and Kos [43]. In Macedonia, kaolin deposits derived from weathering of gneiss at Lefkogia [44-46] or from hydrothermal alteration and weathering of gabbro at Griva in the Jurassic ophiolitic complex of Geuvgueli [47,48].

Industrial silica is obtained (84,000 tpa on average) from quartz hydrothermal veins hosted in the metamorphic basement of the Serbo-Macedonian massif, with 2 million tonnes of reserves [1,49,50]. Quartz vein occurrences are reported also throughout the Pelagonian Zone and the Cycladic massif [1,51]. The quartz sand deposit in Kastoria, amounting to 1.2 million tonnes, is not exploited [1].

Feldspar production ceased in 2013 (peaking to 105,000 tonnes in 2005) although estimated reserves amount to 50 million tonnes [1,4]. Sodic feldspar was extracted from an albitite in the Serbo-Macedonian massif north of Thessaloniki, while potassic feldspar was mined in Thrace (Paranesti). Resources of aplites and pegmatites are reported in Rhodope massif and Samothrace Island [1,52,53].

Basalt for the production of stone wool is extracted at Laguna, in Macedonia.

Barite deposits occur in Thrace and Thassos Island, where extraction ceased in 2006 (peak production: 10,500 tonnes in 1989). Quaternary pyroclastic rocks, hydrothermally mineralized by barite (and Mn oxides) are reported on the Island of Milos [54]. **Talc** was exploited until 2012 (peak production 25,000 tonnes in 1984) in the Divouno deposit, which is hosted in serpentinites of the Serbo-Macedonian massif; reserves were indicated in 700,000 tonnes [1]. **Wollastonite** deposits were formed by contact metamorphism of Oligocene granites on calcitic marbles in the pre-Alpine Rhodope zone (Panorama and Kimeria); estimated reserves for both prospects are 1.3 million tonnes [1,55]. **Kyanite** is present in metapelitic schists and gneisses at various localities in the Southern Rhodope Core Complex (Thassos island) and the Sideroneron massif [1,56]. **Celestine** occurs in Triassic evaporites in eastern Macedonia and Thrace, as well in the External Hellenides [57].

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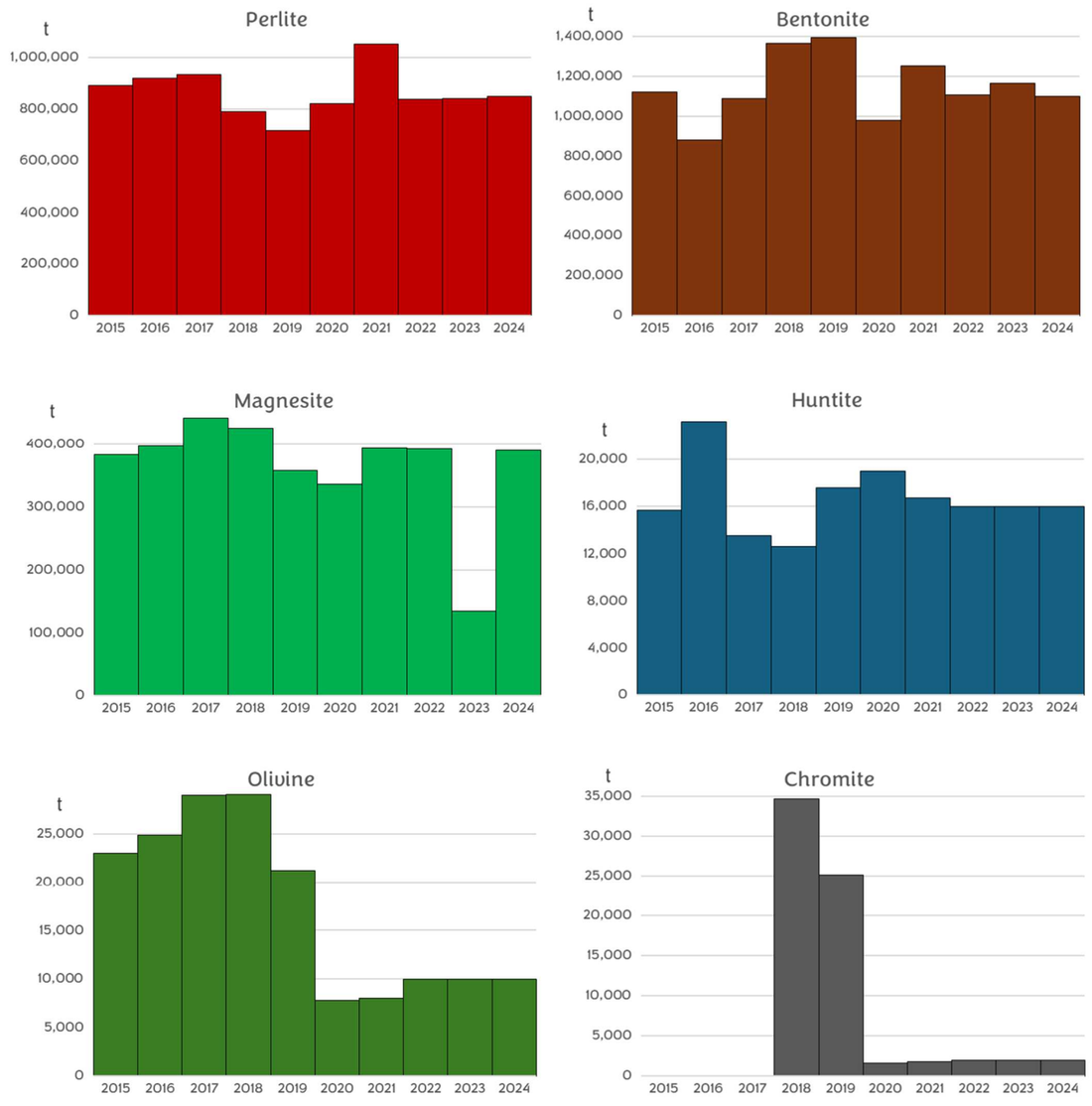


Table GR-a: deposits of raw materials for the ceramic and glass industries in Greece.

#	raw material	status	deposit	municipality
1	rc	A	Danika	Amaliada
2	rc	A	Chanakia	Pyrgos
3	rc	I	Xylokastro	Corinth
4	rc	A	Aspropyrgos	West Attica
5	rc	A	Schimatari-Viotia	Tanagra
6	rc	A	Vassiliko-Evia	Chalkida
7	rc	A	Eretria	Eubea
8	mg	I	Limni Triadas	Messapia
9	mg	A	Cheira Lakka	Messapia
10	mg	A	Stavros	Messapia
11	mg	A	Skopilia Vrisi	Messapia
12	mg	A	Pagontas	Messapia
13	mg	A	Koutzi, Prokopi	Aghia Anna
14	mg	I	Mantoudi	Aghia Anna
15	mg	A	Troupi	Aghia Anna
16	al	A	Aghios Nikolaos	Antikyra
17	bx	A	Mount Parnassos district	Amphissa
18	bx	A	Mount Ghiona district	Gravia
19	bx	A	Mount Koromilia district	Gravia
20	cr	I	Domokos Fthiotida	Domokos
21	cr	A	Eretria	Farsala
22	ol	I	Pindos	Karditsa
23	qz	I	Kalochori	Larisa
24	ol	I	Grevena	Grevena
25	be	A	Velanida	Kozani
26	be	A	Harami	Kozani
27	be	A	Pefkaki	Grevena
28	cr-ol	A	Xerolivado-Rodiani	Kozani
29	ol	A	Vourinos	Kozani
30	hu-mg	I	Lefkada-Neirada	Kozani
31	qz	I	Argos Orestikos	Kastoria
32	qz	O	Veria	Imathia
33	rc	O	Achlada	Achlada
34	rc	I	Katerini	Katerini
35	rc	A	Nea Potidea	Halkidiki
36	qz-fd	I	Sithonia	Chalkidiki
37	mg	A	Poligiros	Chalkidiki
38	mg-ol-cr	A	Gerakini-Ormylia	Chalkidiki
39	rc	I	Agyos Panteleimon	Chalkidiki
40	mg-ol	A	Vavdos	Chalkidiki
41	mg	A	Thermi	Chalkidiki
42	rc	I	Langadas	Lagadas
43	rc	A	Chalastra	Chalastra
44	rc	I	Chalastra 2	Chalastra
45	rc	I	Sindos	Delta
46	rc	I	Chalkidona	Thessaloniki
47	rc	A	Paralimon	Pella
48	rc	A	Axos	Giannitsa
49	rc	I	Palefito	Pella
50	rc	I	Kallipoli	Giannitsa
51	ka	I	Gríva	Goumenissa
52	rc	A	Nea Santa	Kilkis
53	fd	I	Assiros	Lagadas
54	rc	I	Kristoni	Kilkis
55	tc	O	Divouno	Kilkis
56	rc	I	Skoutari	Serres
57	ka	I	Leukogia	Drama
58	wo	O	Panorama	Serres
59	sr	O	Pirgi	Drama
60	ky	O	Sidironero	Drama
61	fd	I	Paranesti	Drama
62	ky	O	Sotiras	Thassos
64	ba	I	Kalussia	Thassos
64	wo	O	Kimeria	Xanthi
65	ky	O	Thermes	Xanthi
66	ze	A	Petrota	Trigono
67	ze	O	Pentalofos	Trigono
68	ze	I	Metaxades	Metaxades
69	tc	O	Smigada	Arriana
70	ba	O	Strofis	Arriana
71	sr	O	Organi	Arriana
72	be	O	Sapes	Sapes
73	ze	A	Skaloma	Arriana
74	ze-be	I	Feres	Alexandroupoli
75	fd	O	Alonia	Samothraki
76	fd	O	Brehos	Samothraki
77	fd	O	Anginaros	Samothraki
78	ze	A	Atsiki	Lemnos
79	ka	I	Aspres Petres	Lesbo
80	ka	I	Arghenos	Lesbo
81	ka	I	Stypsi	Lesbo
82	be	O	Thymiana	Chios
83	bo-ze	I	Karlovasi basin	Samos
84	be	O	Neochori, Platanos	Samos
85	ka	I	Kefalos	Kos
86	be	A	Prassa	Kimolos
87	ze	A	Prassa	Kimolos
88	be	A	Voudia	Milos
88	pe	I	Psathi	Kimolos
89	ze	O	Poliegos	Kimolos
90	be	A	Aggerias	Milos
92	be	A	Agios Gerasimos	Milos
93	be	I	Ano Komia	Milos
94	ka	A	Kastriani	Milos
95	be	A	Theyoricheia	Milos
96	pe	I	Zephyria	Milos
97	ka	I	Paleohori	Milos
98	pe	A	Kalamos	Milos
99	pe	A	Fyriplaka	Milos
100	pe	A	Provatas	Milos
101	ka	O	Thiaphes	Milos
102	pe	A	Trachyla	Milos
103	ba	O	Fourkovouni	Milos
104	ba	O	Cape Vani	Milos
105	ka	I	Kontaros	Milos
106	ka	I	Rallaki	Milos
107	ba	O	Galana	Milos
108	ba	O	Triades	Milos
109	qz	O	Profitis Elias	Ios
110	sw	A	Laguna	Lagadas

Raw material

al	alumina (artificial)
ba	barite
be	bentonite, smectitic clays
bo	borates
bx	bauxite
cr	chromite
fd	feldspar, feldspathic rocks
hu	huntite
ka	kaolin
ky	kyanite, andalusite, sillimanite
mg	magnesite, hydromagnesite
ol	olivine, dunite
pe	perlite
qz	quartz, silica sand
rc	red clays (bricks, tiles, pottery)
sr	celestite (strontium minerals)
sw	basalt for stone wool
tc	talc, steatite
wo	wollastonite
ze	zeolitic tuffs

Status of deposit

A	active mine
I	inactive, mine closed
O	occurrence, no recent mining

100 km

Greece

Map GR-1

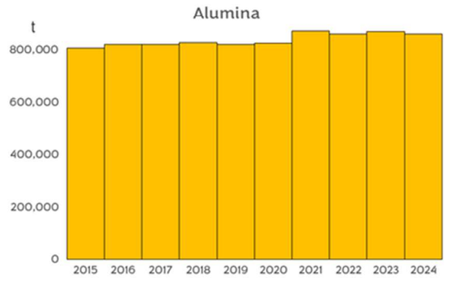
Map GR-2

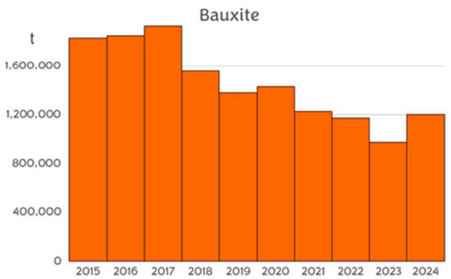
Map GR-3

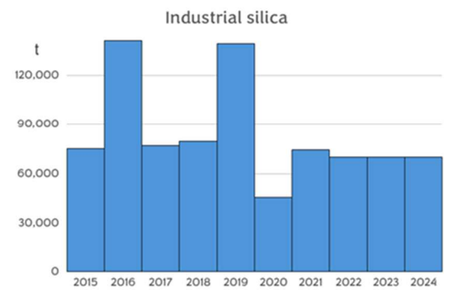
Map GR-4

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active	inactive		active	inactive	
◆	◇ k	ka	▲	▽ z	ze
◆	◇ x	bx	▲	△ b	be
●	ⓑ	rc	▲	△ p	pe
■	q	qz		k	ky
	f	fd	⬟	⬠ o	ol
◆		al	⬟	c	cr
▲		sw		w	wo
☆		sr	⬢	m	mg
				t	tc
				ⓑ	ba
			☆	ⓑ	bo





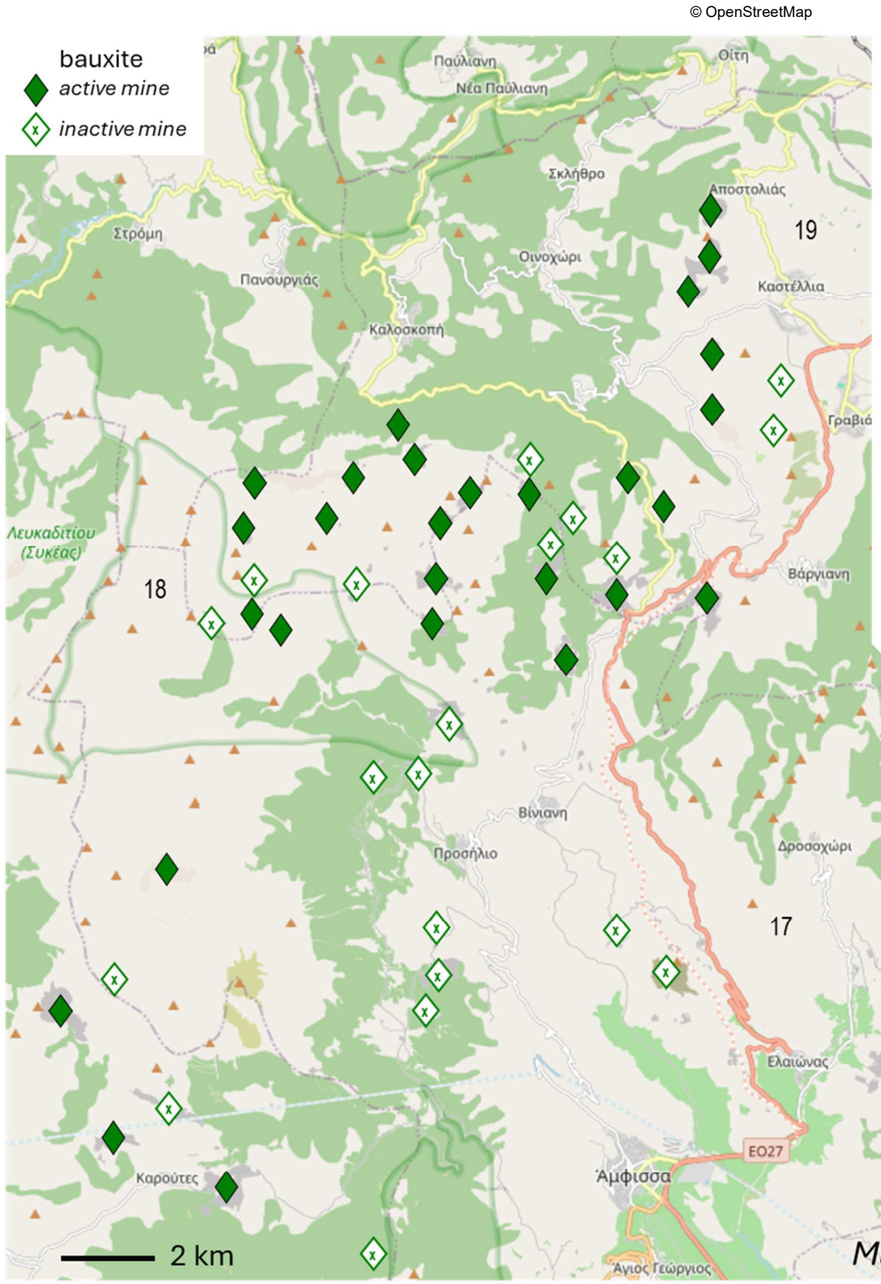


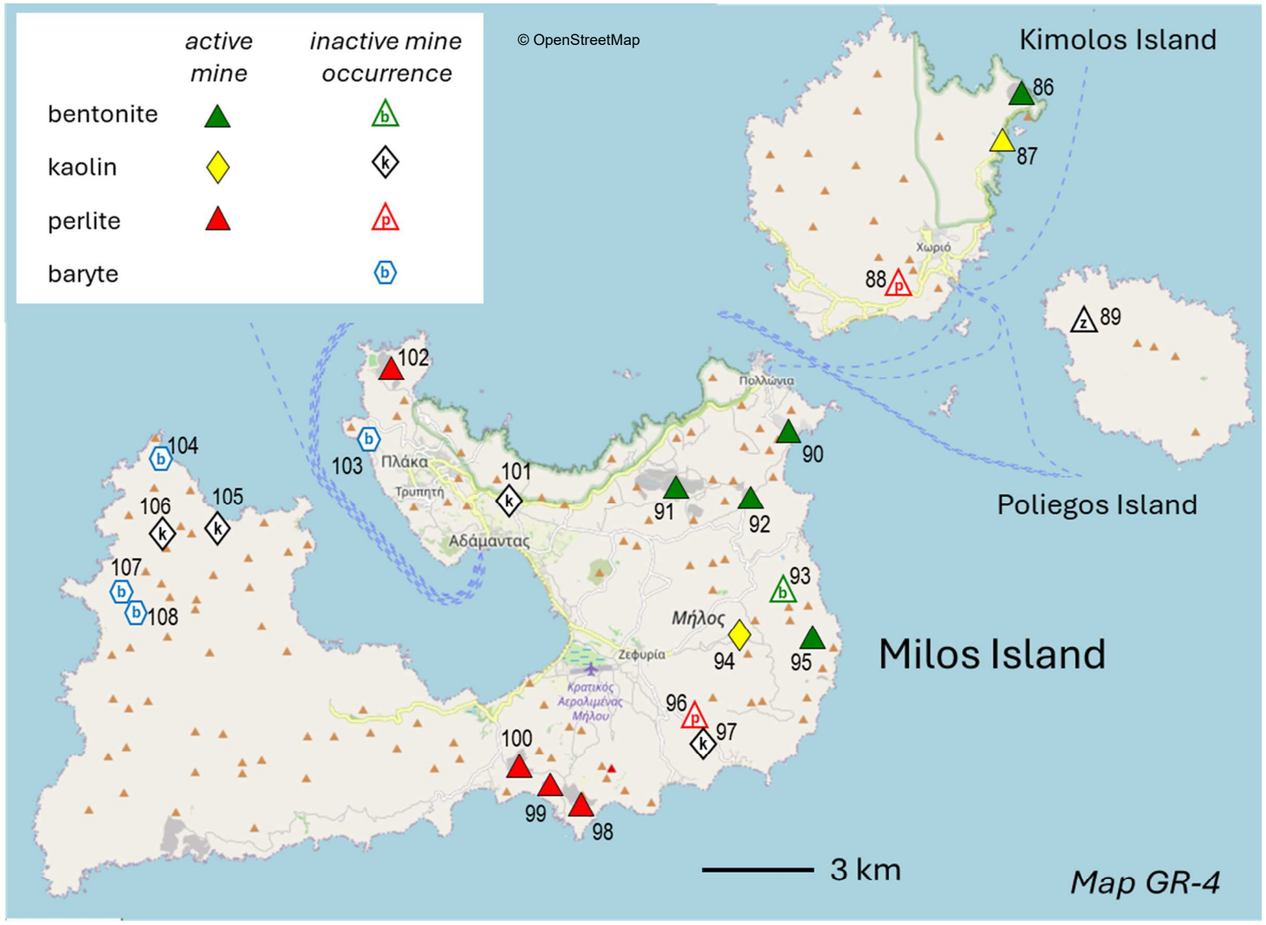
Maps of mining districts:

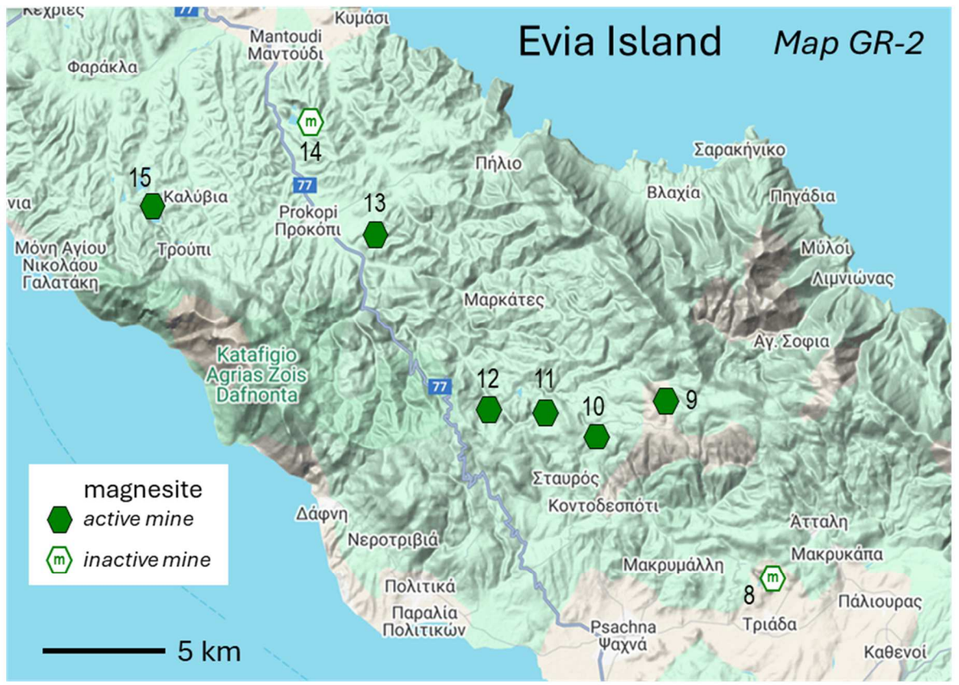
GR-2: Evia Island, Central Greece

GR-3: Mount Parnassos-Mount Ghiona, Central Greece

GR-4: Milos-Kimolos-Poliegos islands, South Aegean







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Hungary

Hungary is a major producer of perlite and zeolites (for both, fifth in the Euro-Mediterranean area) as well as synthetic alumina. Otherwise, Hungarian production of glass and ceramic raw materials is aimed at covering domestic demand: mainly red clays for bricks and roof tiles, as well as silica and quartz-feldspathic sands, bentonite, ball clays and refractory clays. The extraction of kaolin, bauxite and talc has ceased in recent decades [1-3].

Perlite has been extracted (55,000 tpa, 2015-2024 mean) between Pálháza and Telkibánya in the Tokaj Mountains (*Map HU-2*) since 1956, for a total amount of more than 3.7 million tonnes [1,2,4]. Submarine extrusions formed rhyolite-rhyodacite domes, including perlite bodies, emplaced into Miocene sediments [4-6].

Zeolites occur within altered rhyolite tuffs in the southern margin of the Tokaj Mountains (*Map HU-2*). Two mines are currently in operation (32,000 tpa on average) on the Rátka clinoptilolite-rich deposit [7,8] and at Bodrogkeresztur, where mordenite predominates over clinoptilolite [8].

Red clays are excavated in about twenty quarries with an average production of 1,388,000 tpa in the decade 2015-2024 [1]. Pliocene-Pleistocene continental deposits (red loams and loess) are exploited in the Pannonian and the Vienna basins [9,10], while Eocene-Oligocene marine sediments (marly clays) are utilised in North Hungarian Mountains [11].

Bentonite: several occurrences are known, with different genetic conditions, along a NNE-SSW oriented belt from the Tokaj Mountains to Lake Balaton. Two deposits have been exploiting, which took origin from the alteration of basaltic volcanics at Egyházaskesző or rhyodacitic tuffs at Külső-Gombási út [12-16].

Alumina is produced at the Ajka plant with an average of 277,000 tpa in the 2015-2024 period [1,2]. The alumina manufacturing chain from Hungarian raw materials was active until 2019, when **bauxite** production, peaking at 3 million tonnes in 1986, officially ceased [3]. Nevertheless, two mines in the Bakony and Vértes Mountains still appear to be operating on Cretaceous bauxite karst deposits [17,18].

Quartz sands are extracted from Quaternary fluvio-lacustrine deposits near Székesfehérvár, while arkosic sands and gravels are exploited in the Mecsek Mountains from Miocene lacustrine sediments [19,20]. Hungarian production is 97,000 tpa [2].

Kaolin production in Hungary (maximum 64,000 tonnes in 1984) officially ceased in 2008 [3]. The Szegilong and Mád kaolin and bentonite deposits, originating from the alteration of Miocene felsic volcaniclasts [21-23], are no longer exploited. However, the Sárisáp mine is apparently active, even though not productive.

White clay: both the Felsőpetény deposit, which exploits Oligocene reworked residual clay [23,24] and the Sárospatak deposit, in Miocene lacustrine sediments [23,25], are in operation. The Miocene illitic clays of the Füzérradvány deposit are no longer mined [26-28].

Talc: Hungarian production (peaking at 16,000 tpa in 1970-1972) has ceased since 2005 [3]. Leucophyllite deposits (chlorite-sericite-quartz mixtures), generated by Mg-metasomatism on a Lower Austroalpine orthogneiss-micachist complex, were exploited in western Hungary [29-31].

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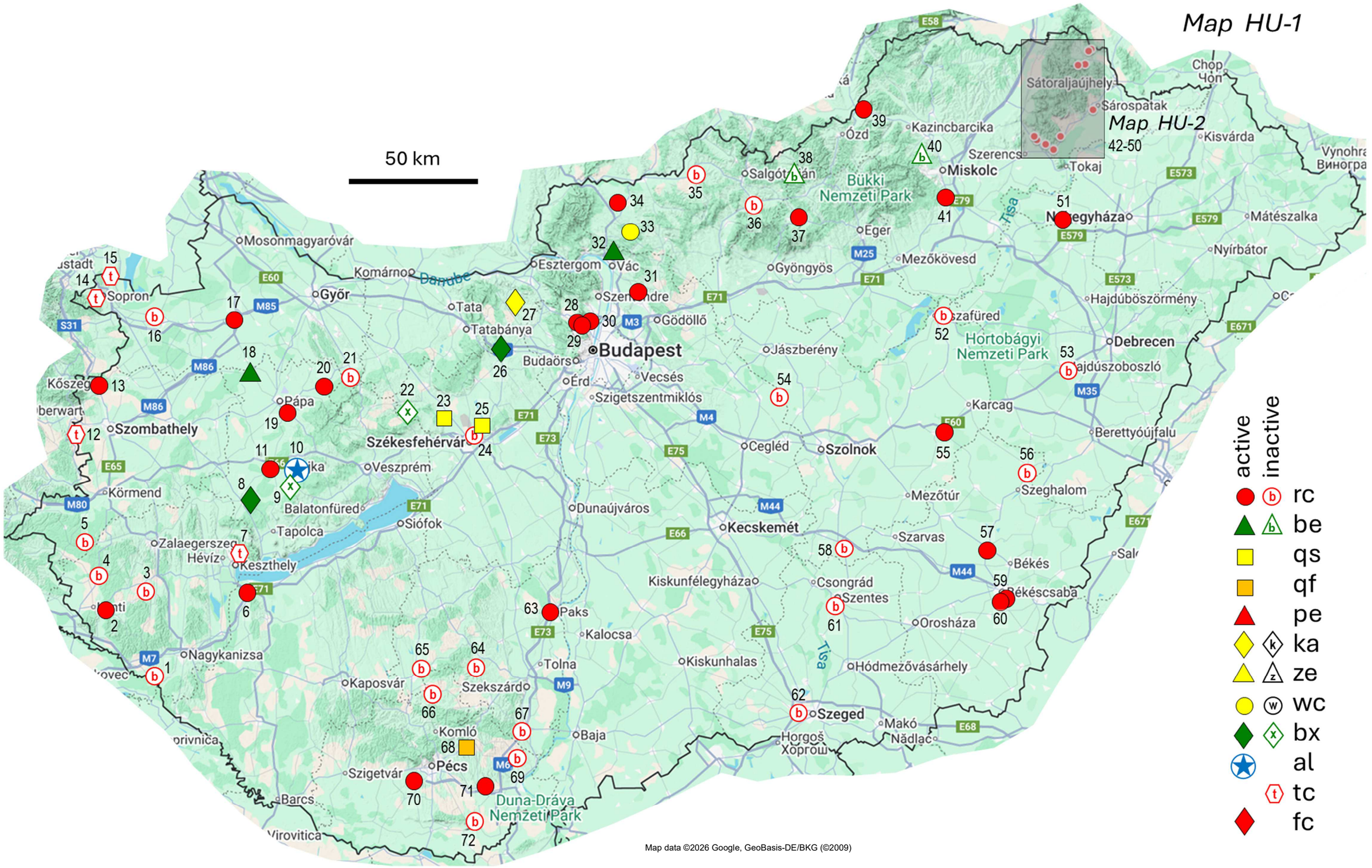

Map HU-1
Map HU-2
42-50
50 km
Sátoraljaújhely
Sárospatak
Kazincbarcika
Ózd
Miskolc
Szerencs
Tokaj
Kisvárda
Chop
Чоп
Vynohra
Виногра
Bükki Nemzeti Park
Eger
Tisa
Nyíregyháza
Mátészalka
Nyírbátor
Gyöngyös
Mezőkövesd
Hajdúböszörmény
Debrecen
Hortobágyi Nemzeti Park
Jászberény
Karcag
Berettyóújfalu
Szolnok
Cegléd
Mezőtúr
Szeghalom
Kecskemét
Szarvas
Békés
Békéscsaba
Csongrád
Szentes
Orosháza
Kiskunfélegyháza
Kiskunhalas
Hódmezővásárhely
Szeged
Makó
Nădlac
Horgoš
Хоргош
Tisa
Paks
Kalocsa
Tolna
Baja
Szekszárd
Kaposvár
Komló
Pécs
Szigetvár
Barcs
Virovitica
Duna-Dráva Nemzeti Park
Budapest
Budaörs
Érd
Vecsés
Szigetszentmiklós
Gödöllő
Tatabánya
Tata
Esztergom
Vác
Szentendre
Komárno
Danube
Mosonmagyaróvár
Győr
Sopron
Kőszeg
Pápa
Szombathely
Körmend
Zalaegerszeg
Hévíz
Keszthely
Tapolca
Balatonfüred
Siófok
Székesfehérvár
Veszprém
Dunaújváros
Nagykanizsa
Budapest
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)
active
inactive
rc
be
qs
qf
pe
ka
ze
wc
bx
al
tc
fc

Table HU-a: deposits of raw materials for the ceramic and glass industries in Hungary.

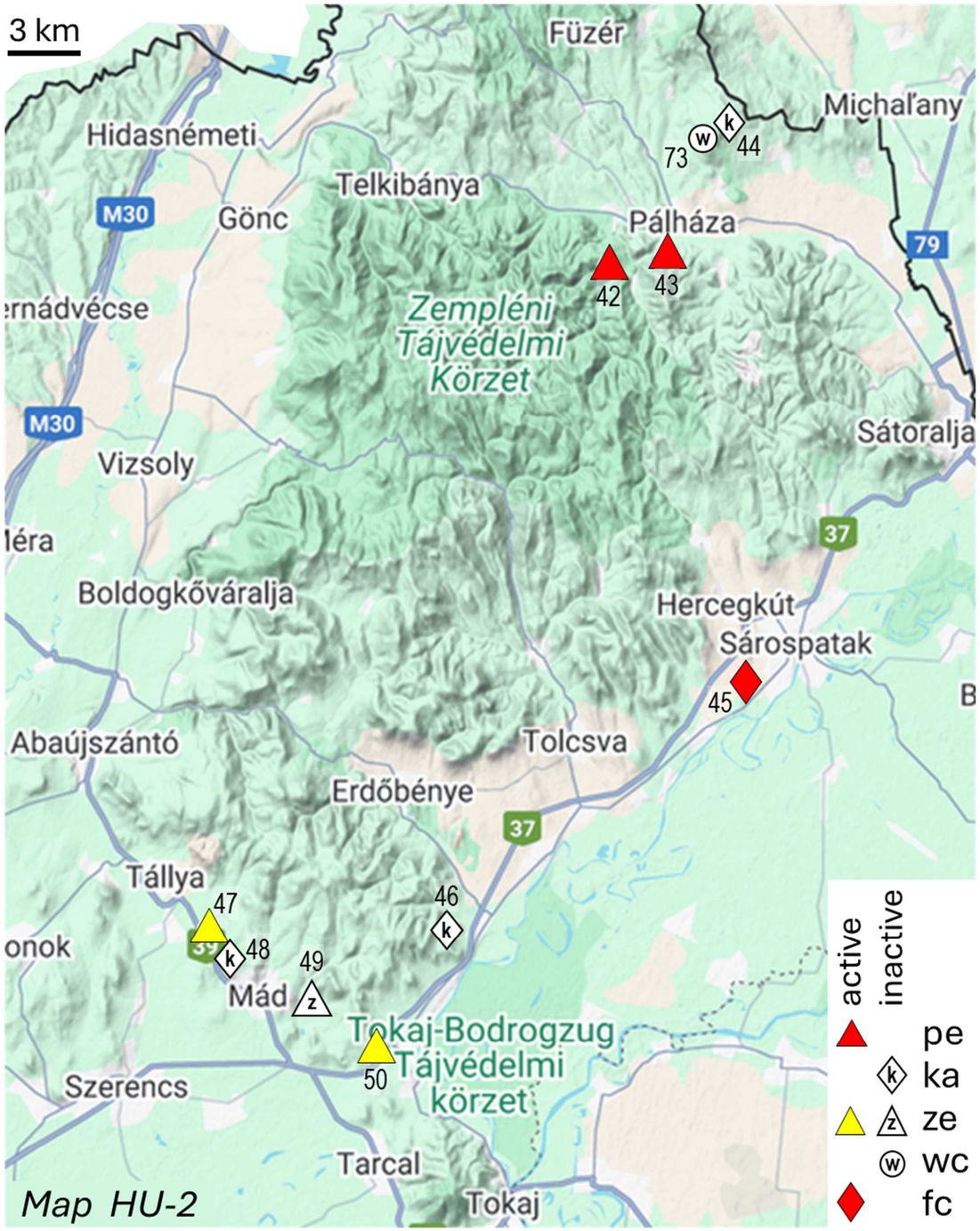
#	r.m.	st	deposit	county
1	rc	I	Molnári	Zala
2	rc	A	Lentiszombathely	Zala
3	rc	I	Tófej	Zala
4	rc	I	Pórszombat	Zala
5	rc	I	Pankasz	Vas
6	rc	A	Balatonszentgyörgy	Zala
7	tc	O	Cserszegtomaj	Zala
8	bx	A	Csabrendek	Veszprém
9	bx	I	Halimba	Veszprém
10	al	A	Ajka	Veszprém
11	rc	A	Devecser	Veszprém
12	tc	I	Felsőcsatár	Vas
13	rc	A	Kőszeg	Vas
14	tc	O	Sopronbánfalva	Győr-Moson-Sopron
15	tc	X	Homokbánya	Győr-Moson-Sopron
16	rc	I	Fertőszéplak	Győr-Moson-Sopron
17	rc	A	Csorna	Győr-Moson-Sopron
18	be	A	Egyházaskesző	Veszprém
19	rc	A	Tapolcafő	Veszprém
20	rc	A	Pápateszér	Veszprém
21	rc	I	Bakonyszentlászló	Győr-Moson-Sopron
22	bx	O	Bakonyozlop	Veszprém
23	qs	A	Kincsesbánya	Fejér
24	rc	I	Székesfehérvár	Fejér
25	qs	A	Fehérvárcsurgó	Fejér
26	bx	A	Óbarok	Fejér
27	ka	A	Sárisáp	Esztergom
28	rc	A	Solymár	Pest
29	rc	A	Solymárvölgyi	Pest
30	rc	A	Üröm	Pest
31	rc	A	Őrbottyán	Pest
32	be	A	Külső-Gombási út	Pest
33	wc-be	A	Felsőpetény	Nógrád
34	rc	A	Érsekvadkert	Nógrád
35	rc	I	Szécsény	Nógrád
36	rc	I	Bátonyterenye	Nógrád
37	rc	A	Mátraderecske	Heves
38	be	O	Istenmezeje	Heves
39	rc	A	Serényfalva	Putnok
40	be	I	Sajobábony	Borsod-Abaúj-Zemplén
41	rc	I	Mályi	Borsod-Abaúj-Zemplén
42	pe	A	Bózsva	Borsod-Abaúj-Zemplén
43	pe	A	Pálháza	Borsod-Abaúj-Zemplén
44	ka	O	Füzérkajata	Borsod-Abaúj-Zemplén
45	fc	A	Sárospatak	Borsod-Abaúj-Zemplén
46	ka	I	Szegilong	Borsod-Abaúj-Zemplén
47	ze	A	Rátka	Borsod-Abaúj-Zemplén
48	ka	I	Mád	Borsod-Abaúj-Zemplén
49	ze	I	Mád-Suba	Borsod-Abaúj-Zemplén
50	ze	A	Bodrogkeresztúr	Borsod-Abaúj-Zemplén
51	rc	A	Tiszavasvári	Szabolcs-Szatmár-Bereg
52	rc	I	Tiszafüred	Jász-Nagykun-Szolnok
53	rc	I	Hajdúszoboszló	Hajdu-Bihar
54	rc	I	Tápiógyörgye	Jász-Nagykun-Szolnok
55	rc	A	Kisújszállás	Jász-Nagykun-Szolnok
56	rc	I	Füzesgyarmat	Békés
57	rc	A	Mezőberény	Békés
58	rc	I	Kunszentmárton	Jász-Nagykun-Szolnok
59	rc	A	Békéscsaba	Békés
60	rc	A	Békéscsaba	Békés
61	rc	I	Szentes	Csongrád-Csanád
62	rc	I	Szeged	Csongrád-Csanád
63	rc	A	Paks	Tolna
64	rc	I	Tevel	Tolna
65	rc	I	Dombóvár	Tolna
66	rc	I	Alsómocsolád	Baranya
67	rc	I	Bátaszék	Tolna
68	qf	A	Pécsvárad	Baranya
69	rc	I	Somberek	Baranya
70	rc	A	Pellérd	Baranya
71	rc	A	Monyoród	Baranya
72	rc	I	Villánykövesd	Baranya
73	wc	I	Füzérradvány	Borsod-Abaúj-Zemplén

Raw material

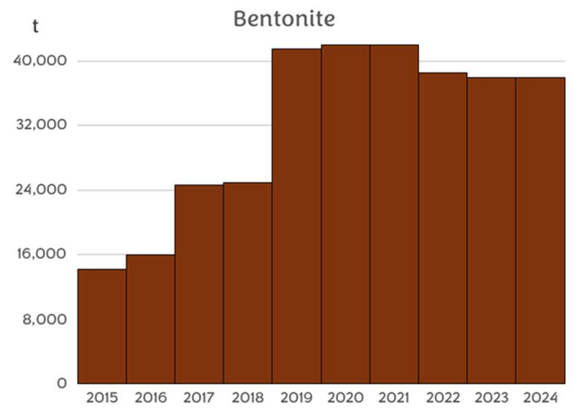
al	alumina (artificial)
be	bentonite
bx	bauxite
fc	refractory clay
ka	kaolin
mg	magnesite
pe	perlite
qf	quartz-feldspathic sand
qs	silica sand
rc	red clays
tc	talc, leucophyllite
wc	white clays
ze	zeolites

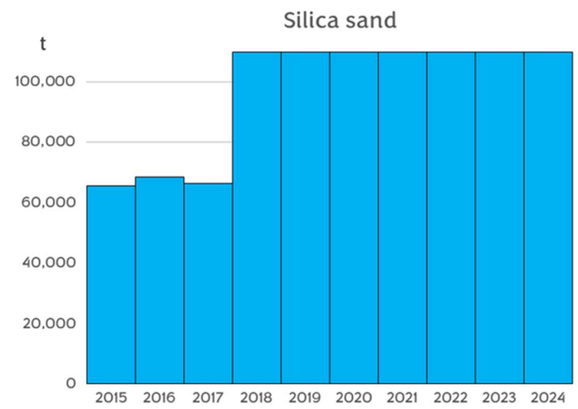
Status of deposit

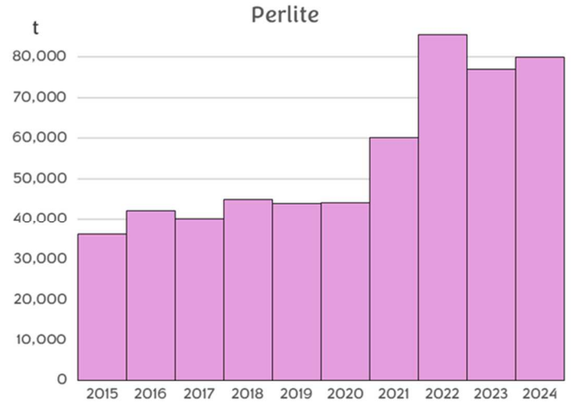
A	active mine
I	inactive mine
O	occurrence

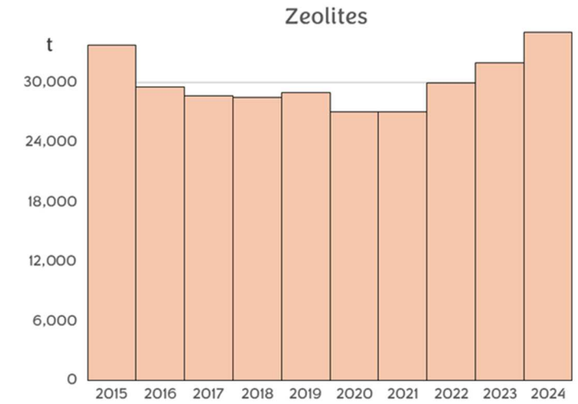


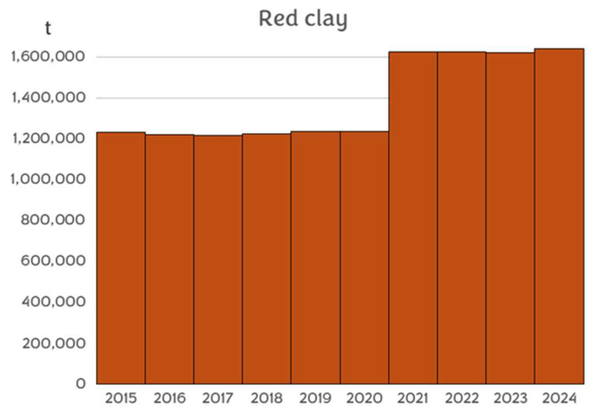
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)

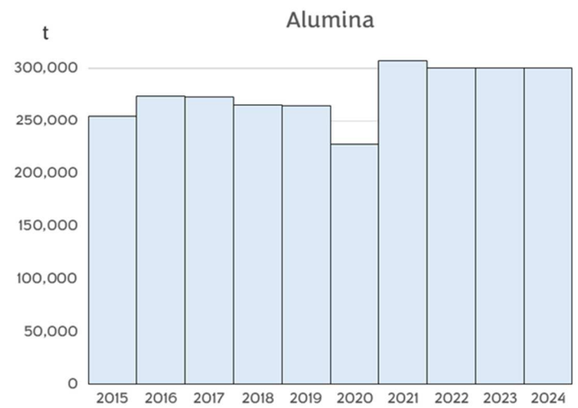












Ireland

Along being the leading producer of alumina in the Euro-Mediterranean zone, Ireland produces quartz and apparently fireclay and red clay (but quantities are not disclosed). In addition, occurrences of lithium minerals, barite, kaolin and talc have been reported [1,2].

Alumina is produced (1,824,000 tpa, mean 2015-2024) by the plant in Aughinish Island near Limerick [1].

Lithium minerals: a pegmatitic province is found along the Tullow Lowlands, a plutonic unit of the Caledonian Leinster Batholith intruding the Ordovician Maulin Formation [3-5]. Several lithium-cesium-tantalum (LCT) pegmatites have been exploring, like those with spodumene at the Aclare and Moylisha deposits [6,7].

Red clays are known from different sources [8,9]: Quaternary alluvial sediments (e.g., Ballymagooly); Pleistocene glacial deposits (e.g., Dysart Glebe); lagoonal marls (Kingscourt); Palaeozoic weathered shales (e.g., Grangegeeth).

Fireclays are found in Carboniferous coal seams (e.g., Caslecomer).

Quartz is extracted in the Muckish vein deposit in Donegal [2].

Kaolin sediments were accumulated in karstic cavities, with the main deposit in Ballymacadam [8,9].

Talc deposits are reported in western Ireland [2].

Barite: a dozen deposits are known in the Irish Midlands and in southernmost Ireland [2]. The most investigated deposits are Pb-Zn-Ba stratiform mineralizations occurring (Ballynoe and Tynagh deposits) and hosted in the Carboniferous Waulsortian Mudbank Formation [10-13] or the Navan Group [14].

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Table IR-a: deposits of raw materials for the ceramic and glass industries in Ireland.

#	raw material	st	deposit	county
1	qz	A	Muckish	Donegal
2	tc	O	Crohy Head	Donegal
3	ba	O	Benbulbin	Sligo
4	tc	O	Westport	Mayo
5	tc	O	Inishbofin	Galway
6	ba	O	Oughterard	Galway
7	ba	O	Tynagh	Galway
8	ba	O	Ballynoe	Cork
9	al	A	Aughinish Island	Limerick
10	ba	O	Derryginagh	Cork
11	ba	O	Scart	Cork
12	ba	O	Bantry	Cork
13	ba	O	Derreennalomane	Cork
14	ba	O	Mount Gabriel	Cork
15	ba	O	Glandore	Cork
16	ba	O	Duneen	Cork
17	rc	O	Ballymagooly	Cork
18	ka	O	Ballymacadam	Kerry
19	rc	I	Youghal	Cork
20	li	O	Aclare	Carlow
21	li	O	Moylisha	Carlow
22	rc	O	Uskerty	Kilkenny
23	rc	A	Dysart Glebe	Kilkenny
24	fc	A	Caslecomer	Kilkenny
25	fc	A	The Swan	Laois
26	rc	A	Timahoe	Laois
27	rc	I	Pullagh	Offaly
28	ba	I	Garrycam	Longford
29	ba	O	Edgeworthstown	Longford
30	ba	I	Lough Sheelin	Westmeath
31	rc	O	Garrymoore	Cavan
32	rc	I	Cavan	Cavan
33	rc	O	Bailieborough	Cavan
34	rc	A	Kingscourt	Cavan
35	rc	A	Carrickmacross	Monaghan
36	rc	A	Togher	Louth
37	rc	A	Grangegeeth	Meath

Raw material

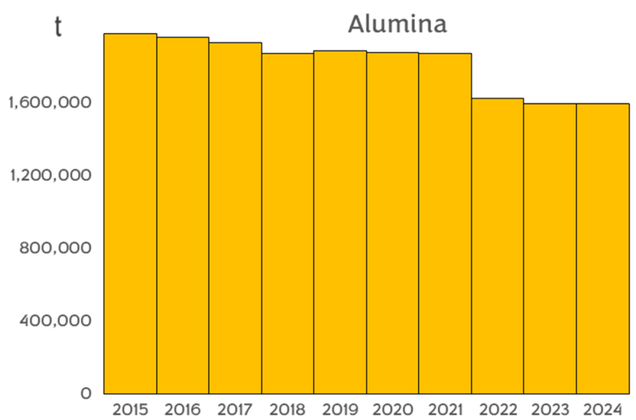
al	alumina
ba	barite
fc	fireclay
li	lithium minerals
qz	quartz
rc	red clays
tc	talc, steatite

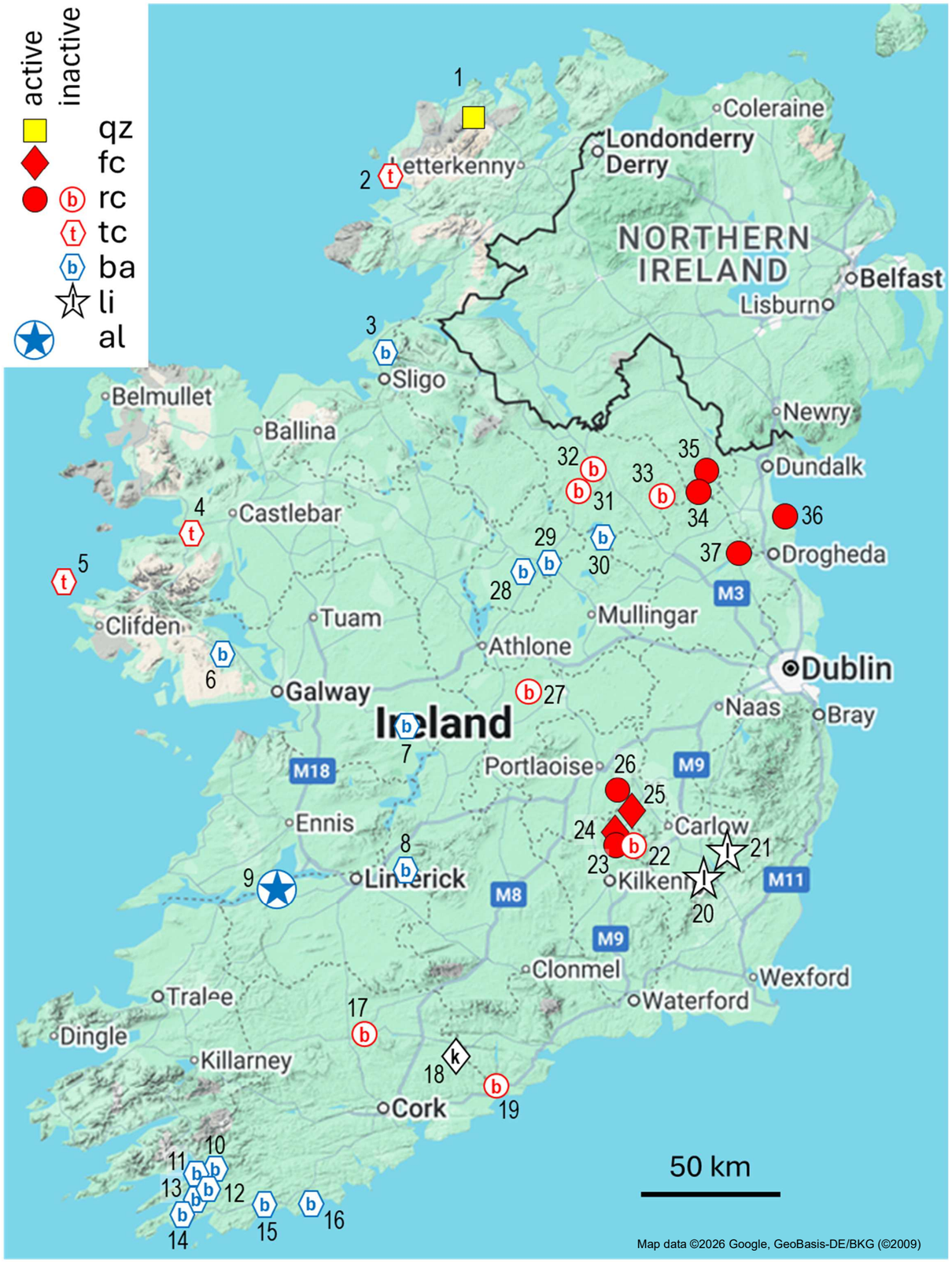
Status of deposit

A	active mine
I	inactive, mine closed
O	occurrence, no recent mining



View towards Aughinish
© Copyright Graham Horn
Geograph Ireland





Israel and Palestine

Israel produces red clays, silica sand, kaolin and white clay to meet the demand of the domestic ceramic and glass industries. Moreover, occurrences of barite and bentonite have been reported [1,2].

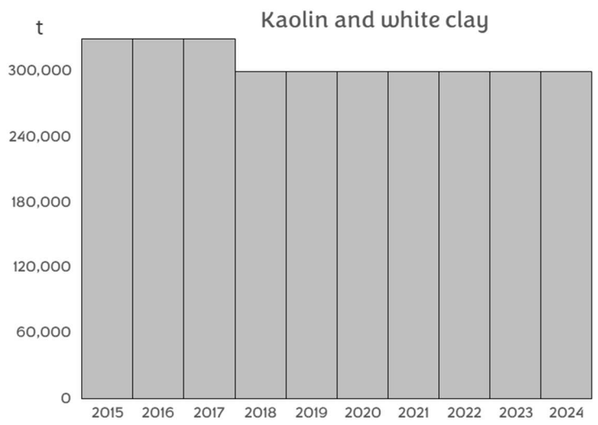
Kaolin: kaolinite-rich continental sediments (Upper Triassic to Middle Jurassic, Mishhor and Ardon formations) are exploited in the Ramon area in the Negev Desert, where both kaolin and **white clay** (flint clay) are extracted from two adjacent deposits [2-5]. The overall production is 309,000 tpa, average 2015-2024 [1].
Silica sand is obtained (440,000 tpa, mean 2015-2024) from two quarries in the Negev Desert (Makhtesh Hatira and Makhtesh Hatsera) which both extract Nubian sandstones (fluvial quartz arenites) of the Cretaceous Hatira Formation [2,6]
Red clay: around one million tons are reported as yearly production, of which 35,000 tpa have brick manufacturing as end-user [1]. Active quarries are exploiting Upper Jurassic (Makhtesh) and Lower Cretaceous (Halutsa) clay deposits, but shales of various geological age are present in the fluvio-lacustrine to neritic sequences in the Negev Desert [3]: from Cambrian (e.g., Timna) to Neogene (e.g., Ein Hatseva) but in prevalence Mesozoic formations.
Bentonite: smectite-rich levels occur in marine to lagoonal sediments, outcropping in southern Negev [3], which mainly pertain to various Upper Cretaceous-Paleocene units (Garheb Fm, Mishash Fm, Taqiya Fm). No deposit appears to be under exploitation. **Barite** is found on the West Bank, interbedded with chalk, chert and clay within the Cretaceous Mishash Formation [7].

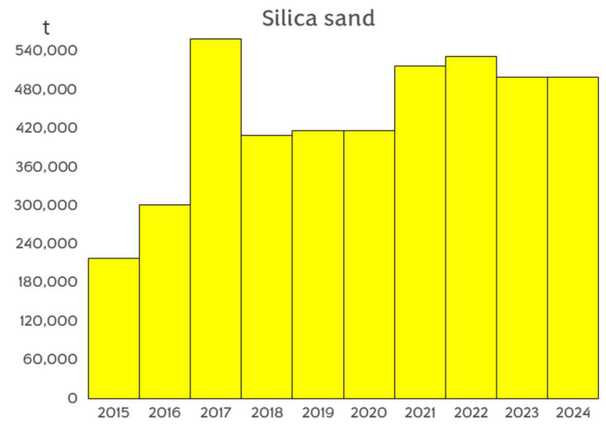
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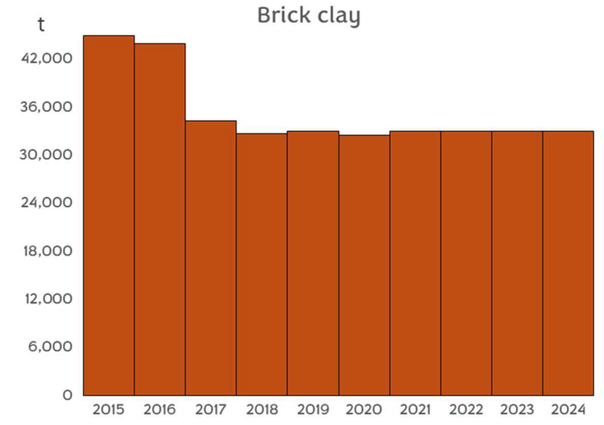
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Table IE-a: deposits of raw materials for the ceramic and glass industries in Israel and Palestine.

#	raw material	st	deposit	district
1	ba	O	Ubeidiya	West Bank
2	rc	O	Tlamim	Ashkelon
3	rc	O	Sdoth Aqiva	Beersheba
4	rc	O	Be'eri	Beersheba
5	rc	O	Ein Gedi	Beersheba
6	rc	O	Metsada	Beersheba
7	rc	A	Halutsa	Beersheba
8	be	O	Kz'iot	Beersheba
9	rc	O	Hatira	Beersheba
10	qs	A	Makhtesh Hatira	Beersheba
11	qs	A	Makhtesh Hatsera	Beersheba
12	rc	A	Makhtesh	Beersheba
13	rc	O	Ein Hatseva	Beersheba
14	be	O	Ein Yahav	Beersheba
15	rc	O	Ramon 3	Beersheba
16	wc	A	Ramon 1	Beersheba
17	ka	A	Ramon 2	Beersheba
18	be	O	Mount Lots	Beersheba
19	be	O	Mount Batur	Beersheba
20	rc	I	Mount Batur	Beersheba
21	be	O	Mount Gshor	Beersheba
22	be	O	Maazer valley	Beersheba
23	be	O	Hayon valley	Beersheba
24	be	O	Mount Ketura	Beersheba
25	rc	O	Baraq valley	Beersheba
26	rc	O	Timna	Beersheba

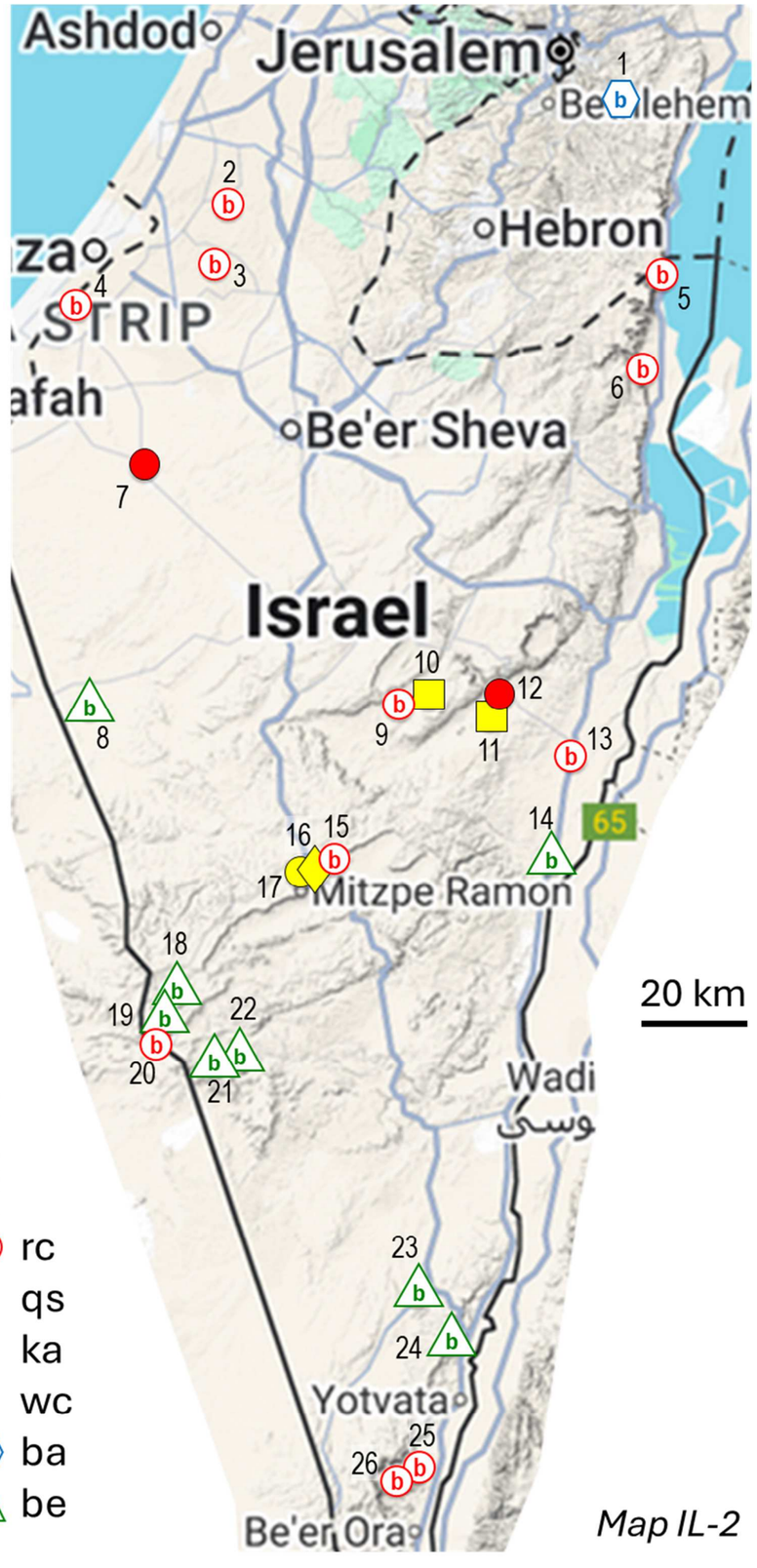






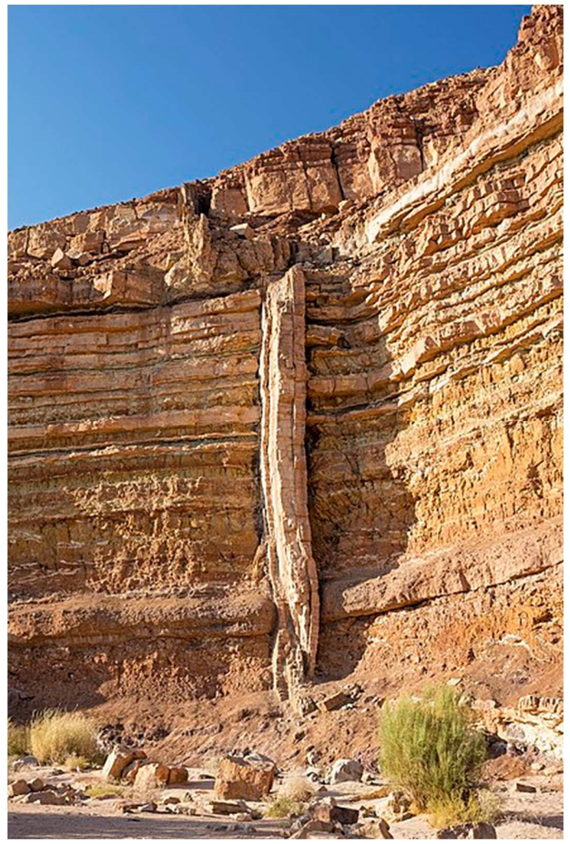


Map IL-1



Map IL-2

Map data ©2026 Google, GeoBasis-DE/BKG (©2009)



Red clay quarry in Makhtesh (Andrew Shiva / Wikipedia)

Raw material

ba	barite
be	bentonite
ka	kaolin
qs	silica sand
rc	red clays
wc	white clay

Status of deposit

A	active mine
I	inactive, mine closed
O	occurrence, no recent mining

Italy

Italy is an important player on the market of glass and ceramic raw materials, being likely the leading dealer of zeolites and the second larger producer of feldspar in the Euro-Mediterranean area, as well as the third of talc and olivine, the fourth of perlite and red clays, and the fifth of soda ash and white clays. In addition, the Italian industry is excavating quartzous materials, bentonite and kaolin. Moreover, occurrences of barite, celestine, bauxite, magnesite, wollastonite, and lithium minerals are reported [1-6].

Feldspar is extracted by two dozen mines at the pace of 2,330,000 tpa [2] from a wide range of sources [7]. The most important are albitites, associated to Variscan granitoids[8-10], extracted from various deposits in central Sardinia (*Map IT-2C*); other albitites are no longer excavated in the Alps as well as in Capo Vaticano and Serre Range, Calabria [7,11,12]. Granites are exploited in northwestern Alps (*Map IT-7U*) from the Variscan *Serie dei Laghi* [13,14], in Tuscany from a Neogene intrusion near Campiglia Marittima [15], and from the Variscan batholith in Sardinia [16]. Pegmatite-aplite bodies are currently mined in the central Alps [17] and in various units of the Sila massif in Calabria [7], while an aplite body, affected by epithermal alteration to sericite, is exploited in the Elba Island [18,19]. Peculiar pyrometamorphic deposits, consisting mainly of sanidine, are known in northern Latium, but no longer mined [20]. Rhyolite is being extracted from the Permian *Serie dei Laghi* in Piedmont [21], while the Ordovician metarhyolites of the Monte Santa Vittoria Formation and Gerrei Porphyroids are no longer excavated in Sardinia [22,23]. Ultrapotassic phonolites and trachytes, quarried in northern Latium and southern Tuscany (*Map IT-5*), have been recently proposed for ceramic tile production [24]. **Quartz-feldspathic sands** represent a considerable share of the Italian output: three mining districts are exploiting the Loiano Formation (Eocene, marine, *Map IT-6*) in northern Apennines [25,26], the Florinas Formation (Miocene, deltaic to shallow marine, *Map IT-2A*) in northwestern Sardinia [27-29], and Pliocene lacustrine deposits (Asti sands, *Map IT-7R*) in Piedmont [7].

Talc is currently mined (166,000 tpa on average) in three districts [1,2]. The mineralization in Val Germanasca (*Map IT-7Q*) is hosted within a pre-Carboniferous polymetamorphic complex of the Dora-Maira massif, associated with micaschist, marble and gneiss [30-32]. In Valmalenco (*Map IT-8V*) talc is found in Mesozoic units, at the contact between marbles and serpentinized ophiolites [33-35]. In the Orani area (*Map IT-2C*), talc deposits, in close spatial relation with albitites, were originated from metasedimentary rocks, intruded by Variscan granitoids and affected by Mg-metasomatism [36,37]. **Olivine** is produced by two mines in Piedmont (around 130,000 tpa, with about 550 million tonnes of reserves) which work on mantle peridotite lenses existing along the western edge of the Ivrea-Verbano zone [38,39].

Zeolites: several pyroclastic units, more or less intensively zeolitized, have been quarried in Italy [40,41] but the yearly output in unknown. Large deposits (phillipsite-chabazite-analcime), originated by Quaternary eruptions of the Phlegrean Fields (*Map IT-4*), are exploited in Campania: Neapolitan Yellow Tuff and Campanian Grey Tuff [42-44]. Clinoptilolite deposits, both zeolitized tuffs and epiclastics, occur in northern and central Sardinia, in relation with Oligo-Miocene volcanism [45,46]. Zeolitites (mostly chabazite) pertaining to the Quaternary Vulsini volcanic complex (*Map IT-5*), are extracted in southern Tuscany [47].

Perlite occurs at the Pliocene-Quaternary Monte Arci volcanic complex (central Sardinia, *Map-IT2*) where it accounts for 25-30% of the total rhyolitic lavas [45]. One deposit is producing about 60,000 tpa of perlite [48].

Red clays are excavated by about 120 quarries, spread in almost every Italian region, for the production of bricks and roof tiles, lightweight aggregates, and drainage vitrified pipes (4,416,000 tpa on average). The Italian ceramic industry exploits a wide spectrum of resources [49-51], the most important are: Holocene alluvial deposits; Quaternary eluvial clays formed by weathering of fluvio-glacial deposits; Pleistocene lacustrine clays; Pliocene-Pleistocene blue marls and Miocene clays (marine shelf); various Paleogene formations ranging from continental to marine environments [52-58].

Stoneware clays, used essentially for wall, floor and roof tiles, are extracted by a dozen quarries in the northern Apennines (*Map IT-6N*) and southern Tuscany [59-62]: distal turbidites of the Oligocene Ranzano Formation and Eocene Montepiano Formation and deep-sea sediments (varicoloured clays) of various Ligurian units (Eocene-Cretaceous).

White clays are extracted by a dozen mines, mainly in Sardinia and Piedmont: 860,000 tpa, 2015-2024 average; 666,000 tpa of which are ball clay and 194,000 tpa refractory clays [3]. Jurassic shales exploited in central Sardinia (*Map IT-2D*) pertain to the Genna Selole Formation and were deposited in alluvial, palustrine and delta plain contexts [63-65]. Both ball clays and refractory clays are mined in the Lozzolo area (*Map IT-7S*) and around Maggiora (*Map IT-7T*) from Pliocene lacustrine sediments [66,67] or weathered Permian volcanics [68]. White clays stemming from hydrothermal alteration of Triassic volcanics [69] are no longer mined in the Vicenza province, but weathering products of Cenozoic volcanics are still under exploration.

Soda ash is produced (about 500,000 tpa) by the plant in Rosignano Solvay, western Tuscany [1].

Bentonite is mined in a dozen sites – located in Sardinia, Molise and Veneto – for an average production of 125,000 tpa [3,4,70]. The most important deposits of Sardinia (*Map IT-2*) are associated with Oligocene-Miocene volcanic rocks, either as bodies interlayered with ignimbrites or as cineritic lenses within the sedimentary sequence [45,71-75]. Bentonites exploited in southern Italy (*Map IT-4K*) are also linked to volcanoclastic deposits within Oligocene-Miocene successions [76,77]. In Veneto, bentonites are associated with Triassic and Eocene-Oligocene volcanism [78].

Kaolin is produced by half a dozen mines, 204,000 tpa on average [3,4]. Most deposits were formed by high-sulphidation hydrothermal activity [45,79,80] on Quaternary volcanics of the Ceriti and Vulsini complexes (*Map IT-5*) in Latium [80,81], as well as Oligo-Miocene volcanic sequences in various districts in Sardinia (*Map IT-2*): Romana-Cossoine [82,83] and the inactive Serrenti-Furtei [84,85] and Tresnuraghes [86,87]. At the Torniella deposit (Tuscany) kaolinization affected Quaternary rhyolites [88,89], while the richest grades in the lacustrine deposits of the Lozzolo district (Piedmont, *Map IT-7S*) are extracted as sedimentary kaolin [79].

Quartzous materials: official statistics claim an average production around 12,500,000 tpa, which likely includes some common sands for construction [3]. Industrial silica is obtained from various sources, the most important are: Quaternary aeolian sands (*Map IT-5M*) in southern Latium [4]; Miocene Numidian flysch (*Map IT-4*) in southern Italy [90]; Triassic quartzites (*Map IT-7*) in southern Piedmont [91].

Lithium minerals: no production was recorded and the potential for conventional hard-rock Li deposits is modest [92]. Permo-Triassic spodumene pegmatites, occurring in the Austroalpine units of the Central Alps (*Map IT-8*), attracted some interest [93,94]. Small Li occurrences are reported in Cenozoic LCT pegmatites (Alps and Elba Island, *Map IT-5L*), cookeite metabauxites (Maritime Alps), lithiophorite-bearing conglomerates (northern Sardinia), and the Capo Bianco aplite (Elba Island) but exploitation appears difficult or unfeasible; some potential is attributed to unconventional, Li-rich fluid resources [92].

Barite extraction ceased in 2013, but two deposits are being reactivated in Gerrei (Sardinia, *Map IT-2*) to exploit a hydrothermal barite-fluorite mineralization within Ordovician porphyroids [95,96]. Other Sardinian deposits consist of hydrothermal veins in the Paleozoic basement or karst deposits within the Cambrian limestones in Sulcis-Iglesiente [97]. In the Alps (*Map IT-8*), vein and stratabound mineralizations (hydrothermal and sedimentary origin) are known within Permian and Triassic units [98]. **Celestine** was mined until 1988 in the Pian dell'Organo deposit (Latium, *Map IT-5*) formed by Quaternary volcanic activity [99].

Magnesite: small deposits are known in the Jurassic ophiolites of western Alps (*Map IT-7*) and central Tuscany (*Map IT-5*), originated by a serpentinite-hosted epithermal system and weathering driven by tectonic activity [100].

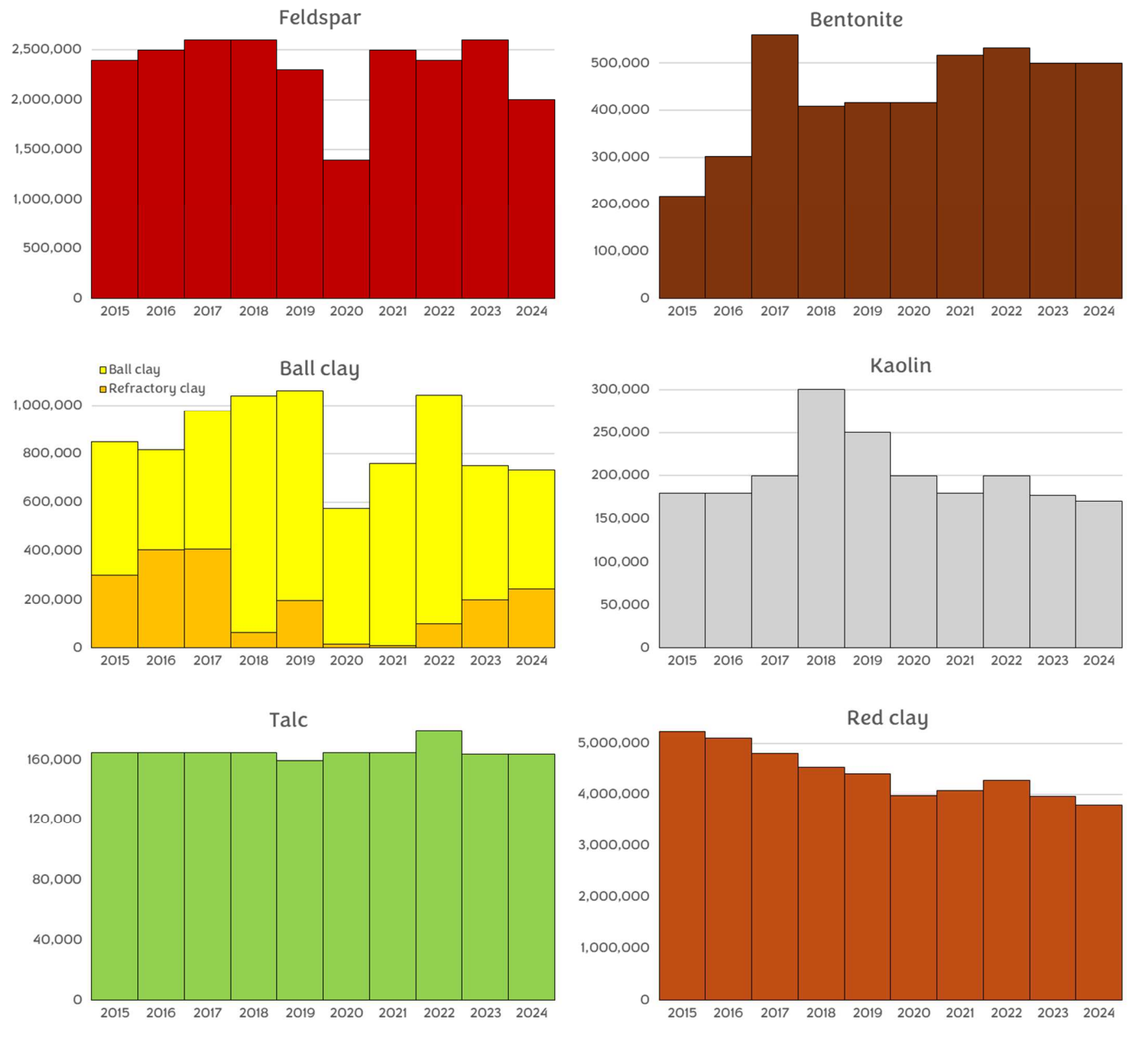
Wollastonite occurrences are reported in Sardinia, at the contact between Variscan granitic intrusions and Palaeozoic limestones, with a limited exploitation potential [101-103].

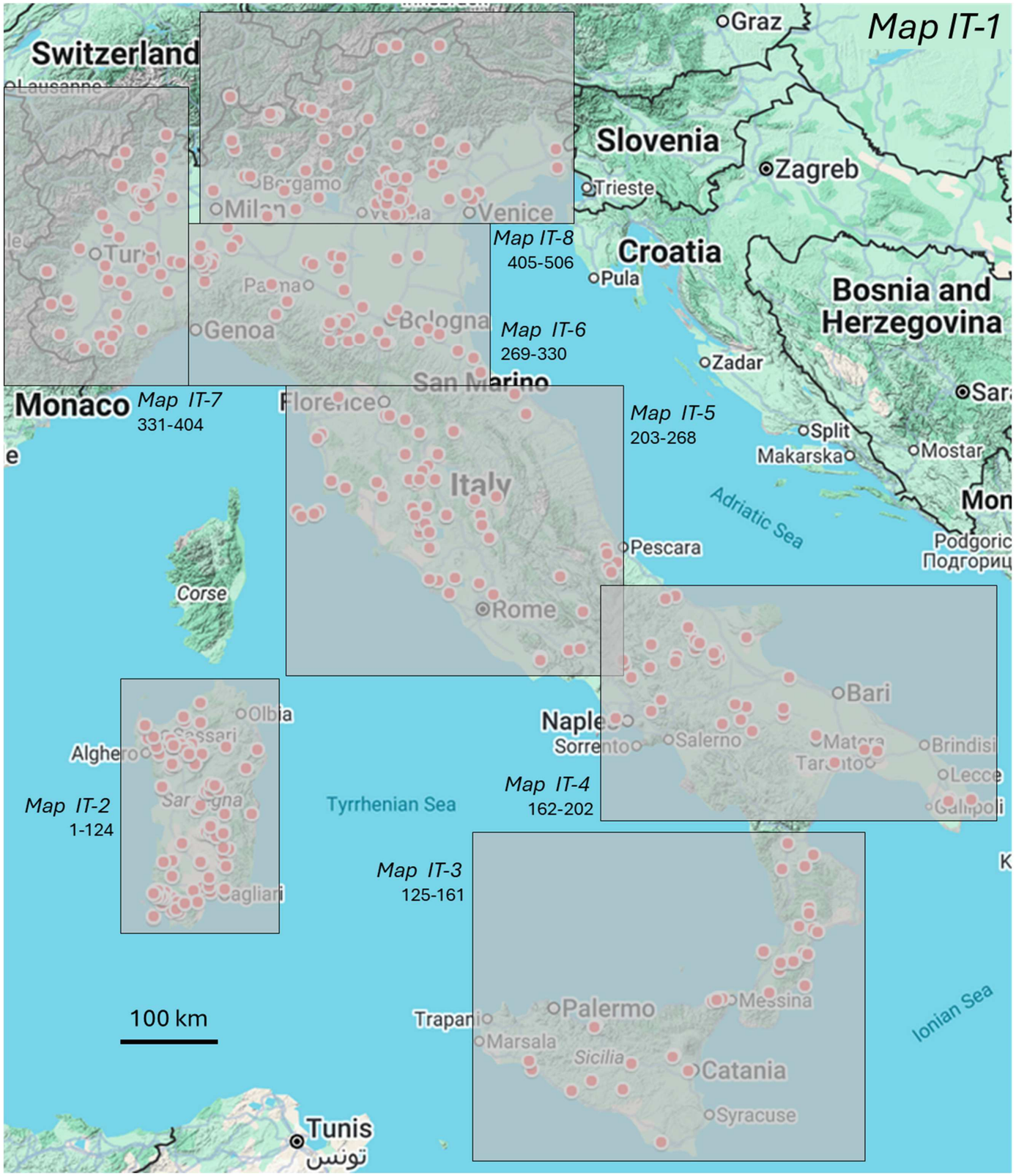
Bauxite: almost all Italian deposit are of karst type and developed within Cretaceous carbonatic sequences in northwestern Sardinia, and central-southern Apennines [104-107]. Bauxite extraction peaked to 98,000 tonnes in 1992 and ceased in 1996 [2].

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active / inactive

- al
- ba
- be
- bx
- ec
- fc
- fd
- ka
- li
- mg
- ol
- pe
- qf
- qz
- rc
- sa
- sc
- sr
- tc
- wc
- wo
- ze

Raw material	
al	alumina (artificial)
ba	barite
be	bentonite
bx	bauxite
ec	expanded clay
fc	fireclay, refractory clay
fd	feldspar
ka	kaolin
li	lithium minerals
mg	magnesite
ns	foid phonolite
ol	olivine
pe	perlite
qf	quartz-feldspathic sand
qs	silica sand
qz	quartz
rc	red clays
sa	soda ash
sc	red stoneware clays
sr	celestine
tc	talc, steatite
wc	white clays
wo	wollastonite
ze	zeolites

Status of deposit	
A	active mine
I	inactive mine
O	occurrence

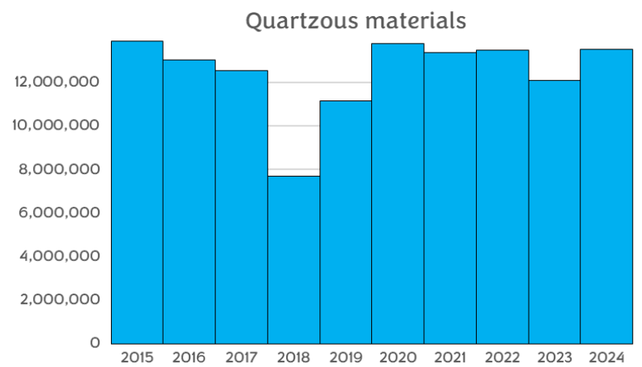
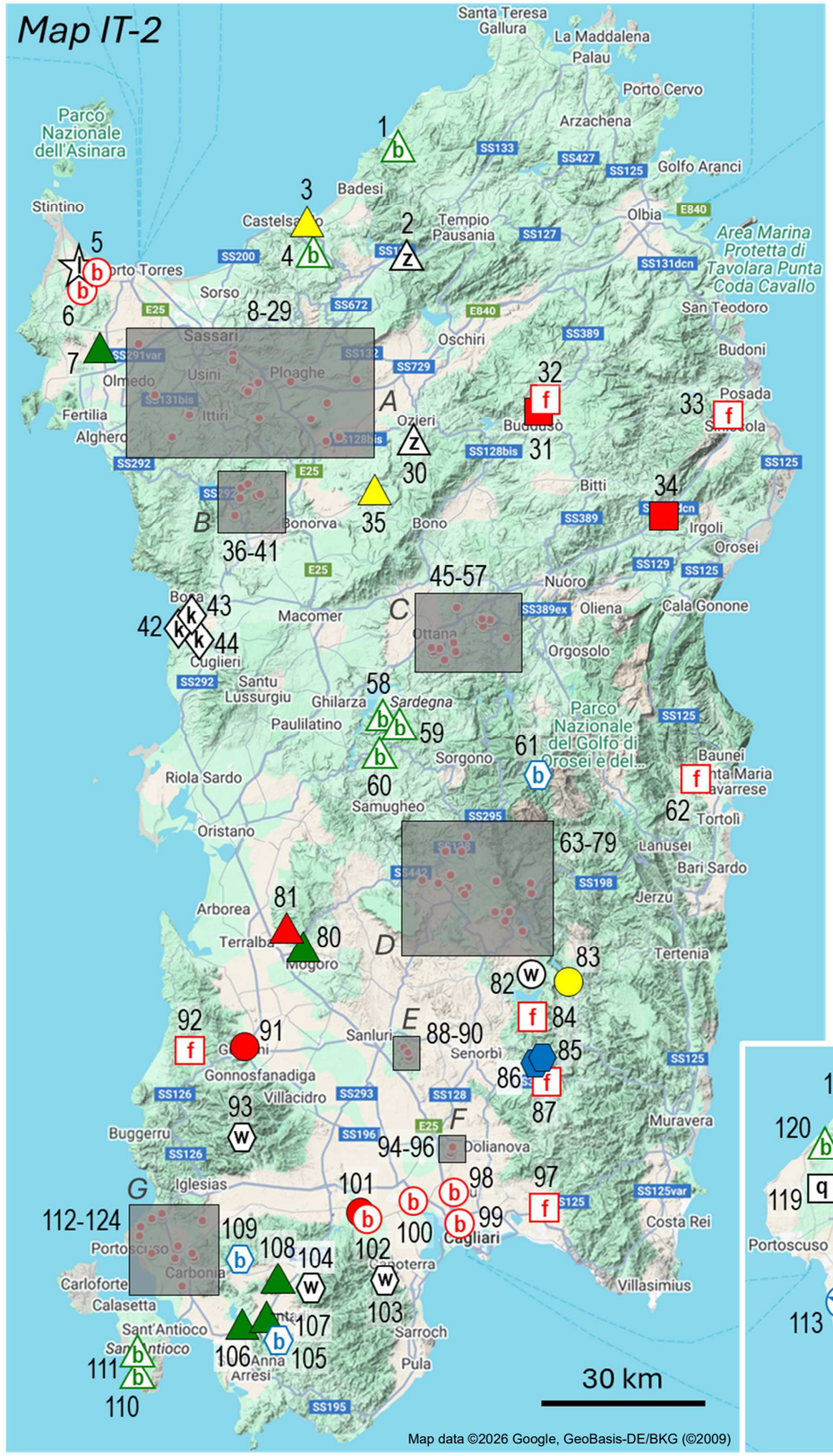
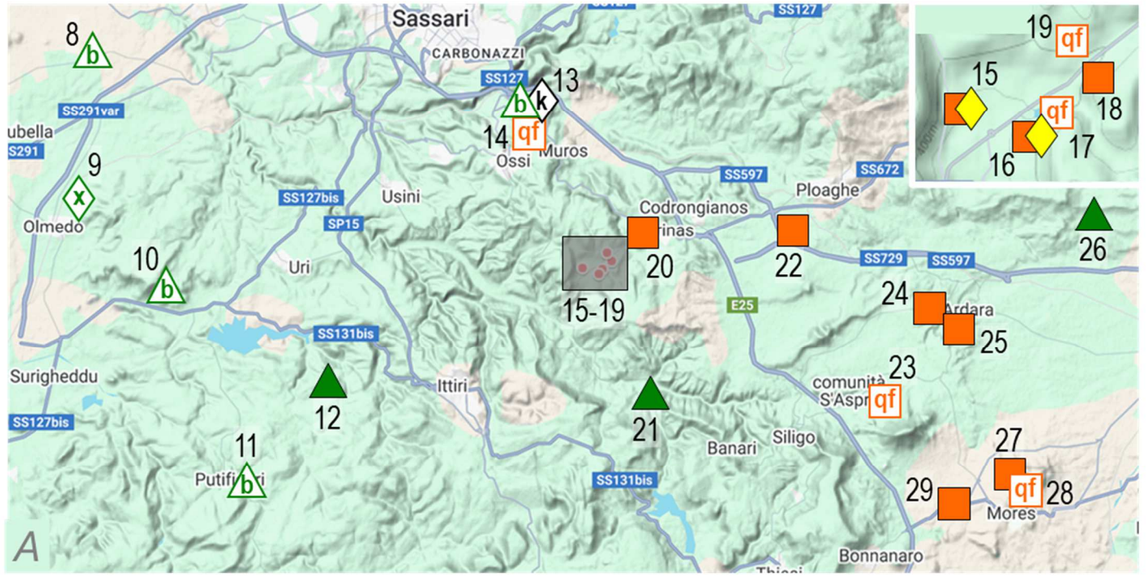


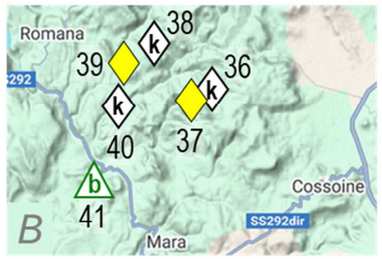
Table IT-a: deposits of raw materials for the ceramic and glass industries in Italy.

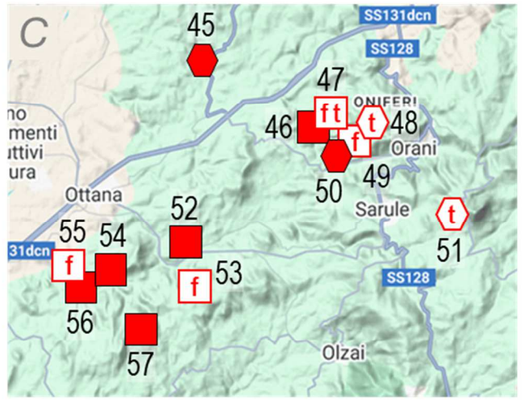
#	r. m.	st	deposit	province
1	be	I	Azza di Li Cossi	Olbia-Tempio
2	ze	I	Sa Contra	Sassari
3	ze	A	Monte Ossoni	Sassari
4	be	I	San Lorenzo	Sassari
5	rc-li	I	Scala Erre	Sassari
6	rc	I	Pian di Trobas	Sassari
7	be	A	S`Aliderru	Sassari
8	be	I	Padulazzu	Sassari
9	bx	I	Olmedo	Sassari
10	be	I	Pedra de Fogu - Nalvonazzos	Sassari
11	be	I	Monte Ladu	Sassari
12	be	A	Sa Pigada Bianca	Sassari
13	ka-be	I	Rocca Ruja	Sassari
14	qf	I	Su Padru	Sassari
15	qf-ka	A	Monte Mamas	Sassari
16	qf-ka	A	Sas Arenas	Sassari
17	qf	I	Monte Sa Pria	Sassari
18	qf	A	Pedru Soddu	Sassari
19	qf	I	Ena Elittu	Sassari
20	qf	A	Cantoru Ena	Sassari
21	be	A	Tanca Su Santu	Sassari
22	qf	A	Murineddu	Sassari
23	qf	I	Pischina Niedda	Sassari
24	qf	I	Pianu Mannu	Sassari
25	qf	A	Molino Falzu	Sassari
26	be	A	Monte Furros	Sassari
27	qf	A	Pertusa & San Giovanni	Sassari
28	qf	I	San Salvatore	Sassari
29	qf	A	Badde Lacana	Sassari
30	ze	I	Monte Nurra	Sassari
31	fd	A	Su Monte Ladu	Olbia-Tempio
32	fd	I	Santa Reparata	Olbia-Tempio
33	fd	I	San Simplicio	Nuoro
34	fd	A	Serra Maiore	Nuoro
35	ze	A	Bono	Sassari
36	ka	I	Nuraghe S'Emis	Sassari
37	ka	A	Locchera - Castello di Bonvei	Sassari
38	ka	I	Monte Tiloromo	Sassari
39	ka	A	Donigazza	Sassari
40	ka	I	Riu Badu de Ludu	Sassari
41	be	I	Puttu Sassu	Sassari
42	ka	I	Su Fongarrazzu	Oristano
43	ka	I	Punta Salamura	Oristano
44	ka	I	Patalza	Oristano
45	tc	A	Su Venosu	Nuoro
46	fd	A	Costarvine-Ciarumannu	Nuoro
47	tc-fd	I	Is Paduleddas	Nuoro
48	tc	I	Predas Biancas	Nuoro
49	fd	I	Sa Costa	Nuoro
50	tc	A	Sa Matta	Nuoro
51	tc	I	San Francesco	Nuoro
52	fd	A	Monte Cuccureddu	Nuoro
53	fd	I	Sant'Angelo di Olzai	Nuoro
54	fd	A	Carchinargios	Nuoro
55	fd	I	Intrachercu	Nuoro
56	fd	A	Badu e' Carru	Nuoro
57	fd	A	Funtana Tenesoli	Nuoro
58	be	I	Monte Calighe	Oristano
59	be	O	Pardischedda	Oristano
60	be	I	Busachi	Oristano
61	ba	I	Intergennas	Nuoro
62	fd	I	Nuraghe Lorio	Ogliastra
63	wc	I	S`Arramanargiu (Ortuabis)	Nuoro
64	wc-fc	I	Funtanamela	Oristano
65	be-wc	I	Corona Sa Guardia	Oristano
66	wc	A	Pala Asonis	Oristano
67	be	I	Tamadili	Cagliari
68	fd	I	Pilicapu	Nuoro
69	be	I	Su Lau	Oristano
70	wc	A	Pitzu Rubiu	Cagliari
71	wc	I	Pitzu Rubiu S	Cagliari
72	be	I	Is Porcillis	Cagliari
73	wc	A	Campu Genna Ilixi	Cagliari
74	wc	I	Figarba	Cagliari
75	wc	I	Nurassolu	Cagliari
76	be	I	Cea Sa Pira	Cagliari
77	wc	I	Punta Su Corongiu	Cagliari
78	be	A	Serra Narbonis	Cagliari
79	be	A	Rio Bau Nurri	Cagliari
80	be	A	Monti Miana - Santa Maria	Oristano
81	pe	A	Monte Sparau	Oristano
82	wc	I	Bruncu de Murdegus	Cagliari
83	wc	A	Funtana Piroi	Cagliari
84	fd	I	Murdeghina	Cagliari
85	ba	A	Genna Tres Montis	Cagliari
86	ba	A	Muscadroxiu	Cagliari
87	fd	I	San Nicolò	Cagliari
88	ka	I	Coronas Arrubias	Medio Campidano
89	ka	I	S'Allumini	Medio Campidano
90	ka	I	Monte Porceddu	Medio Campidano
91	rc	A	Cuccuriba	Medio Campidano
92	fd	I	Pedrixedda	Medio Campidano
93	wo	I	Bega d`Aleni	Sulcis-Iglesiente
94	rc	I	Francischettu 2	Cagliari
95	rc	I	Francischettu	Cagliari
96	rc	A	Bidda de Nuxisi	Cagliari
97	fd	I	Corongiu	Cagliari
98	rc	I	Foradas de S`Arenas	Cagliari
99	rc	I	Cabitzudu	Cagliari
100	rc	I	Argiolas Mannas	Cagliari
101	rc	A	Guardia Predicasu	Cagliari
102	rc	I	Sa Guardia Iada-Bruncu Arrubiu	Cagliari
103	wo	I	San Leone	Cagliari
104	wo	I	Monte Tamara	Sulcis-Iglesiente
105	ba	I	Su Benatzu	Sulcis-Iglesiente
106	be	A	Santa Brà	Sulcis-Iglesiente
107	be	A	Rio Palmas - Nuraghe Panicasu	Sulcis-Iglesiente
108	be	A	Monte Idda	Sulcis-Iglesiente
109	ba	I	Punta Pepixedda	Sulcis-Iglesiente
110	be	I	Monte Oliena	Sulcis-Iglesiente
111	be	I	Monte Ravenna	Sulcis-Iglesiente
112	be	I	Monserrato	Sulcis-Iglesiente
113	al	A	Portovesme	Sulcis-Iglesiente
114	ba	I	Corona Sa Craba	Sulcis-Iglesiente
115	qs	I	Campo S'Arenazzu	Sulcis-Iglesiente
116	rc	A	Flumentepido	Sulcis-Iglesiente
117	qs	I	Mesu Pranu	Sulcis-Iglesiente
118	qs	I	Sa Spinarba	Sulcis-Iglesiente
119	qs	I	Su Murtaxiu	Sulcis-Iglesiente
120	be	I	Guroneddu	Sulcis-Iglesiente
121	qs	I	Cannemenda	Sulcis-Iglesiente
122	qs	I	Pintixedda	Sulcis-Iglesiente
123	qs	A	Pintixedda-Canali Trottu	Sulcis-Iglesiente
124	ba	I	Barega	Sulcis-Iglesiente
125	rc	I	Bertolino	Agrigento
126	rc	A	Contrada Bordea	Agrigento
127	rc	A	Contrada Piano Gatta	Agrigento
128	rc	I	Villanuova	Agrigento
129	wc	I	Villaurea	Palermo

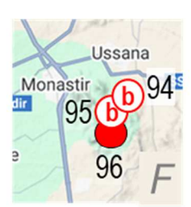
Map IT-2

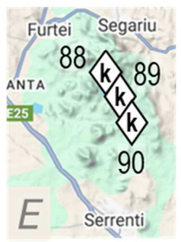


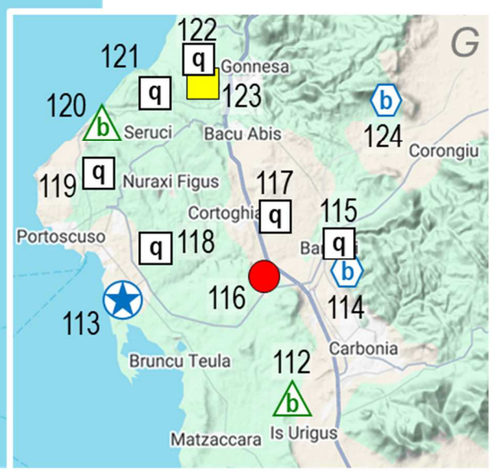


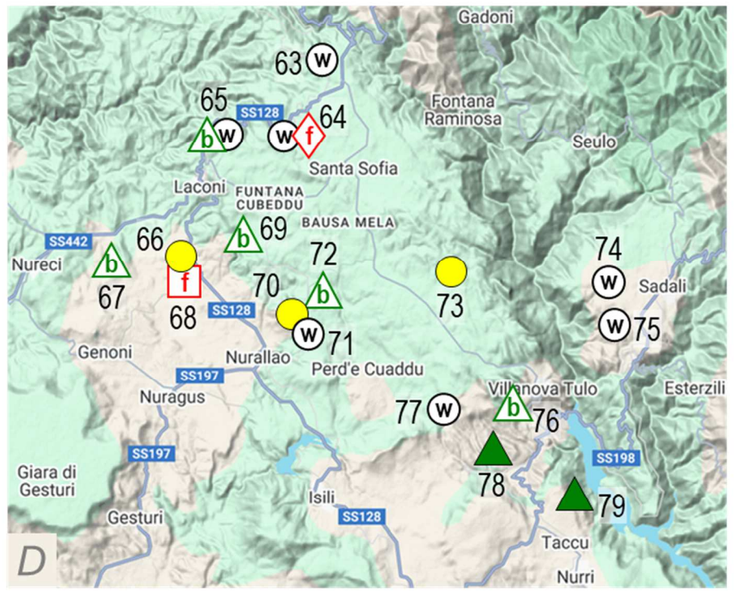






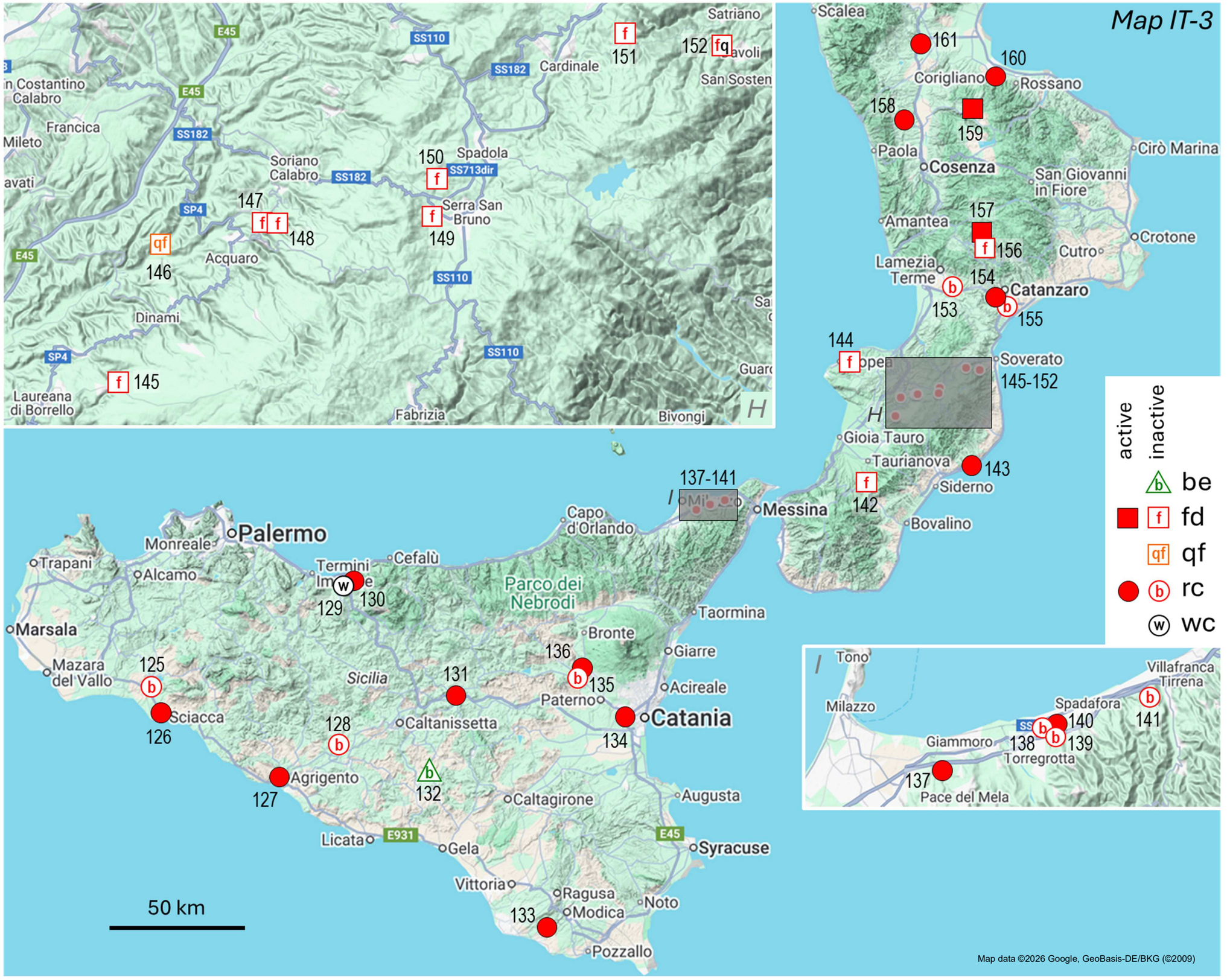






active / inactive

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- fd
- ka
- li
- pe
- qf
- qz
- rc
- tc
- wc
- wo
- ze


Map IT-3
Scalea
161
160
Corigliano
Rossano
158
159
Paola
Cosenza
Cirò Marina
San Giovanni in Fiore
Amantea
157
156
Crotone
Cutro
Lamezia Terme
154
153
Catanzaro
155
144
Soverato
145-152
Gioia Tauro
Taurianova
143
Siderno
142
Bovalino
Messina
137-141
Capo d'Orlando
Palermo
Monreale
Trapani
Alcamo
Termini Imerese
Cefalù
129
130
Parco dei Nebrodi
Taormina
Marsala
Mazara del Vallo
125
126
Sciacca
Sicilia
131
Bronte
136
135
Giarre
Acireale
Paterno
Catania
134
128
Caltanissetta
Agrigento
127
132
Caltagirone
Augusta
Licata
E931
Gela
E45
Syracuse
Vittoria
Ragusa
Noto
Modica
133
Pozzallo
50 km
Tono
Villafranca Tirrenа
Milazzo
Spadafora
140
141
Giammoro
138
139
Torregrotta
137
Pace del Mela
active
inactive
be
fd
qf
rc
wc
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)
Satriano
151
152
Cardinale
San Sosten
150
Spadola
SS713dir
Soriano Calabro
147
148
Serra San Bruno
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SP4
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Acquaro
Dinami
145
Laureana di Borrello
Fabrizia
Bivongi
E45
SS110
SS182

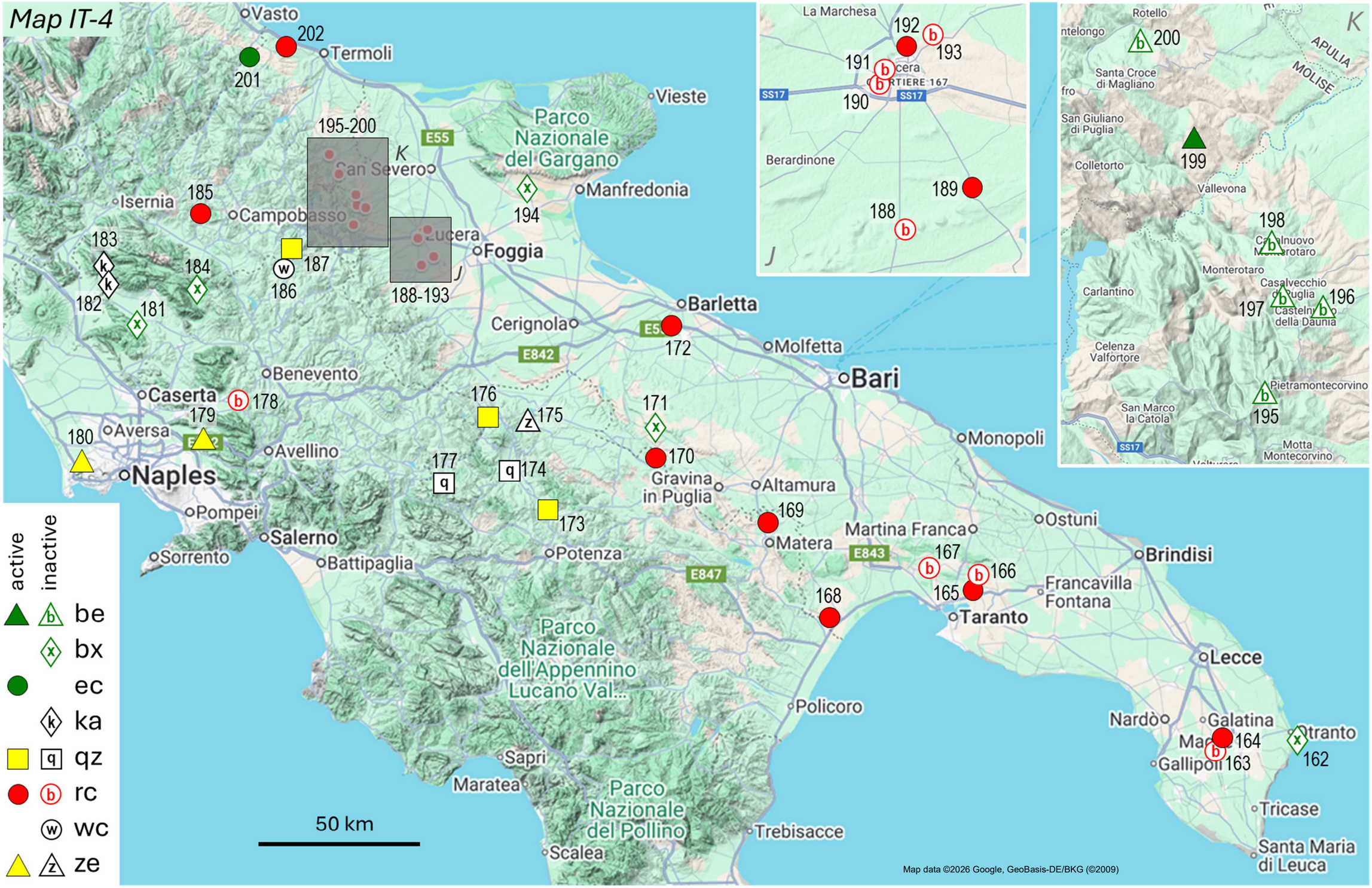

Map IT-4
Vasto
Termoli
202
201
195-200
K
San Severo
E55
Parco Nazionale del Gargano
Vieste
Manfredonia
194
Isernia
185
Campobasso
Lucera
Foggia
183
184
182
181
187
186
188-193
J
Barletta
172
Cerignola
E842
Molfetta
Bari
Benevento
Caserta
178
179
180
Aversa
Avellino
Naples
176
175
177
174
173
171
170
Gravina in Puglia
Altamura
169
Matera
Monopoli
Pompei
Salerno
Sorrento
Battipaglia
Potenza
E847
Martina Franca
E843
167
166
165
168
Ostuni
Brindisi
Francavilla Fontana
Taranto
Lecce
Parco Nazionale dell'Appennino Lucano Val...
Policoro
Nardò
Galatina
164
163
Gallipoli
Otranto
162
Tricase
Santa Maria di Leuca
Sapri
Maratea
Parco Nazionale del Pollino
Trebisacce
Scalea
50 km
La Marchesa
192
193
191
190
SS17
Berardinone
189
188
Rotello
200
Santa Croce di Magliano
San Giuliano di Puglia
Colletorto
199
Vallevona
198
Monterotaro
Carlantino
197
196
Celenza Valfortore
Pietramontecorvino
195
San Marco la Catola
Motta Montecorvino
APULIA
MOLISE
active
inactive
be
bx
ec
ka
qz
rc
wc
ze
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Table IT-b: deposits of raw materials for the ceramic and glass industries in Italy.

#	r. m.	st	deposit	province
130	rc	A	Bovitello	Palermo
131	rc	A	Contrada Grada	Enna
132	be	I	Pizzo Corvo	Caltanissetta
133	rc	A	Contrada Truncafilo	Ragusa
134	rc	A	Piano Tavola	Catania
135	rc	I	Contrada Contrasto	Catania
136	rc	A	Contrada Cardellicchia	Catania
137	rc	A	Contrada Liparano	Messina
138	rc	I	Contrada Timoniere	Messina
139	rc	I	La Moderna	Messina
140	rc	A	Torrente Senia	Messina
141	rc	I	Filari	Messina
142	fd	I	Piminoro	Reggio Calabria
143	rc	A	Contrada Vasì	Reggio Calabria
144	fd	I	Gabrielli	Vibo Valentia
145	fd	I	Ligurni	Reggio Calabria
146	qf	I	Palombaro	Vibo Valentia
147	fd	I	Cammeri	Vibo Valentia
148	fd	I	Ciano	Vibo Valentia
149	fd	I	Scendamo	Vibo Valentia
150	fd	I	Colle Morrone	Vibo Valentia
151	fd	I	Monte Burilli	Catanzaro
152	fd-qz	I	Pollastra	Catanzaro
153	rc	I	Contrada Crisura	Catanzaro
154	rc	A	Contrada Campo	Catanzaro
155	rc	I	Località S. Maria	Catanzaro
156	fd	I	Serralta	Catanzaro
157	fd	A	Santa Caterina (Colle San Domenico)	Catanzaro
158	rc	A	Fortunatello	Cosenza
159	fd	A	Colle Costantino (Sorbo)	Cosenza
160	rc	A	Madeo-Rossano	Cosenza
161	rc	A	Contrada Serragiumenta	Cosenza
162	bx	I	Otranto	Lecce
163	rc	I	Mandrò	Lecce
164	rc	A	Don Paolo	Lecce
165	rc	A	Montepagliulo	Taranto
166	rc	I	Visciolo	Taranto
167	rc	I	Canale Montegiordano	Taranto
168	rc	A	Girifalco	Taranto
169	rc	A	Venusio S.S. 99	Matera
170	rc	A	Monte Poto	Potenza
171	bx	I	Spinazzola	Barletta-Andria-Trani
172	rc	A	Valle Marchesa	Barletta-Andria-Trani
173	qs	A	Monte Torretta	Potenza
174	qs	I	Atella	Potenza
175	ze	I	Fara d'Olivo	Potenza
176	qs	A	Bosco della Frasca	Potenza
177	qs	I	Ponte Ficocchia	Potenza
178	rc	A	Tora Moccia	Benevento
179	ze	A	Comiziano	Napoli
180	ze	A	Grotta del Sole	Napoli
181	bx	I	Castello di Dragoni	Caserta
182	ka	I	Macchie	Caserta
183	ka	I	Pantano Fragneto	Caserta
184	bx	I	Bocca della Selva	Benevento
185	rc	A	Biferno	Campobasso
186	wc	I	Piana della Battaglia	Benevento
187	qs	A	Toppo Capoiacci	Campobasso
188	rc	I	Monte Aratro	Foggia
189	rc	A	Ripatetta	Foggia
190	rc	I	Coppa Rossa	Foggia
191	rc	I	Galvanese	Foggia
192	rc	A	Strada per Palmori	Foggia
193	rc	I	Costa S. Severo	Foggia
194	bx	I	San Giovanni Rotondo	Foggia
195	be	I	Crocella	Foggia
196	be	I	Vettrucco	Foggia
197	be	I	Macchia di Lenza	Foggia
198	be	I	Vignali	Foggia
199	be	A	Monte Calvo	Campobasso
200	be	I	Colle Pagliarone	Campobasso
201	ec	A	Contrada Coccetta	Chieti
202	rc	A	Petacciato Scalo	Campobasso
203	qs-wc	A	Ripa o Mucchi	Latina
204	qs-wc	A	Il Colle	Latina
205	qs	I	Tulisse Juvat	Latina
206	rc	A	Campo di Cristo	Frosinone
207	qs	A	Melfa	Latina
208	bx	I	Mandrilli	L'Aquila
209	rc	A	Vallone Defenza	Pescara
210	rc	A	Alanno Scalo-Fossatello	Pescara
211	rc	A	Brecciarola	Chieti
212	rc	A	San Martino	Pescara
213	rc	A	Contrada Riparossa	Pescara
214	bx	I	Campo Felice	L'Aquila
215	rc	A	Vallericca	Roma
216	ns	I	Capocroce	Roma
217	ka	A	Monte Sughereto-Sasso	Roma
218	ka	I	Torre d'Ischia	Viterbo
219	ka	I	La Provvidenza	Roma
220	sr	I	Pian dell'Organo	Viterbo
221	ns	O	Riserva Muraccio	Viterbo
222	ns	O	Spiniccio	Viterbo
223	ka	A	Poggio San Luce	Viterbo
224	ns	O	Poggio Nardeci	Grosseto
225	ze	A	Campimaglia	Grosseto
226	ze	A	Piandirena	Grosseto
227	sc	A	Villa Rosselli - Selvena	Grosseto
228	sc	A	Podere Bechi	Grosseto
229	rc	A	Barburigo	Siena
230	rc	A	Fornaci-Castel Viscardo	Terni
231	rc	I	Fabbruciano	Terni
232	rc	A	Colle Stoppione	Terni
233	rc	A	Dunarobba	Terni
234	rc	A	Pontenaia	Perugia
235	rc	A	Marsciano	Perugia
236	rc	A	Poggio Cammello	Perugia
237	rc	A	Arquata	Perugia
238	rc	A	Argiano	Siena
239	rc	A	Castroncello	Arezzo
240	rc	A	Guazzino	Siena
241	rc	I	San Giuseppe	Siena
242	rc	I	Pienza	Siena
243	rc	A	Malintoppo	Siena
244	rc	I	Torrenieri	Siena
245	qs	I	Paganico	Grosseto
246	ka	I	Podere Le Pescine	Grosseto
247	ka-fd	A	Piloni (Torniella)	Grosseto
248	qz	I	Poggio Speranzona	Grosseto
249	fd	A	Botro ai Marmi-Montorsi	Livorno
250	fd	I	San Rocco (Crino di Serra)	Livorno
251	Li	I	San Piero in Campo	Livorno
252	Li	O	Capo Bianco aplite	Livorno
253	fd	A	Buraccio - La Crocetta	Livorno
254	tc	I	Grottarione	Livorno
255	sa	A	Rosignano Marittimo	Livorno
256	mg	I	Macchia Escafrullina	Livorno
257	rc	A	Cava Serredi	Livorno
258	rc	A	Staggiano	Livorno

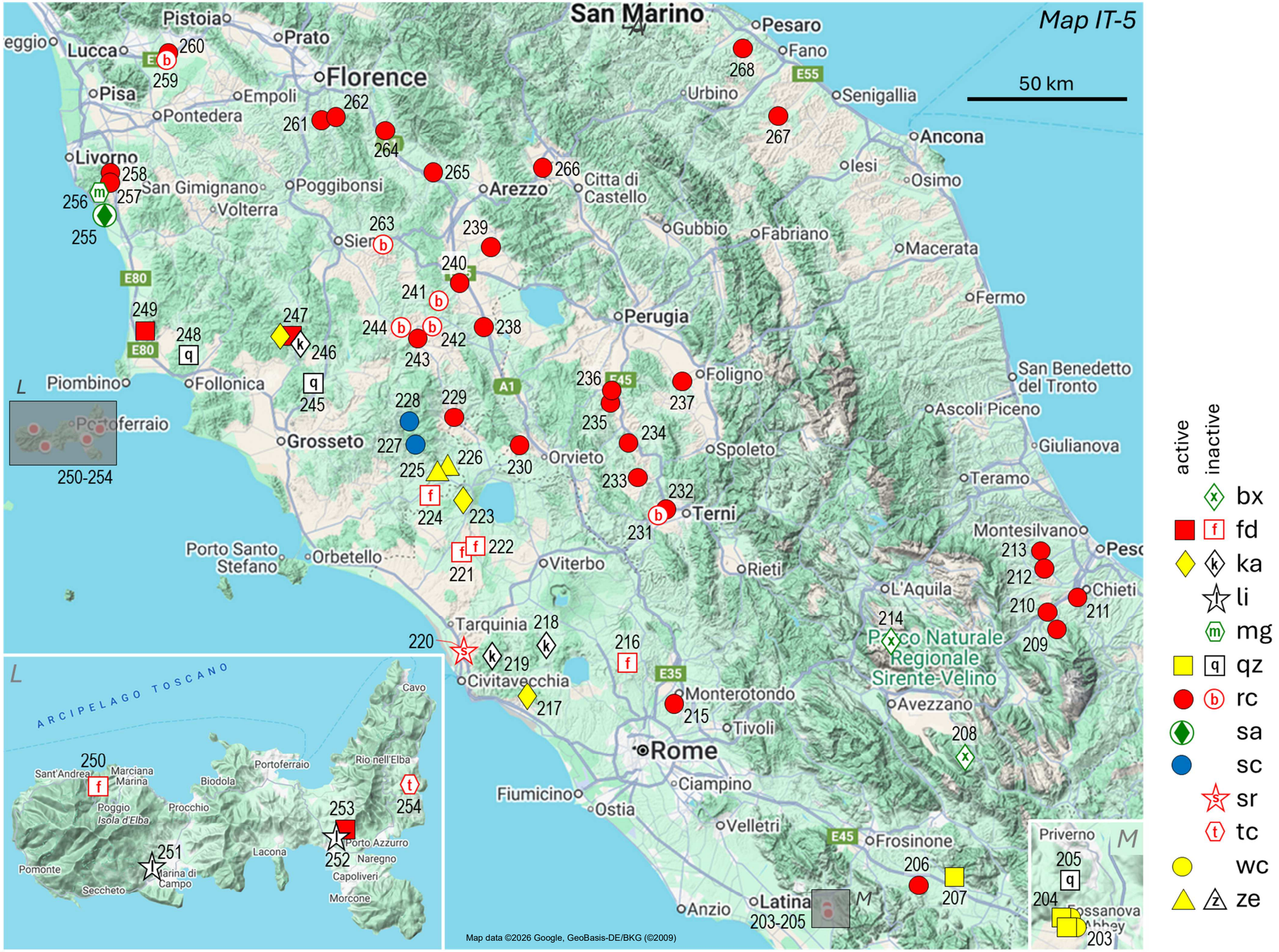

Map IT-5
50 km
San Marino
Pistoia
Prato
Florence
Pisa
Empoli
Pontedera
Lucca
Livorno
San Gimignano
Poggibonsi
Volterra
Siena
Arezzo
Citta di Castello
Pesaro
Fano
Urbino
Senigallia
Ancona
Iesi
Osimo
Gubbio
Fabriano
Macerata
Fermo
Perugia
Foligno
San Benedetto del Tronto
Ascoli Piceno
Giulianova
Teramo
Spoleto
Orvieto
Terni
Rieti
Viterbo
Montesilvano
Chieti
L'Aquila
Parco Naturale Regionale Sirente-Velino
Avezzano
Tivoli
Rome
Ciampino
Fiumicino
Ostia
Velletri
Frosinone
Latina
Anzio
Tarquinia
Civitavecchia
Porto Santo Stefano
Orbetello
Piombino
Follonica
Grosseto
Portoferraio
Priverno
Fossanova Abbey
ARCIPELAGO TOSCANO
Sant'Andrea
Marciana Marina
Biodola
Procchio
Poggio
Isola d'Elba
Rio nell'Elba
Porto Azzurro
Lacona
Naregno
Capoliveri
Marina di Campo
Pomonte
Seccheto
Morcone
Cavo
250-254
active
inactive
bx
fd
ka
li
mg
qz
rc
sa
sc
sr
tc
wc
ze
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)

Table IT-c: deposits of raw materials for the ceramic and glass industries in Italy.

#	r. m.	st	deposit	province
259	rc	I	Scalabrino	Lucca
260	rc	A	Marginone	Lucca
261	rc	A	Ferrone Manetti	Firenze
262	rc	A	Meleto-Palagione	Firenze
263	rc	I	Berardenga Scalo	Siena
264	rc	A	Le Chiuse	Arezzo
265	rc	A	Casanuova	Arezzo
266	rc	A	Fighille	Perugia
267	rc	A	San Michele al Fiume	Pesaro-Urbino
268	rc	A	Cà Lucaione	Pesaro-Urbino
269	rc	I	Ripa Bianca	Rimini
270	rc	I	Casino Neri - Bagnarola	Forlì-Cesena
271	rc	I	San Leonardo-Pievequinta	Forlì-Cesena
272	rc	I	Fornace Cotignola	Ravenna
273	rc	A	Bubano	Bologna
274	sc	I	Arzella	Ravenna
275	rc	A	Coderotte	Rovigo
276	rc	A	La Ghirotta	Rovigo
277	rc	I	Casalone	Bologna
278	rc	A	Fondo Beverara	Bologna
279	qf	A	Segalara	Bologna
280	qf	A	Vado	Bologna
281	qf	A	Colombara	Bologna
282	sc	I	Roncobotto	Modena
283	qf	A	Gaianello La Zavattona	Modena
284	sc	I	Poggio Mezzature	Modena
285	sc	A	Caselette/Morano	Modena
286	sc	A	Sopra Vigne	Reggio Emilia
287	sc	I	Le Salde	Reggio Emilia
288	sc	A	Molino di Caneparola	Reggio Emilia
289	sc	A	Monte Quercia	Reggio Emilia
290	sc	A	Boccadello	Reggio Emilia
291	sc	A	Lovaro	Reggio Emilia
292	sc	I	Pianella	Reggio Emilia
293	sc	I	Ca' del Monte	Reggio Emilia
294	sc	I	Ca' Talami	Reggio Emilia
295	sc	A	Monte Stadola - Roteglia	Reggio Emilia
296	sc	I	La Pianazza-Vallurbana	Modena
297	sc	I	Riola	Modena
298	rc	I	Scartazza	Modena
299	rc	A	Fosdondo	Reggio Emilia
300	rc	I	Luzzara	Reggio Emilia
301	rc	I	Torricella-Motteggiana	Mantova
302	rc	I	Campitello	Mantova
303	rc	I	Torricella-Gussola	Cremona
304	rc	I	Gerola	Cremona
305	ec	A	Rubbiano	Parma
306	tc	I	Moreschi	Parma
307	tc	I	Il Lamino	Parma
308	rc	A	Campolungo-Lugagnano Val d'Arda	Piacenza
309	qs	A	Sostegno (Spessa-Torre de' Negri)	Pavia
310	rc	I	Belfuggito	Lodi
311	qs	A	Bascape-Landriano	Pavia
312	qs	I	Dorno-Zinasco	Pavia
313	rc	A	Castelletto Sette Laghi	Pavia
314	rc	A	Cascina Bronzina	Pavia
315	rc	I	Carantano-Casatisma	Pavia
316	rc	I	Montebello della Battaglia	Pavia
317	rc	I	Torrazzetta-Torrazza Coste	Pavia
318	rc	I	Cascina Castagnola-Codevilla	Pavia
319	rc	I	Staffora-Retorbido	Pavia
320	rc	I	Voghera-Via Arcalini	Pavia
321	rc	I	Voghera-Strada Oriolo	Pavia
322	rc	I	Sant'Antonio-Cervesina	Pavia
323	rc	I	Cascina Mario-Silvano Pietra	Pavia
324	rc	I	Casei Gerola-Via Silvano Pietra	Pavia
325	rc	A	Casei Gerola-Regione Magenta	Pavia
326	rc	A	Casei Gerola-La Cecosa	Pavia
327	rc	A	Momperone-Giarella	Alessandria
328	rc	I	Bassignana-Valle del Pozzo	Alessandria
329	rc	A	Cascina Groppello-Valenza Po	Alessandria
330	rc	A	San Quirico-Castelnuovo Bormida	Alessandria
331	rc	I	Solero-Cascina Urbana	Alessandria
332	rc	A	Oltre Stura	Alessandria
333	rc	A	Ottiglio-Regione Molino	Alessandria
334	rc	I	Cascina Cerrato - Bottigliana	Asti
335	qs	A	Bricco Toni	Asti
336	rc	I	Cascina Coppette-Poirino	Torino
337	rc	A	Ceresole d'Alba-Le Crocette	Cuneo
338	rc	A	Alba-Cascina Gallino	Cuneo
339	rc	A	Dogliani-Coppa d'Oro	Cuneo
340	rc	A	Ferrere-Cairo Montenotte	Savona
341	rc	I	Campolungo	Cuneo
342	qs	A	Val Predere-Vicoforte	Cuneo
343	rc	A	Canaveri-Vicoforte	Cuneo
344	rc	A	San Grato	Cuneo
345	rc	I	Belvedere	Cuneo
346	qz	A	Frabosa Sottana	Cuneo
347	Li	O	Bossea	Cuneo
348	qz	A	Tetti Filibert-Vernante	Cuneo
349	qz	A	Snive Colla Bassa-Robilante	Cuneo
350	tc	I	Monte Bram	Cuneo
351	fd	I	Martiniana	Cuneo
352	fd-ka	I	Rivo Freddo	Cuneo
353	fd-ka	I	Tre Fontane	Cuneo
354	qz	I	Monte Bracco	Cuneo
355	tc	O	Passo Gallarino	Cuneo
356	tc	I	Crosetto	Torino
357	tc	A	Nuova Fontane	Torino
358	tc	A	Rodoretto	Torino
359	mg	I	Monte Calvo	Torino
360	rc	A	Cascina Talpone	Torino
361	rc	I	Cascina Goretta	Torino
362	rc	A	Foglizzo	Torino
363	rc	A	Gerbole-San Giorgio Canavese	Torino
364	ol	A	Bric Carledà - Crose	Torino
365	rc	I	Cascina S. Giuseppe - Cavaglià	Biella
366	fd	I	Piaro	Biella
367	fd	I	Mud di Mezzo	Vercelli
368	fd	I	Morghen	Verbania-Cusio-Ossola
369	rc	A	Cascina Belvedere-S.Giacomo V.se	Vercelli
370	rc	A	Cascina Vota-Masserano	Biella
371	rc	A	Cascina Sorte-Castelletto Cervo	Biella
372	rc	A	Cascina Montorio-Rovasenda	Vercelli
373	qs	A	Monte della Guardia	Biella
374	fd	A	San Rocco	Biella
375	fd	I	Cascina Borino	Biella
376	fd	A	Cacciano	Biella
377	qs	A	Gabella	Biella
378	wc	I	Villa del Bosco-Portiglie	Vercelli
379	rc	A	Via Rovasenda-Gattinara	Vercelli
380	wc	A	Virauda	Vercelli
381	wc	I	Fornaccio-Ca` del Bosco	Vercelli
382	ka	A	Fornaccio	Vercelli
383	fd	I	Virauda Ceresei	Vercelli
384	fd	I	Sella Bramaterra	Biella
385	ka	I	Bramaterra	Biella
386	wc	A	Ceresei	Vercelli
387	wc	A	Croso del Sasso	Vercelli

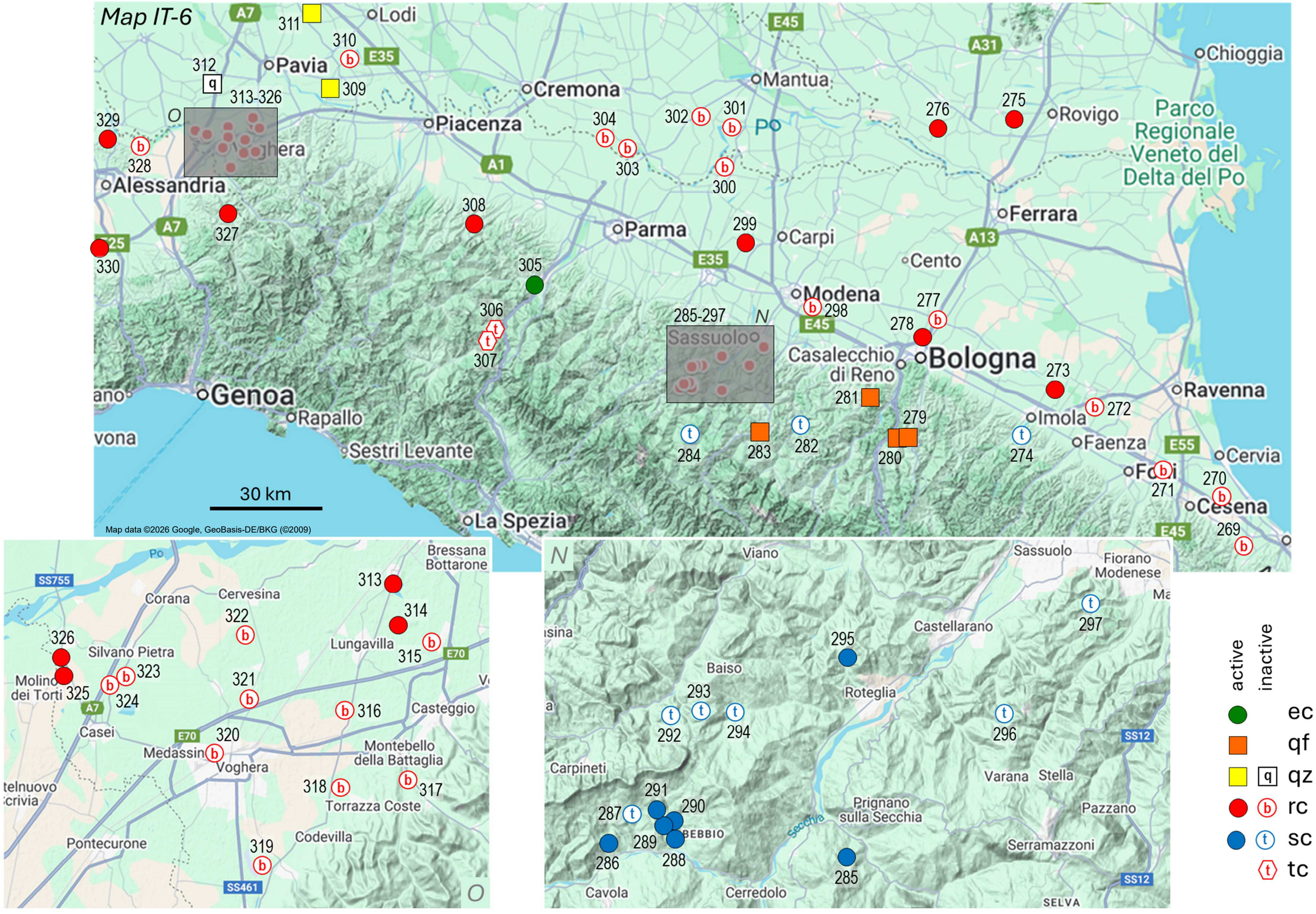
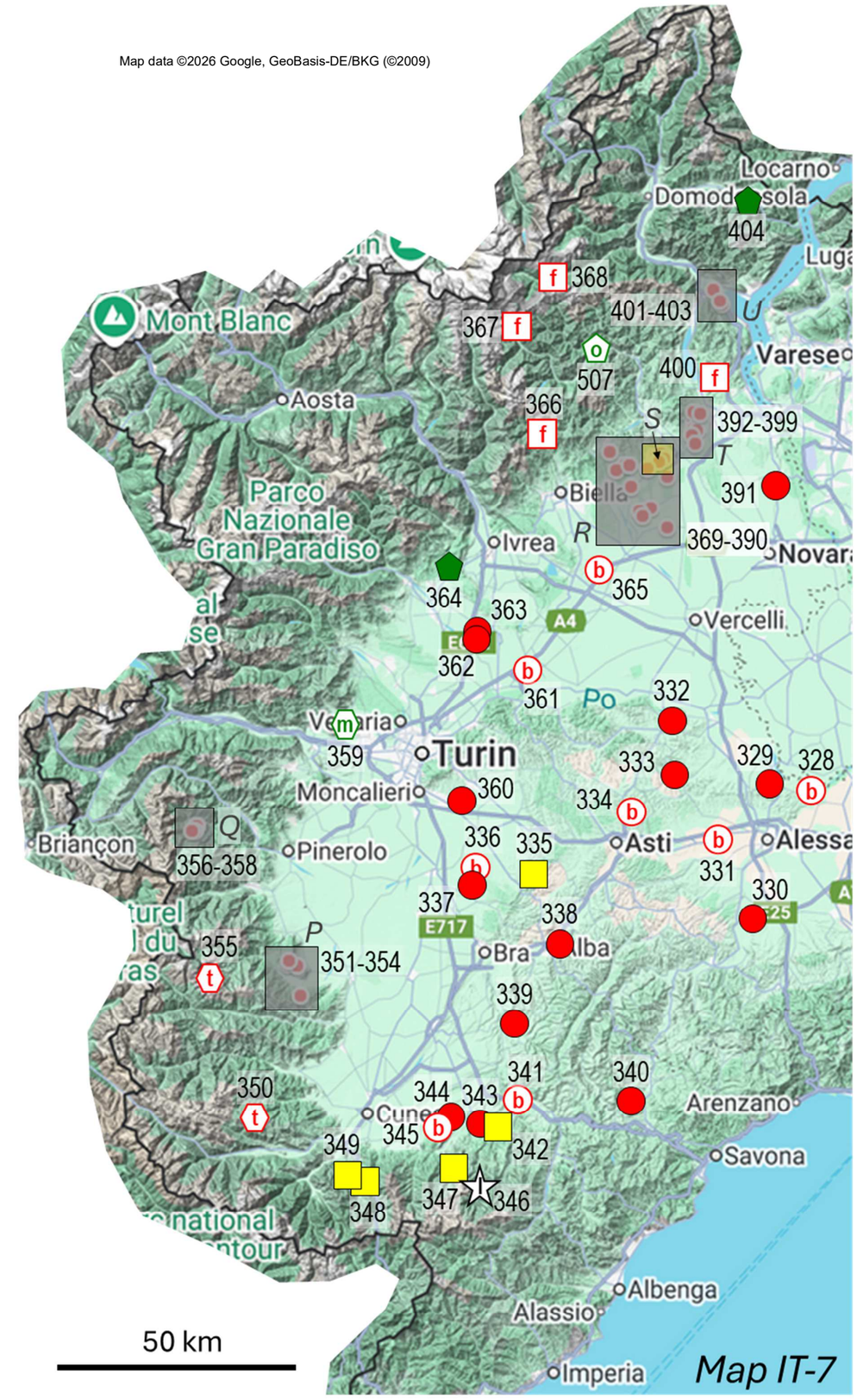
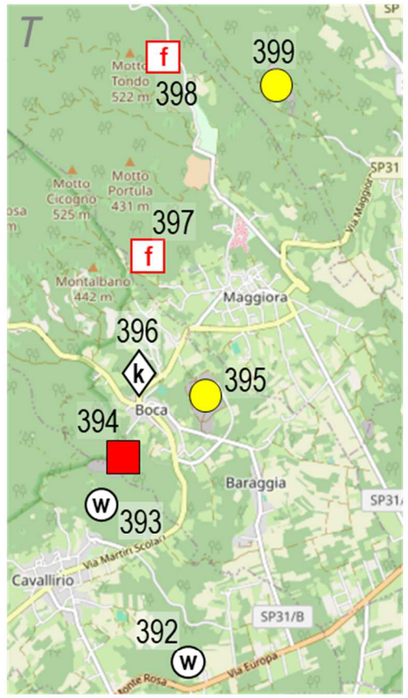

Map IT-6
A7
E45
A31
E35
A1
A13
E55
E70
SS755
SS461
SS12
Lodi
Pavia
Cremona
Mantua
Chioggia
Piacenza
Rovigo
Parco Regionale Veneto del Delta del Po
Alessandria
Parma
Carpi
Ferrara
Cento
Modena
Sassuolo
Casalecchio di Reno
Bologna
Ravenna
Imola
Faenza
Forlì
Cervia
Cesena
Genoa
Rapallo
Sestri Levante
La Spezia
Po
Bressana Bottarone
Corana
Cervesina
Silvano Pietra
Molino dei Torti
Casei
Medassino
Voghera
Lungavilla
Casteggio
Montebello della Battaglia
Torrazza Coste
Codevilla
Pontecurone
Viano
Castellarano
Baiso
Roteglia
Fiorano Modenese
Carpineti
Prignano sulla Secchia
Varana
Stella
Pazzano
Serramazzoni
Cavola
Cerredolo
BEBBIO
Secchia
SELVA
285-297
313-326
30 km
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)
active
inactive
ec
qf
qz
rc
sc
tc

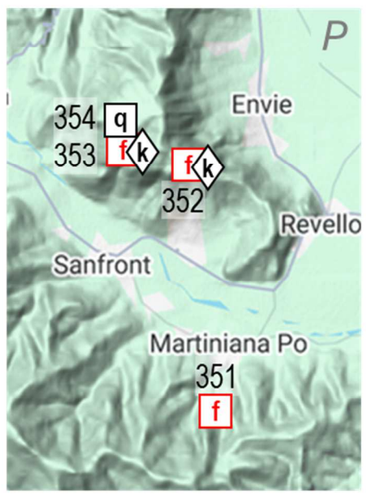
Table IT-d: deposits of raw materials for the ceramic and glass industries in Italy.

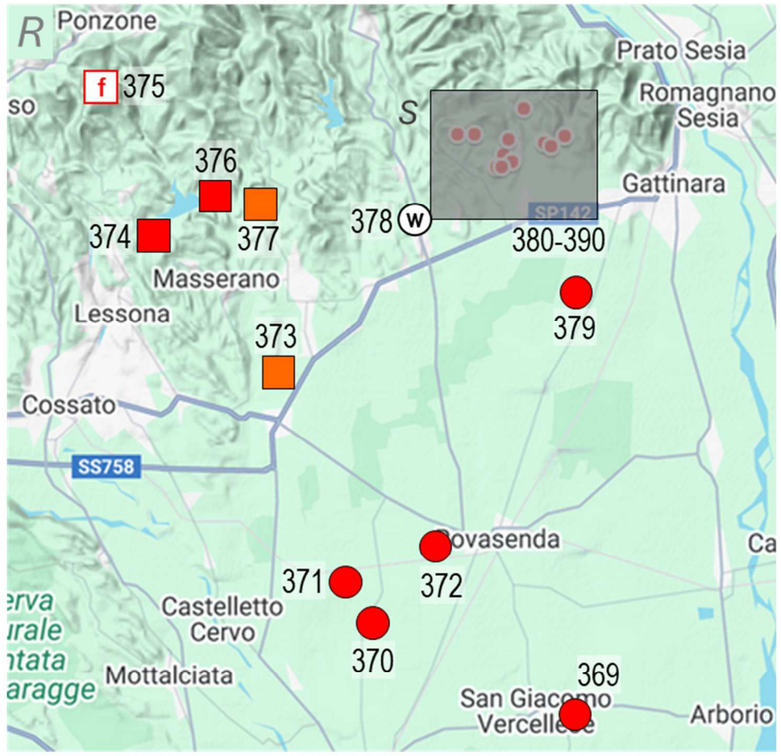
#	r. m.	st	deposit	province
388	wc	I	Coccola	Vercelli
389	wc	I	Coccola-Rolleja	Vercelli
390	fd	I	Uccineglio	Vercelli
391	rc	A	Motto Grizza-Oleggio	Novara
392	wc	I	Strona-Cavallirio	Novara
393	wc	I	Motto-Cavallirio	Novara
394	fd	A	San Grato	Novara
395	wc	A	Bocciole	Novara
396	ka	I	Marello	Novara
397	fd	A	Castagna Morera-Maggiora	Novara
398	wc	A	Cumiona	Novara
399	fd	A	Motto Tondo-Maggiora	Novara
400	fd	I	Barro	Novara
401	fd	A	Monte Camoscio-Baveno	Verbania-Cusio-Ossola
402	fd	A	Seula-Baveno	Verbania-Cusio-Ossola
403	fd	A	Montorfano (Toce)	Verbania-Cusio-Ossola
404	ol	A	Finero	Verbania-Cusio-Ossola
405	rc	A	Villaggio Snia	Monza-Brianza
406	rc	I	Burligo	Bergamo
407	qz	I	Monte Botto - Monte Castra	Bergamo
408	ba	I	Faidallo	Lecco
409	fd	A	Pernighera-Surlosasso-Bogia-Lentrée NW	Lecco
410	qz	I	Madesimo	Sondrio
411	tc	I	Mastabbia e Lago	Sondrio
412	tc	I	Pra Mosin	Sondrio
413	tc	I	Sasso Nero	Sondrio
414	tc	I	Sasso	Sondrio
415	tc	I	Bagnada	Sondrio
416	tc	A	Brusada-Ponticelli	Sondrio
417	tc	A	Sasso della Pradaccia	Sondrio
418	tc	A	Valbrutta	Sondrio
419	tc	I	Largone Superiore	Sondrio
420	tc	I	Monte Zocca	Sondrio
421	fd	I	Val Regone	Bergamo
422	rc	I	Melotta	Cremona
423	rc	A	Soncino	Cremona
424	rc	I	Fenili Belasi	Brescia
425	rc	I	Gavardo Fornaci	Brescia
426	rc	A	Borgonato	Brescia
427	ba	I	Graticelle	Brescia
428	ba	I	Marigole-Pice	Trento
429	Li	O	Forcel Rosso	Brescia
430	fd	I	Scarpa	Sondrio
431	qz	A	Sondalo	Sondrio
432	fd	I	Stavello-Val Dombastone	Sondrio
433	fd	I	Canè	Brescia
434	fd	I	Sant'Apollonia	Brescia
435	fd	I	Giustino	Trento
436	rc	A	Piscolo	Trento
437	rc	A	Ischia	Trento
438	rc	I	Rio Belasio	Trento
439	fd	I	Santa Maria (Monte Stalla Rossa)	Bolzano-Bozen
440	li	O	Hohe Kreuzspitze	Bolzano-Bozen
441	tc	I	Casateia	Bolzano-Bozen
442	rc	A	Gasser	Bolzano-Bozen
443	li	O	Uttenheim	Bolzano-Bozen
444	fd	I	Al Lago	Trento
445	fd-ba	I	Monte Zaccon-Marter	Trento
446	be	I	Zanconi	Vicenza
447	be	I	Monte Cimo	Verona
448	wc	I	Monticello di Fara	Vicenza
449	ka	I	Bertozzo	Vicenza
450	wc	A	Costa Benedetta	Vicenza
451	be	A	Pozzolo	Vicenza
452	be	I	Grancare	Vicenza
453	qs	I	Monte Cugola	Vicenza
454	wc	I	Montemezzo	Vicenza
455	be	I	Sant'Urbano	Vicenza
456	ka	I	Monte Madarosa	Verona
457	be	I	Luvi	Verona
458	be	I	Monte Guarda	Verona
459	fc	I	Croce di Popi - Cerealto	Vicenza
460	rc	A	Seldare	Vicenza
461	be	I	Guizza	Vicenza
462	rc	A	Fabbrega	Vicenza
463	rc	A	Varesin	Vicenza
464	rc	A	Fossanigo	Vicenza
465	rc	I	Scovizze	Vicenza
466	rc	A	Leogra	Vicenza
467	rc	A	Fasola	Vicenza
468	rc	A	Capiterlina	Vicenza
469	rc	A	San Marco	Vicenza
470	rc	A	Casette	Vicenza
471	rc	A	Visan	Vicenza
472	rc	A	Zanella Vergan	Vicenza
473	be	A	Maruffa	Vicenza
474	be	I	Giani	Vicenza
475	be	I	Vegri-Campotamaso	Vicenza
476	ka	I	Malga Ofra	Vicenza
477	ba	I	Cima Bocchese	Vicenza
478	ka	I	Riolo (Valle dei Mercanti)	Vicenza
479	be	I	Canova	Vicenza
480	be	I	Fontanone	Vicenza
481	rc	A	Soran	Vicenza
482	rc	A	Coppine	Vicenza
483	rc	A	Martinè	Vicenza
484	ka	I	Santa Caterina I	Vicenza
485	wc	I	Pozzani	Vicenza
486	ka	I	Valle dell'Orco	Vicenza
487	qz	A	Pozzerle	Vicenza
488	qs	I	Fontanelle	Vicenza
489	rc	A	Strada San Dono-Noale	Venezia
490	rc	I	Dosson-Casier	Treviso
491	rc	I	Gaggio-Marcon	Venezia
492	rc	A	Treponti-Casale sul Sile	Treviso
493	rc	I	Serenissima-Roncade	Treviso
494	rc	I	Acque	Treviso
495	rc	A	Possagno-Carcoselle	Treviso
496	rc	A	Possagno-Via Olivi	Treviso
497	rc	A	Costalunga & Menegazzo	Treviso
498	rc	A	Le Musse - Castelli W	Treviso
499	rc	A	Le Musse - Castelli E	Treviso
500	rc	A	Curogna	Treviso
501	rc	I	Fornace di Pederobba	Treviso
502	rc	A	Villabruna	Belluno
503	qz	A	Lista dei Narcisi-Revine Lago	Treviso
504	qz	I	Laste-Revine Lago	Treviso
505	rc	A	Mortesins	Udine
506	rc	I	Manzano	Udine
507	ol	I	Giavine Rosse-Balmuccia	Vercelli

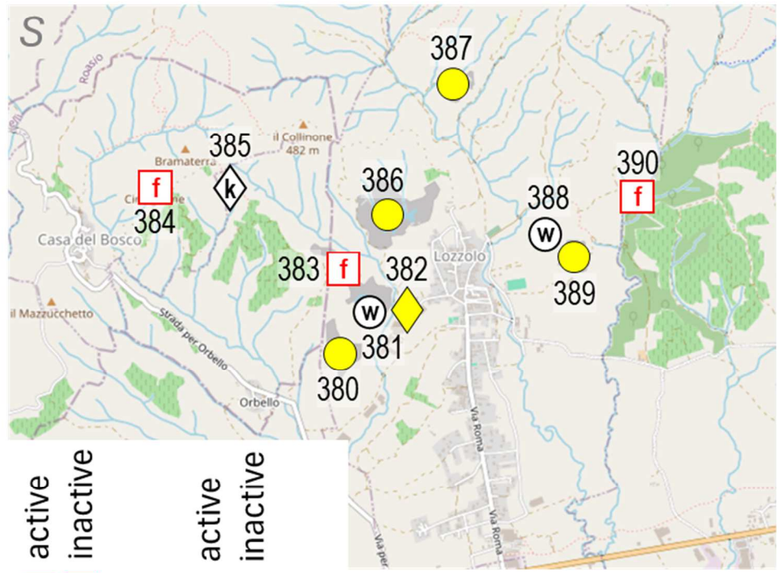

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Mont Blanc
Parco Nazionale Gran Paradiso
Aosta
Ivrea
Biella
Varese
Locarno
Domodossola
Turin
Moncalieri
Pinerolo
Briançon
Bra
Alba
Asti
Alessa
Cuneo
Arenzano
Savona
Albenga
Alassio
Imperia
Vercelli
Po
A4
E717
368
367
401-403
404
507
400
366
392-399
391
369-390
364
363
362
365
361
332
359
360
333
329
328
334
336
335
331
330
337
338
339
356-358
355
351-354
350
344
343
345
341
340
342
349
348
347
346
Q
P
S
T
R
50 km
Map IT-7

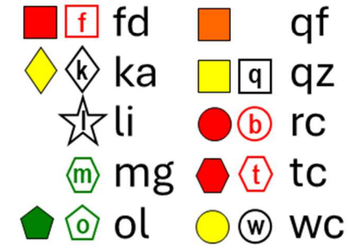

Mergozzo
U
SS33
Fondotoce
E62
Gravellona Toce
403
Feriolo
402
401
Baveno

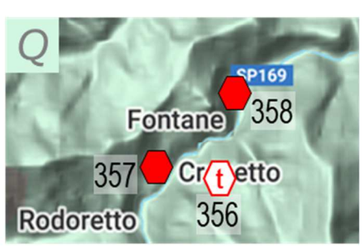

T
399
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397
396
395
394
393
392
Maggiora
Baraggia
Boca
Cavallirio

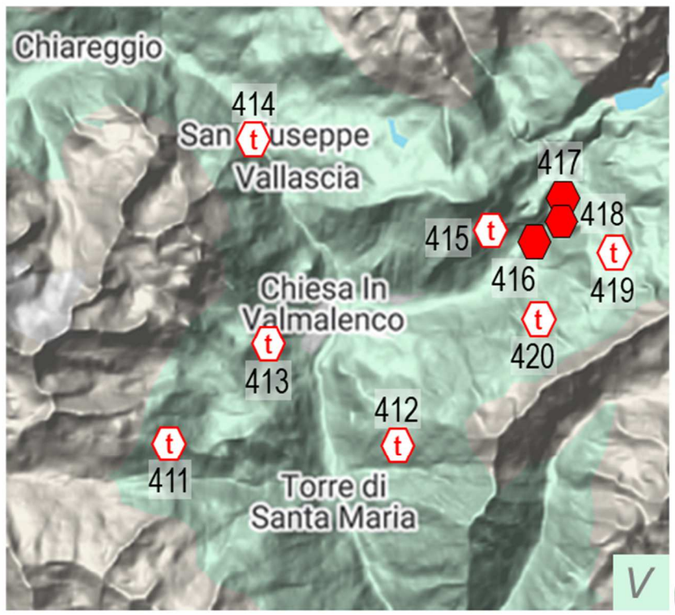

P
Envie
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353
352
Revello
Sanfront
Martiniana Po
351

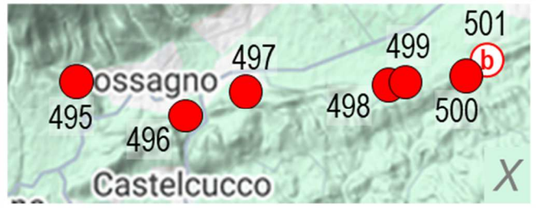

R
Ponzone
375
Prato Sesia
Romagnano Sesia
S
376
374
377
378
Gattinara
380-390
Masserano
379
Lessona
373
Cossato
SS758
Ca
Ovasenda
371
372
Castelletto Cervo
370
Mottalciata
369
San Giacomo Vercellese
Arborio

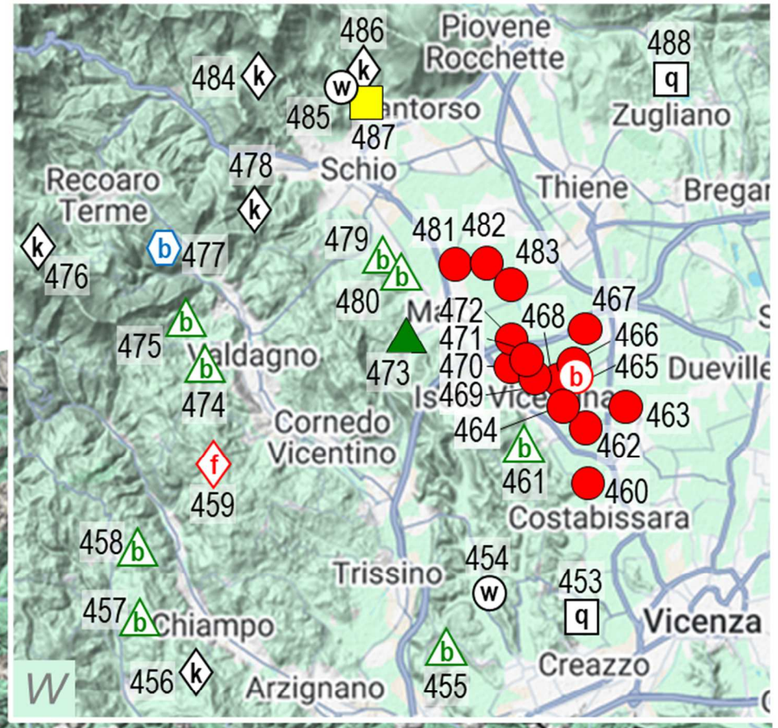

S
387
385
386
390
384
388
389
383
382
381
380
Casa del Bosco
Lozzolo
Orbello


active
inactive
fd
ka
li
mg
ol
qf
qz
rc
tc
wc


Q
SP169
358
Fontane
357
356
Rodoretto

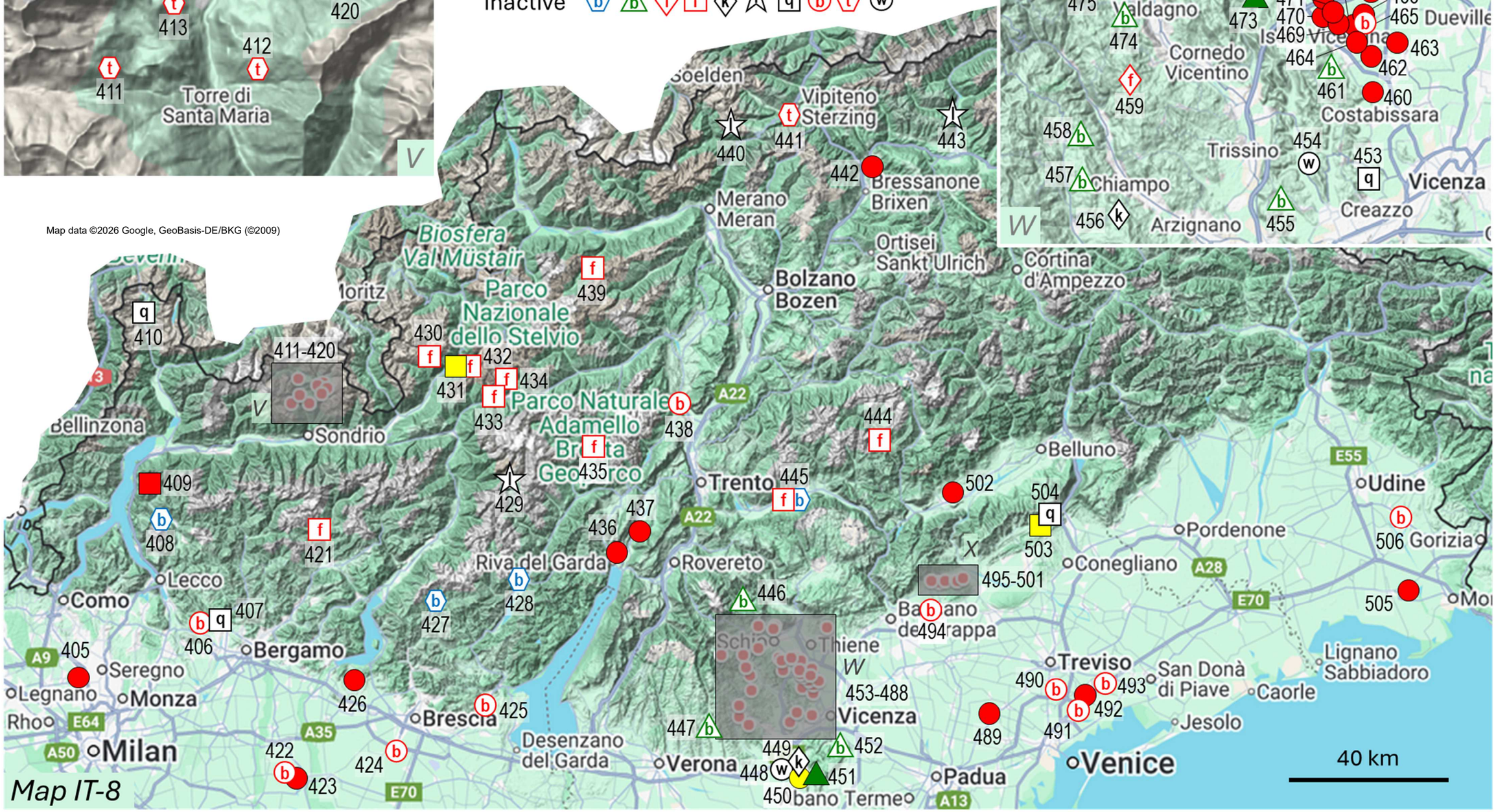

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Goelden
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Bressanone
Brixen
Merano
Meran
Biosfera
Val Müstair
Parco
Nazionale
dello Stelvio
Ortisei
Sankt Ulrich
Bolzano
Bozen
Cortina
d'Ampezzo
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Bellinzona
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E55
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421
Pordenone
506 Gorizia
Riva del Garda
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X
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A28
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Lecco
Como
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Bergamo
Schio
Thiene
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Treviso
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493
San Donà
di Piave
Lignano
Sabbiadoro
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A9
Seregno
453-488
Vicenza
Caorle
Legnano
Monza
426
492
Rho
E64
Brescia
425
447
491
Jesolo
A35
Desenzano
del Garda
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452
489
A50
Milan
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448
451
Venice
40 km
Verona
423
450
Padua
E70
A13
Map IT-8

Jordan

The Jordanian production of ceramic and glass raw materials include kaolin and refractory clay, red clay and stoneware clay, silica sand, zeolites, basalt for stone wool and probably bentonite and feldspar. Also, occurrences of barite and zirconium minerals have been reported [1-5].

Kaolin is mined at Wadi Siq-Wadi Rakyia (central Jordan) from altered sandstones of the lower Cretaceous Kurnub Formation [6-8]. Analogous deposits are no longer exploited at Qa'a El Disi in the south [6,9,10] as well as Mahis and Ghor-Kabid [6,11] in the north of the country. **Refractory clays** are quarried in southern Jordan from marine sediments of the Silurian Muddawwara Formation at Jabal Al-Harad [6,12,13] and the Ordovician Hiswa Formation at Hiswa [5,13]. Totall production (mean 2015-2024) is 395,000 tpa of raw kaolinitic clay [5] and about 16,000 tpa of processed kaolin [15]. Huge resources are claimed [2]; reserves were estimated to be ~119 million tonnes [1].

Red clays are extracted from various geological sources [5]: shales of Lower Silurian [6] and Cretaceous claystones of the Fuhais, Hummar, Shueib and Kurnub formations [6,16]. **Stoneware clays** are quarried at Al-Yamaniya (Aqaba) from Pleistocene sediments of nearshore environment [6,17,18].

Silica sand resources are substantial, given to thick sandstone units of the Ordovician Disi Formation (300 m) and the Cretaceous Kurnub Formation (20 m). The most important deposit is in Ras An-Naqab, where Ordovician massive whitish weathered sandstone is quarried [6]. Quartz sand is also recovered as byproduct of kaolin processing at Wadi Siq-Wadi Rakyia mine [6] and from Pleistocene loose sands of the Azraq Formation [18]. The output of the last decade has been 170,000 tpa on average [5] while resources are large [2].

Basalt for stone wool is extracted (an unspecified fraction of the total basalt production, ~150,000 tpa) from the Quaternary Bishriyya Group in northern Jordan [6,19,20]. **Zeolites** are widely distributed within the Jordan Graben, and particularly in the Pleistocene Aritayn Formation in the Azraq Basin [20-25]. Zeolitization of pyroclastic rocks (leading to the formation of phillipsite, chabazite, faujasite and analcime) occurred through a complex convolution of syneruptive, supergene and epigenetic alteration [26,27]. Currently productive (10,500 tpa, mean 2015-2024) is the Jabal Al Aritayn mine [4] and total reserves of zeolites exceed 200 million tonnes [1]. **Bentonite** is mined at Qa' El-Azraq, where it is intercalated with diatomaceous beds in the Pleistocene Azraq Formation; reserves in the area are very large [6,20,28-30].

Feldspar deposits are reported within the alkali granitic complex of southern Jordan, where the target are leucogranites [31-33] and pegmatites [34], and as quartz-feldspathic sands in the Highlands [35]. Although the Jordanian production (peaking to 13,800 tonnes in 2005) officially ceased in 2008 [15], four mines appear to be in operation. Reserves are indicated in 138 million tonnes [1,2].

Barite is found at Wadi El-Mingar, as filling of a fracture system cutting the Eocene Wadi Shallala Chalk Formation, which is associated to emplacement of Pleistocene basaltic dykes [36].

Zirconium minerals: the middle member of the Ordovician Dubaydib Sandstone Formation contains significant concentrations of heavy minerals, and particularly up to 3.7% of zircon [2]. Exploration of Wadi Al-Mezrab area has estimated reserves of zircon for 96,000 tonnes [1,2].

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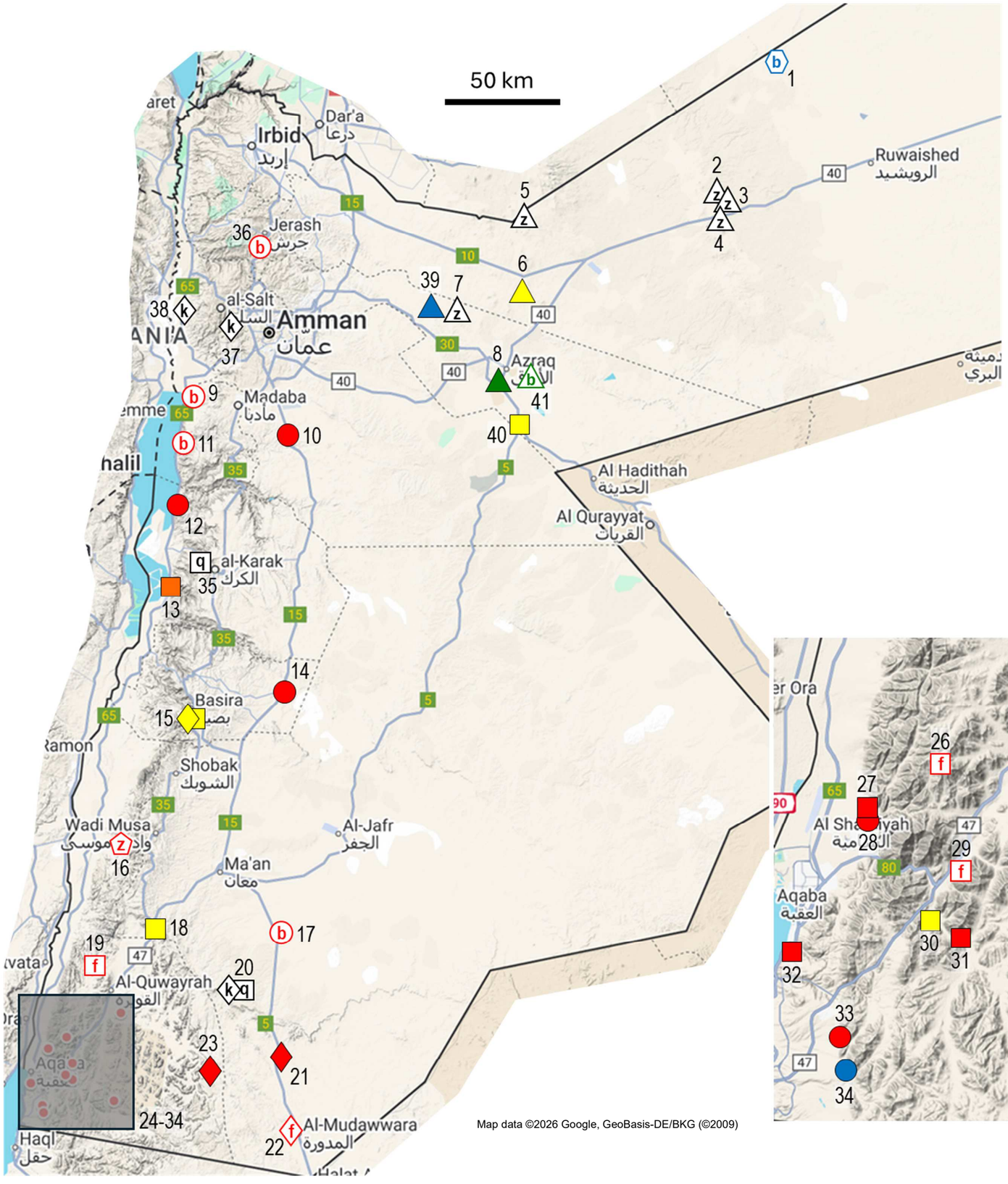
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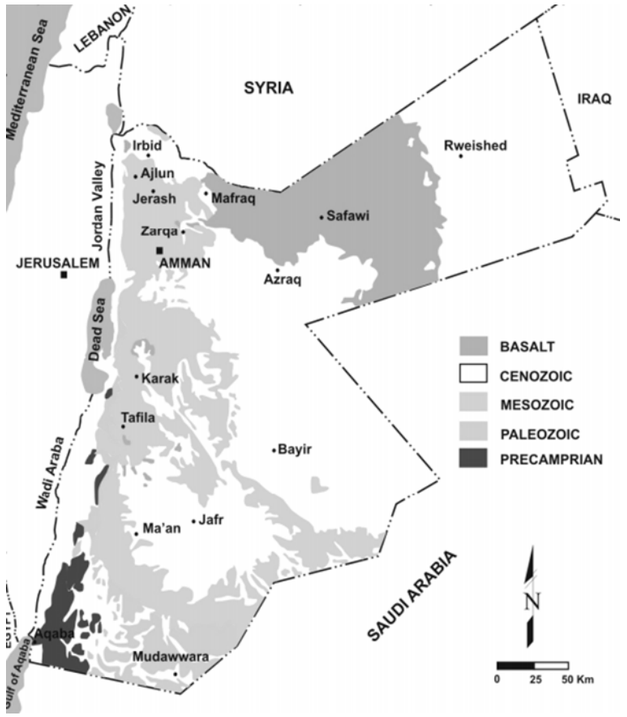
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active / inactive

- rc
- fd
- ka
- fc
- qf
- qs
- ze
- be
- sc
- sw
- ba
- zr



Geological sketch of Jordan [1]

Raw material

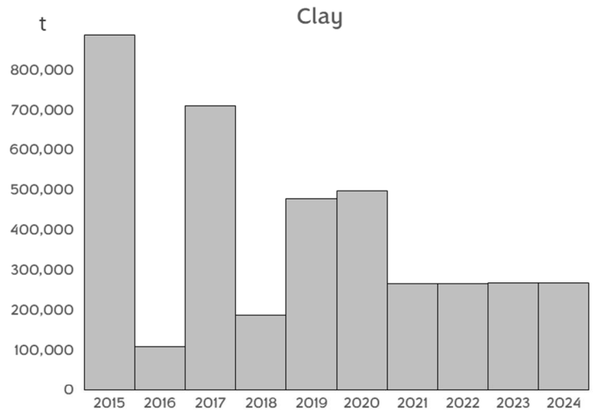
ba	barite
be	bentonite, smectitic clays
fc	fireclay, refractory clays
fd	feldspar, feldspathic rocks
ka	kaolin
qf	quartz-feldspathic sand
qs	silica sand
rc	red clays
sc	red stoneware clays
sw	basalt for stone wool
ze	zeolites
zr	zirconium minerals

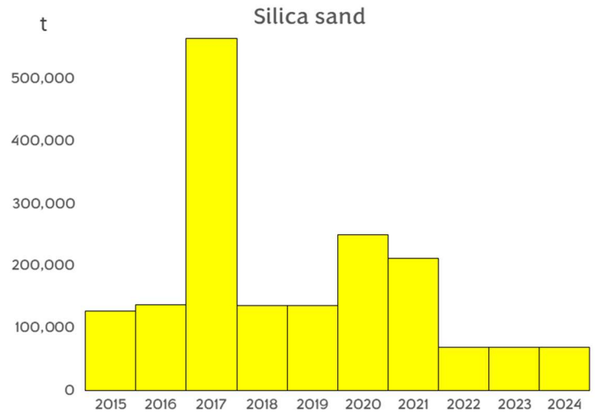
Status of deposit

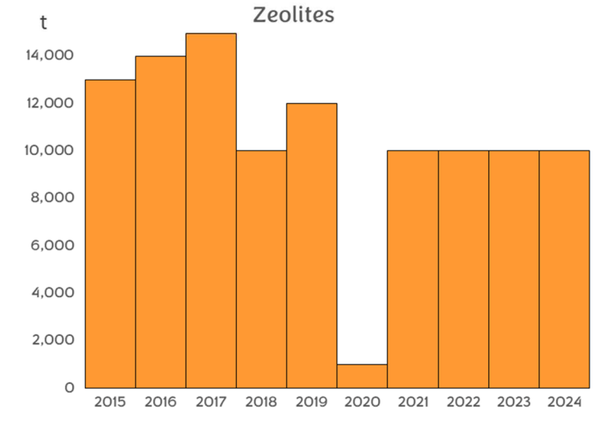
A	active mine
I	inactive, mine closed
O	occurrence, no recent mining

Table JO-a: deposits of raw materials for the ceramic and glass industries in Jordan.

#	raw material	st	deposit	district
1	ba	O	Wadi El Mingar	Rwaished
2	ze	O	Jabal Tarboush	Rwaished
3	ze	O	Jabal Hannoun	Rwaished
4	ze	O	Jabal Ashqaf	Rwaished
5	ze	O	Tell Rimah	Badiah Shamaliya
6	ze	A	Jabal Al Aritayn	Badiah Shamaliya
7	ze	O	Tell Hassan	Zarqa
8	be	A	Q'a Al Azraq	Zarqa
9	br	I	Suwaymah	Shoonah Janoobiyah
10	br	A	Dab'a	Jizah
11	br	I	Al-Dabbusah	Diesan
12	br	A	Wadi Sudud Sabihah	Ghawr Almazra'a
13	qf	A	Wadi Numeira	Shoonah Janoobiyah
14	br	A	Al Hasa	Al Hasa
15	ka-qs	A	Wadi Siq-Wadi Rakyia	Busayra
16	zr	O	Wadi Al-Mezrab	Aqaba
17	br	I	Abu Tarafah	Ma'an
18	qs	A	Ras An-Naqab	Ma'an
19	fd	O	Wadi Mahlab	Aqaba
20	ka-qs	O	Qa'a El Disi	Ma'an
21	fc	A	Jabal Al-Harad	Ma'an
22	fc	O	Al Mudawara	Ma'an
23	fc	A	Hiswa	Aqaba
24	qf	O	Ayn Al Hashim	Aqaba
25	qf	I	South Al Quweira	Al Quweira
26	fd	O	Jabal Abu Al Ghoufran	Aqaba
28	br	A	Al Shamiyah	Aqaba
27	fd	A	Wadi Araba	Aqaba
29	fd	O	Wadi Saader Mulghan	Aqaba
30	qs	A	Wadi Al-Jayshiah W	Aqaba
31	fd	A	Wadi Al-Jayshiah E	Aqaba
32	fd	A	Wadi Hood Al-Sufun	Aqaba
33	br	A	South Aqaba	Aqaba
34	sc	A	Al-Yamaniyyah	Aqaba
35	qs	O	Ein El Bayda	al-Karak
36	br	O	Zarqa River	Jerash
37	ka	I	Mahis	Mahes & Fuhais
38	ka	O	Ghor-Kabid	Dair Alla
39	sw	A	Bishriyya	Badiah Shamaliya
40	qs	A	Dahikyya	Zarqa
41	be	O	Ein El-Baida	Zarqa







Kosovo

In the Kosovar territory, crossed by the ophiolite belt (Dinarides) and the Vardar zone, several raw materials are currently extracted for the ceramic and glass industries: bauxite, chromite, kaolin, magnesite, red clay, silica sand and zeolites. Bentonite and talc deposits are no longer exploited [1-3].

Bauxite: karstic deposits are found in Jurassic and Cretaceous limestones of the Dinaride sector [4,5] with an active mining district around Grebnik, but no information on current production is available. Reserves are estimated to 1.7 million tonnes [6].

Chromite deposits are related to dunite massifs in the ophiolitic belt [1,2] where the Devë mine is producing 40,000 tpa as average of 2015-2024 [7]; inferred resources are given to approximately 90 million tonnes of raw ore [2].

Kaolin deposits derive from hydrothermal alteration of granitic rocks of the Bujanovac massif [2,8-10]: halloysite is being extracted in Novo Brdo (undisclosed extracted quantities) while mining activity in the Karaçevë deposits is suspended, although reserves of 5.7 million tonnes were indicated [2].

Magnesite: the Goleš and Strezovce mines are active, but recent production is unknown. These are vein deposits of cryptocrystalline magnesite, originating from metasomatic processes on gabbro and peridotite of the ophiolite belt [11,12]. Reserves amount to about 5 million tonnes [6].

Red clays are excavated in some quarries that exploit Pliocene to Quaternary deposits, with production of 480,000 tpa (mean 2015-2024) destined for the manufacture of bricks and cement [7]. Reserves are 26 million tonnes [13].

Silica sands are currently exploited at Lipjan, from Pliocene sediments, with average production of 46,000 tpa [9] and reserves of 3.8 million cubic meters [14].

Zeolites: a white clinoptilolite-rich tuff occurs as a level, up to 5 m thick, intercalated in a Miocene marine sequence [15]; production and reserves are not disclosed.

Bentonite is present in Pliocene and Miocene sedimentary sequences in the Gjilian and Ferizaj districts, with estimated reserves of 86 million tonnes [1].

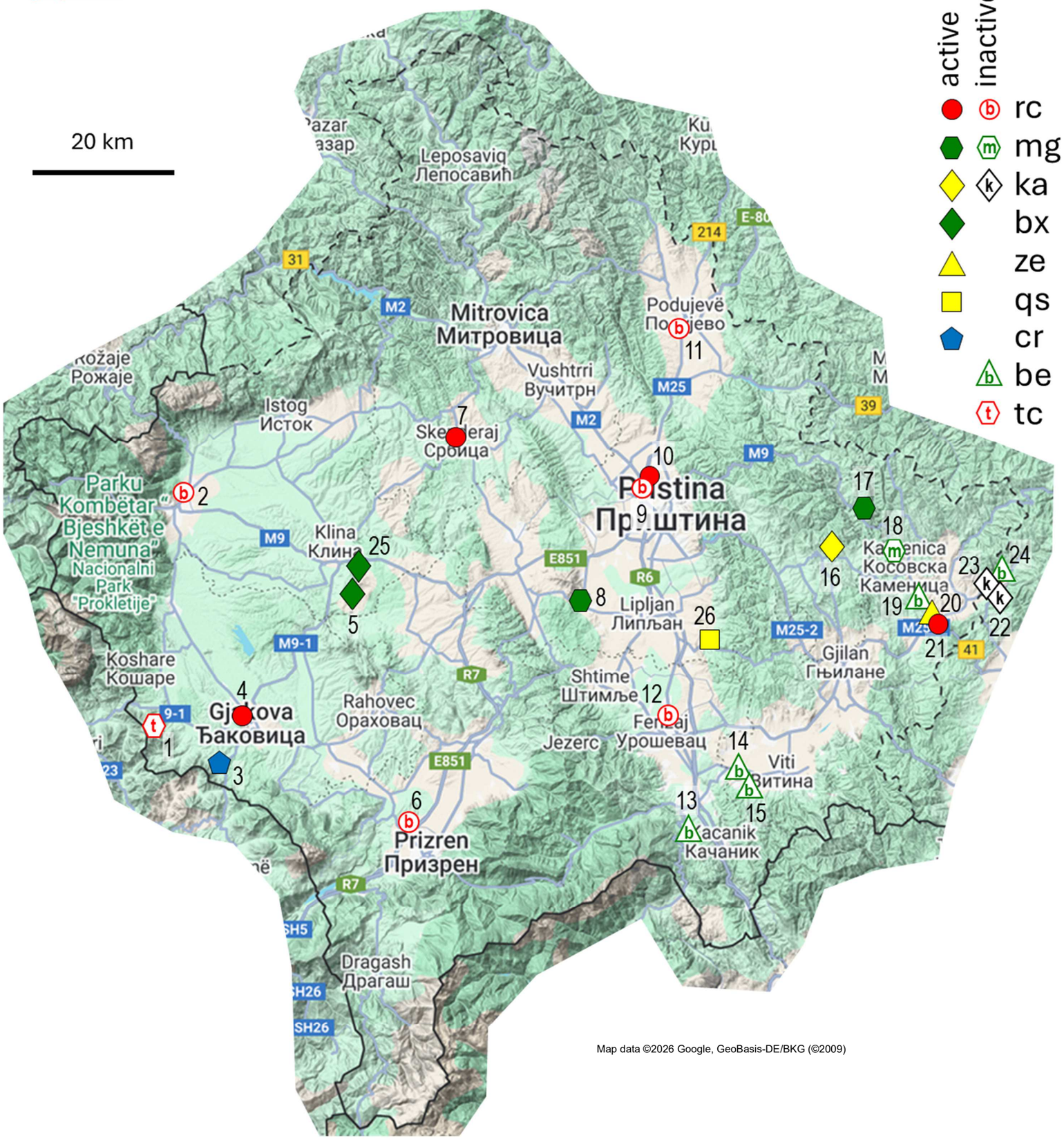
Talc: a small deposit formed by hydrothermal-metamorphic actions on Paleozoic shales is reported [2].

Table KS-a: deposits of raw materials for the ceramic and glass industries in Kosovo.

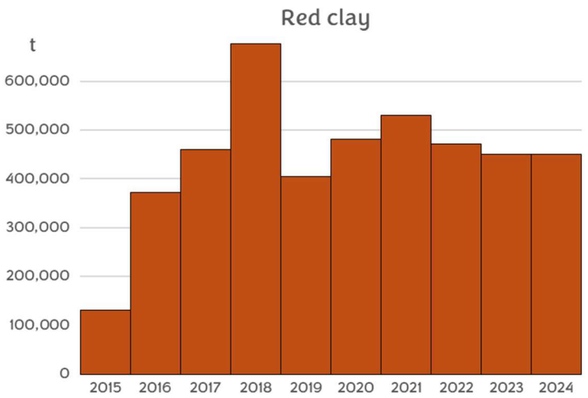
#	raw material	st	deposit	district
1	tc	I	Streoci	Morinë
2	br	I	Pejë	Pejë
3	cr	A	Devë	Gjakova
4	br	A	Pishkote	Gjakova
5	bx	A	Boxitet e Volijakut	Klina
6	br	I	Landovice	Prizren
7	br	A	Klinë e Poshtme	Skenderaj
8	mg	A	Goleš	Lipjan
9	br	I	Oliliq	Prishtine
10	br	A	Llazarevë	Kastriot
11	br	I	Podujevë	Podujevë
12	br	I	Ferizaj	Ferizaj
13	be	I	Dubravë	Ferizaj
14	be	O	Jerli Sadovina	Gjilian
15	be	O	Gushicë	Gjilan
16	ka	A	Farbani Potok	Novo Brdo
17	mg	A	Strezovce	Kamenicë
18	mg	I	Tamnica	Kamenicë
19	be	O	Koretin	Gjilan
20	ze	A	Topanicë	Kamenicë
21	br	A	Donje Korminjane	Kamenicë
22	ka	I	Donje Karaçevë	Gjilan
23	ka	O	Gornje Karaçevë	Gjilan
24	be	O	Karaqeva	Gjilan
25	bx	A	Grebnik	Klina
26	qs	A	Sllovi	Lipjan

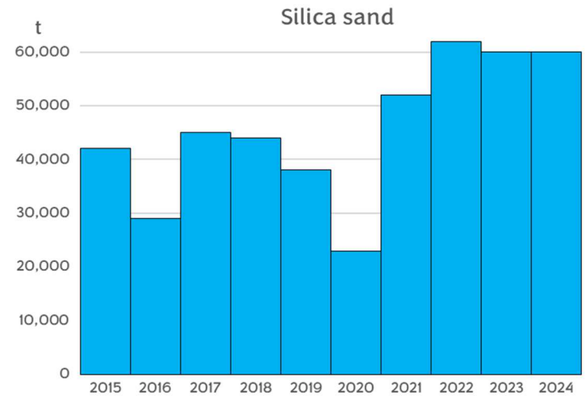
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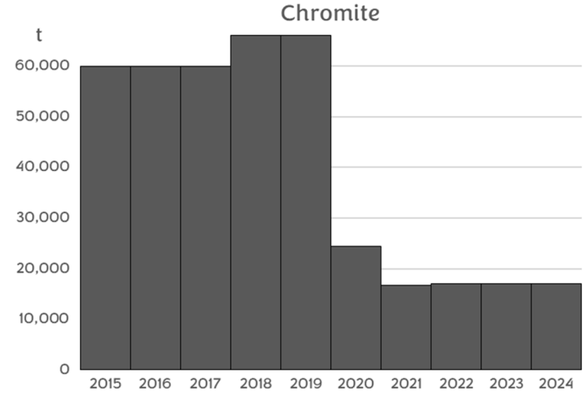
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Latvia

Latvia produces red clays and silica sands for the domestic glass and brick industries. Raw materials are exploited from Pleistocene, Triassic, and Devonian sediments. In addition, the occurrence of zircon-bearing heavy sands is reported.

Red clay: Latvian clays have been recovered from marine sediments of Devonian (Burtnieki, Gauja and Katleši stages) or Triassic age (Nemunas stage), and Pleistocene glacio-lacustrine deposits [1,2]:

- Devonian sediments occur at shallow depths in the northern part of Latvia, where clays are mined from the Liepa deposit (Lode Formation, Gauja stage). Although extensively used in the past [1–6], clays of the Katleši stage (Kuprava deposit) and the Burtnieki stage (Tūja and Vitrupe deposits) are no longer extracted. Overall reserves exceed 20 million cubic metres and can be supplemented by important potential resources [1,2].
- Triassic clay is currently mined at the Vadakste deposit, with reserves of 16 million m³ [2]. Although used by the cement industry, these clays are also being evaluated as a possible raw material for brick production [5].
- Pleistocene clay deposits are numerous and associated with glacio-lacustrine sediments in western and southern Latvia, where clays are used for brick production in the Jelgava district [3,5]. The estimated clay reserves exceed 300 million m³ [1,2].

Quartz sand: the Latvian deposits consist of weakly cemented sandstones pertaining to both Devonian (Gauja stage) and Jurassic marine sediments [1,2,7]. Most of silica sand resources occur in the Valmiera and Cēsis districts, where significant reserves (up to 1.8 billion tonnes) are indicated, as well as in the Kuldīga district. These quartz sands can be used for both foundry and glass production, once beneficiated, and two quarries are currently in operation, with a mean production of 43,000 tpa in the last decade [8,9].

Zircon: placers of heavy minerals are reported all along the Baltic coast and the Gulf of Riga. Concentration of zircon in these ancient beach sands is in the 0.9–2.6 kg/t range [1].

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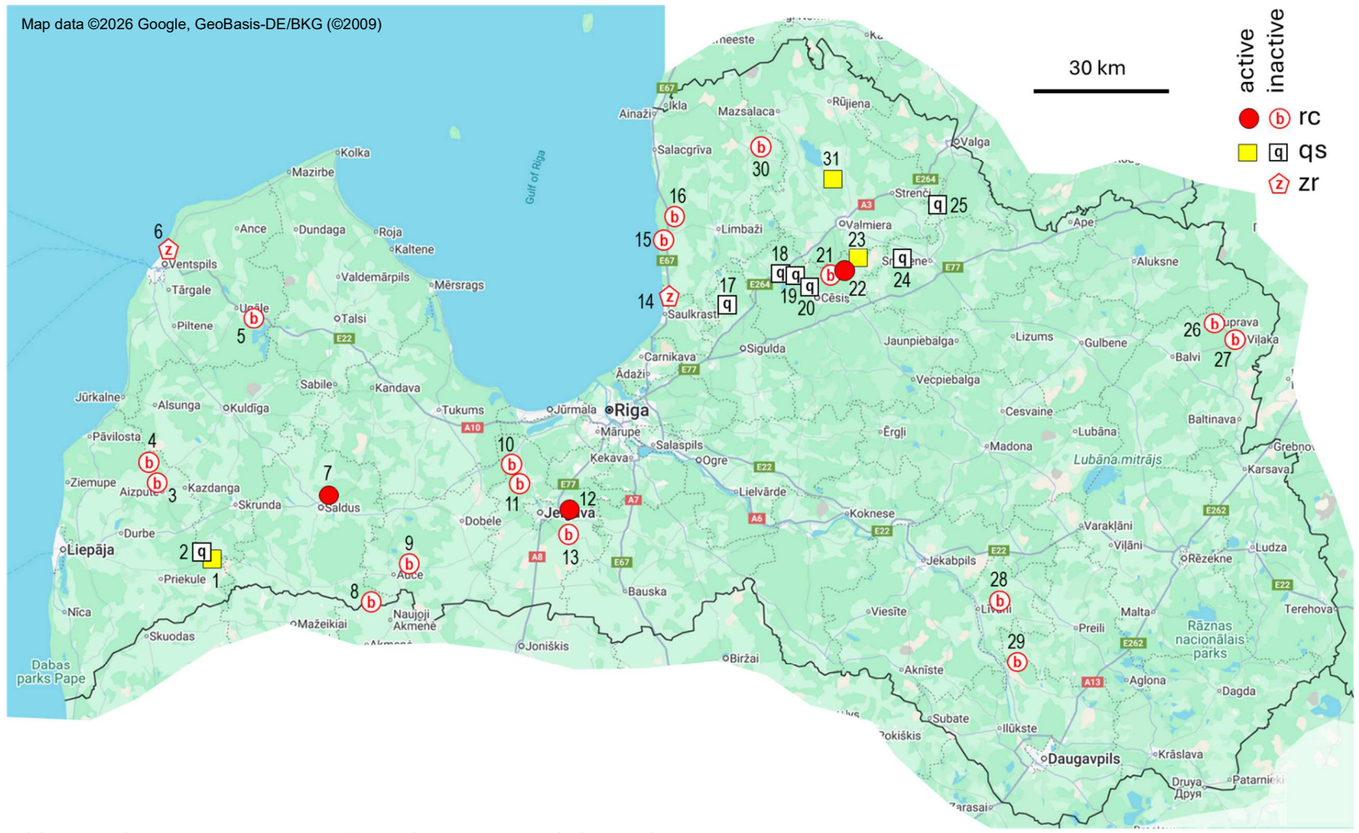


Table LV-a: deposits of raw materials for the ceramic and glass industries in Latvia.

#	r.m.	st	deposit	municipality
1	qs	A	Pīlādži	Kuldīga
2	qs	A	Skudras	Kuldīga
3	rc	I	Laža	South Kurzeme
4	rc	I	Apriki	South Kurzeme
5	rc	O	Usmas	Ventspils
6	zr	O	Staldzene	Ventspils
7	rc	A	Brocēni	Saldus
8	rc	O	Vadakste	Saldus
9	rc	I	Lielauce	Dobeles
10	rc	I	Kalnciems	Jelgava
11	rc	I	Kaiģi	Jelgava
12	rc	A	Spartaks	Jelgava
13	rc	I	Progress	Jelgava
14	zr	O	Skulte	Limbaži
15	rc	I	Tūja	Limbaži
16	rc	I	Vitrupe	Limbaži
17	qs	O	Lēdurga	Siguldas
18	qs	I	Bērziņi	Cēsis
19	qs	I	Bāle-Bērziņi	Cēsis
20	qs	I	Cīruļi	Cēsis
21	rc	O	Gāršas	Cēsis
22	rc	A	Liepa (Straumeni)	Cēsis
23	qs	A	Mārsnēni	Cēsis
24	qs	O	Blome	Smiltene
25	qs	O	Vijciems	Valkas
26	rc	I	Kuprava	Balvi
27	rc	O	Vilaka	Balvi
28	rc	I	Rožupes	Līvāni
29	rc	I	Nīcgales	Daugavpils
30	rc	I	Planči	Valmieras
31	qs	A	Burtnieki	Valmieras

Lebanon

Amongst ceramic and glass raw materials, only silica sand and red clay are extracted in Lebanon. The amount of production is not disclosed and neither the size of reserves [1-3].

Silica sands are mainly extracted in the Bcharri (*Map LB-1A*), Keserwan (*Map LB-1B*) and Aley (*Map LB-1C*) districts, where there are extensive outcrops of loosely consolidated sandstones, deposited in fluvio-deltaic environment of the Lower Cretaceous (Chouf Sandstones), which represent the major source of silica sand in Lebanon [1,4,5]. Any extraction of Quaternary aeolian and alluvial sands should be abandoned [2,4].

Red clays are used essentially for the manufacture of bricks, tiles, and pottery [1,2,6]. Half a dozen quarries exploit clays, occurring in seams and pockets in the Cretaceous (Barremian) fluvio-deltaic sequences of the Chouf Formation. A minor source is given by shales in the Cretaceous (Albian) Niha Formation [1].

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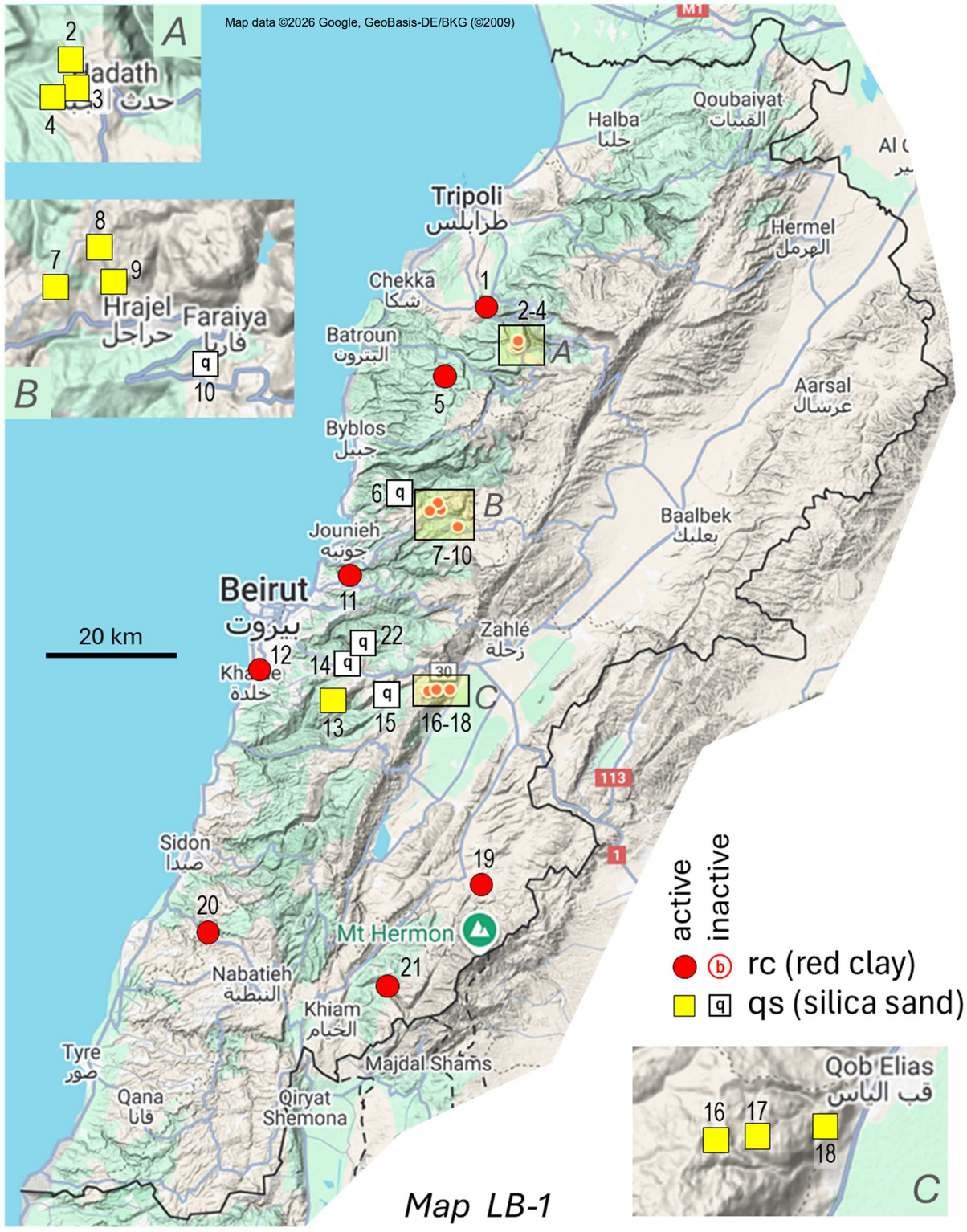
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Table LB-a: deposits of raw materials for the ceramic and glass industries in Lebanon.

#	raw material	st	deposit	district
1	rc	A	Kousba	Koura
2	qs	A	Hadath el-Jebbe 3	Bcharri
3	qs	A	Hadath el-Jebbe 2	Bcharri
4	qs	A	Hadath el-Jebbe 1	Bcharri
5	rc	A	Hadtoun	Batroun
6	qs	I	Jouret el-Termos	Keserwan
7	qs	A	Hrajel	Keserwan
8	qs	A	Faraya	Keserwan
9	qs	A	Mayrouba	Keserwan
10	qs	I	Kfardebian	Keserwan
11	rc	A	Mazraat Yachouh	Metn
12	rc	A	Chouaifet El Qoubbeh	Aley
13	qs	A	Ghaboun-Sebaal	Aley
14	qs	I	Dhour el-Aabadiye	Baabda
15	qs	I	Aazzouniye	Aley
16	qs	A	Ain Dara 1	Aley
17	qs	A	Ain Dara 2	Aley
18	qs	A	Ain Dara 3	Aley
19	rc	A	Rashaya	Rashaya
20	rc	A	Zefta	Nabatieh
21	rc	A	Hebbariye	Hasbaya



Libya

Libya does not produce any ceramic and glass raw materials, except silica sand. Some resources are claimed (kaolin, bentonite, natural soda ash, feldspar, and red clay) but no mining activity is reported, nor is the importance of possible deposits known.

Silica sand is extracted in a dozen quarries located along the escarpment of the Nafusa Mountains from Holocene aeolian sand dunes and Lower Paleozoic sandstones [1-3]. Additional resources have been explored: quartzarenites (Cambrian and Ordovician) in Fezzan [3,4] and quartzites (Cambrian, Devonian and Cretaceous) in the Sirte Basin [5] and Cyrenaica [3,6].

Bentonite was explored at two sites in Cyrenaica, where thick smectite-rich layers are intercalated in the basal member of the Upper Oligocene-Lower Miocene Al-Faidiyah Formation [7,8].

Natural soda ash (natron and trona) is known to occur in Saharian chotts, such as El-Gatrun and al-Abyad in Fezzan [6] but there is no evidence of any industrial exploitation.

Kaolin: half a dozen deposits have been identified in fluvial sediments of the Early Cretaceous Messak Formation in the Sabha area (Fezzan) where kaolinitic claystones characterize the Jarmah Member [9-11]. Kaolin is also reported to occur in the Murzuq Basin (Fezzan) as weathering and diagenetic product at expenses of glacial deposits and post-glacial sandstones of the Ordovician Melaz Shuqran and Mamunyiat formations [12].

Red clay: only artisanal potteries are reported, which use shales of the Cretaceous Kiklah Formation and, to a lesser extent, of the Triassic Abu Shaybah Formation [2]. Clay occurrences are also reported in Cyrenaica, as continental sediments of the Neogene Sahabi Formation [13,14].

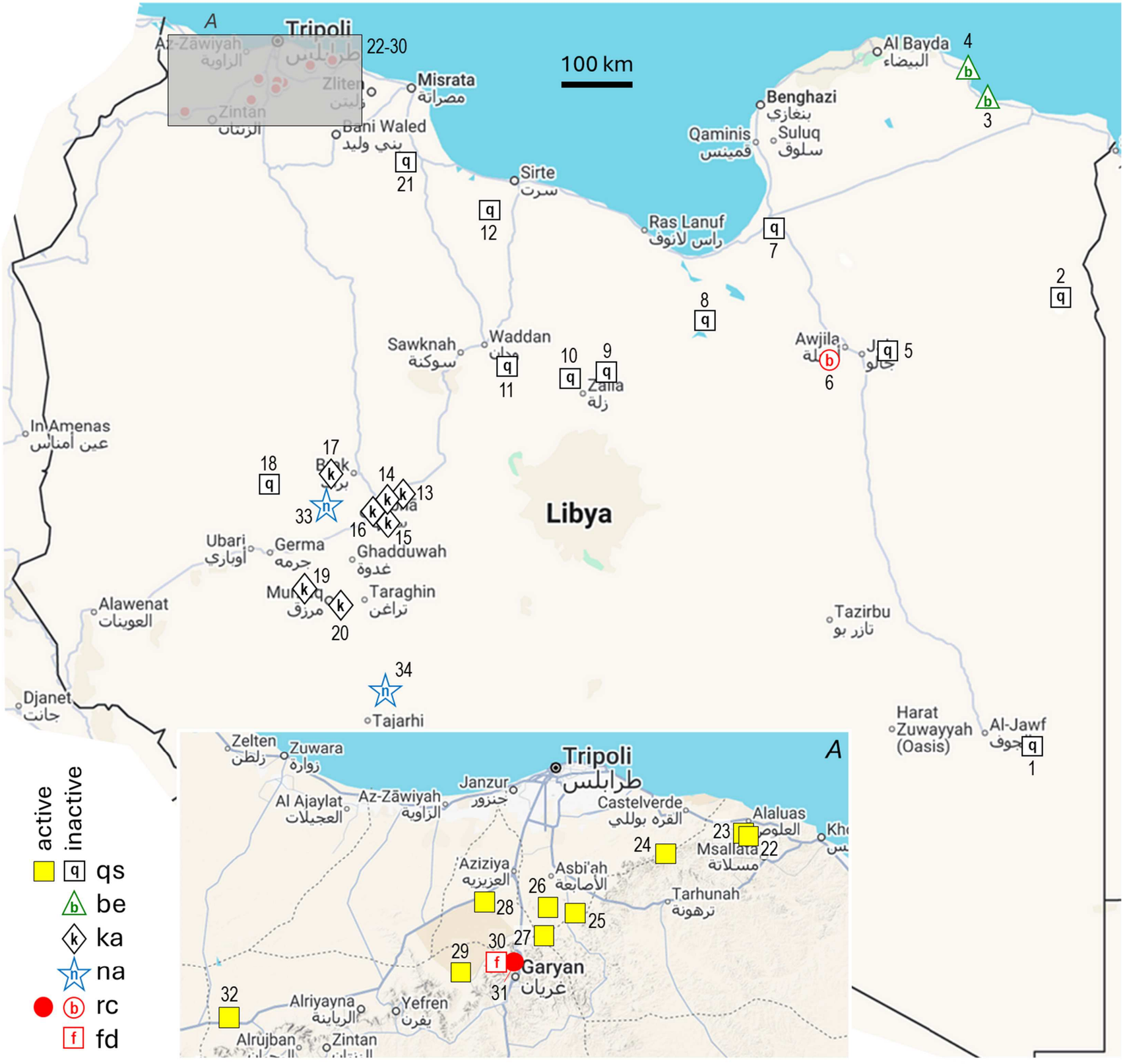
Feldspar: silica-undersaturated rocks outcrop widely in northwestern Libya; here, the Gharyan volcanic province (Cenozoic) hosts huge resources of nepheline-sodalite phonolites [15], hitherto used as aggregates, but also tested as feldspathic flux for whiteware [16].

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Table LY-a: deposits of raw materials for the ceramic and glass industries in Libya.

#	raw material	st	deposit	district
1	qs	O	Al-Kufrah	Al-Kufrah
2	qs	O	al-Jaghbūb	Al-Butnan
3	be	I	Ain Al Ghazala	Al-Butnan
4	be	I	Umm Ar Razam	Derna
5	qs	O	Jalo	Al-Wahat
6	br	O	As Sahabi	Al-Wahat
7	qs	O	Aǧdābiyā	Al-Wahat
8	qs	O	Maradah	Al-Wahat
9	qs	O	Ghani	Jufra
10	qs	O	az-Zallah	Jufra
11	qs	O	Waddan	Jufra
12	qz	O	Sirte	Sirte
13	ka	I	Samnu	Sebha
14	ka	I	Tamanhint	Sebha
15	ka	I	Sebha East	Sebha
16	qs	O	Sebha West	Sebha
17	ka	O	Tarout	Wadi al Shati
18	qs	O	Edree	Wadi al Shati
19	ka	O	Agar	Murzuq
20	ka	O	Murzuq	Murzuq
21	qs	O	Abu Qurayn	Misrata
22	qs	A	Qabilat Salimah 2	Al-Murgub
23	qs	A	Qabilat Salimah 1	Al-Murgub
24	qs	A	Al-Khawaliq	Al-Murgub
25	qs	A	Al-Khmies Emsihel	al-Jifarah
26	qs	A	Asbi'ah	al-Jifarah
27	qs	A	Gharian	al-Jifarah
28	qs	A	Al-Kasarat	al-Jifarah
29	qs	A	Al-Manasir	Jebel Garbi
30	fd	O	Ras Tunat	Gharyan
31	br	A	Gharyan	al-Jifarah
32	qs	A	Alruhaibat	Jebel Garbi
33	na	O	al-Abyad	Wadi al Shati
34	na	O	El-Gatrun	Murzuq



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Raw material

be	bentonite
fd	feldspar, feldspathic rocks
ka	kaolin
na	natural soda ash
qs	silica sand
rc	red clays

Status of deposit

A	active mine
I	inactive, mine closed
O	occurrence, no recent mining

Lithuania

The Lithuanian mining industry is getting red clays and silica sands, essential for the domestic production of glasses and bricks, mainly from Pleistocene, Pliocene and Triassic deposits. Minor resources are provided by Devonian sediments [1,2].

The Lithuanian geological succession consists of Precambrian crystalline rocks underlying a thick pre-Quaternary sedimentary cover (up to 2000 m) which is from late Proterozoic to Pliocene in age. This sequence is covered by Quaternary glacial deposits from 30 to 120 m thick [3].

Red clays are obtained mainly from Triassic continental sediments (Nemunas Formation) in the northwest of the country and from glacio-lacustrine deposits in southern and eastern Lithuania [1]. Total reserves exceed 100 million cubic metres [2]. The Triassic Šaltiškiai deposit provides approximately 80% of Lithuanian production (430,000 tpa, 2015-2024) which is essentially directed towards brick production [4,5]. Glacio-lacustrine deposits are currently exploited by four quarries in Tauragé and around Kaunas [6,7]. Devonian marine sediments, once mined at Ukmergé and Pajiešmeniai, are no longer in use [7,8].

Silica sand is obtained from Pliocene lacustrine-alluvial plain deposits of the Anykščiai Formation (about 60,000 tpa) in central Lithuania [1].

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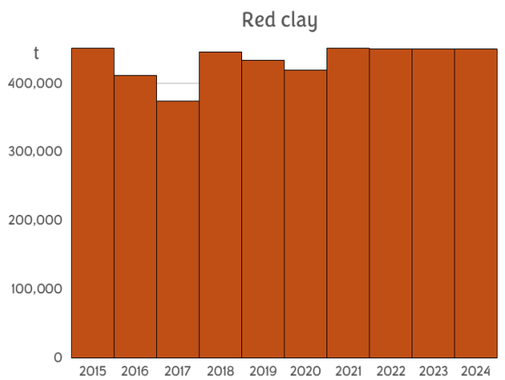
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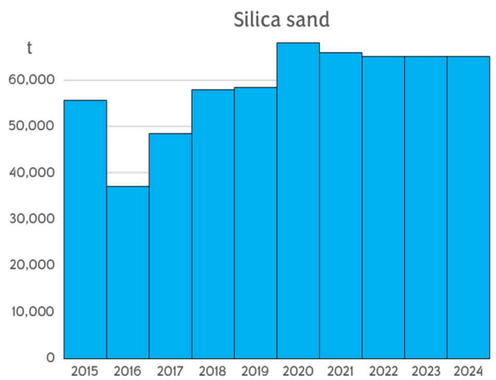
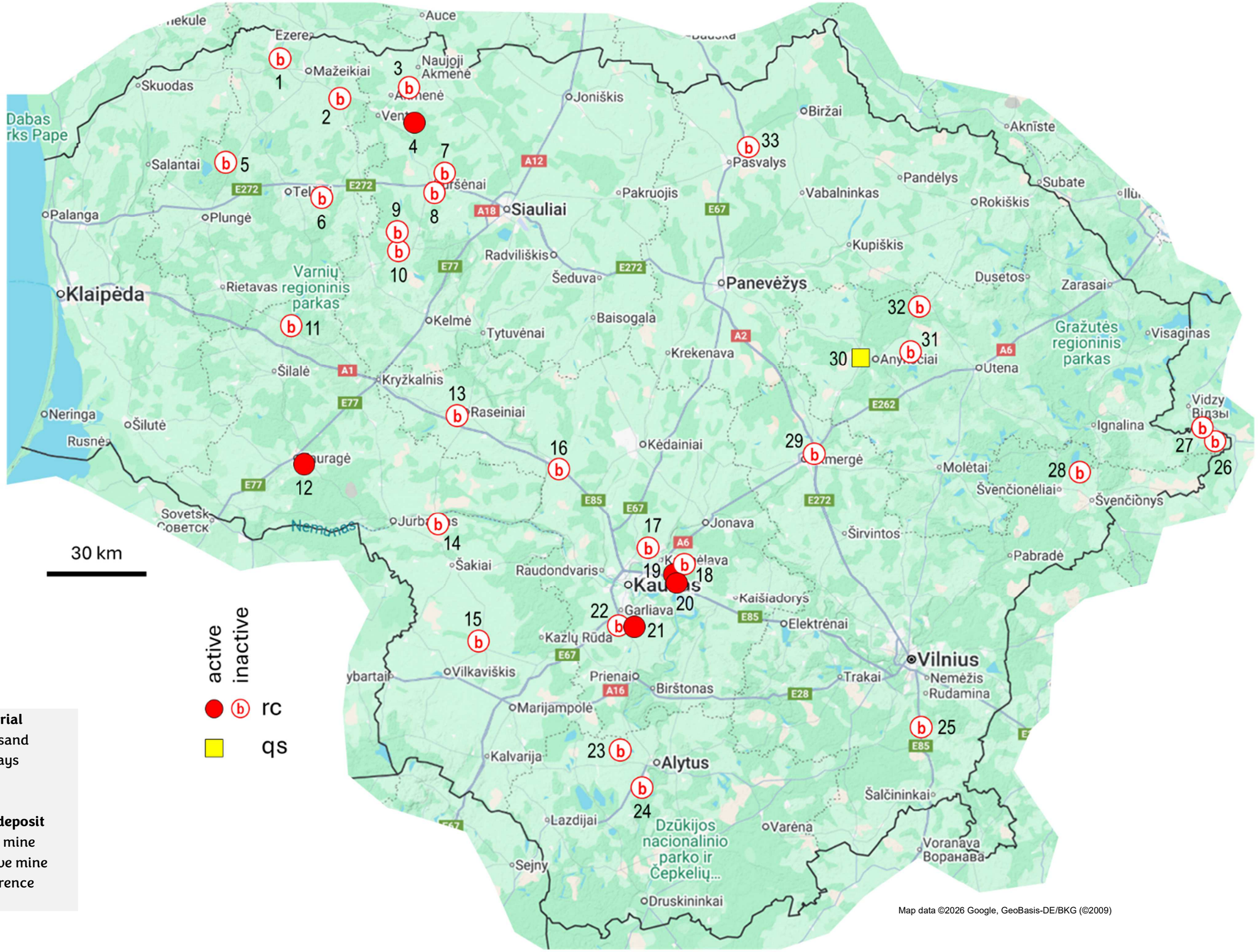


Table LT-a: deposits of raw materials for the ceramic and glass industries in Lithuania.

#	r.m.	st	deposit	region
1	rc	I	Venta-Pampurai	Telšiai
2	rc	O	Čekai	Telšiai
3	rc	I	Alkiškiai	Šiauliai
4	rc	A	Šaltiškiai	Šiauliai
5	rc	O	Platakiai	Telšiai
6	rc	I	Geruliai	Telšiai
7	rc	I	Kuršėnai	Šiauliai
8	rc	I	Daugėliai	Šiauliai
9	rc	I	Tonribis	Šiauliai
10	rc	I	Ušnėnai	Šiauliai
11	rc	I	Dvarviečiai	Tauragė
12	rc	A	Tauragė	Tauragė
13	rc	I	Raseiniai	Kaunas
14	rc	I	Gelgaudiškis	Mariampolė
15	rc	I	Pilviškiai	Mariampolė
16	rc	I	Molupiai	Kaunas
17	rc	I	Šatijai	Kaunas
18	rc	I	Didydis Raustas	Kaunas
19	rc	A	Neveronys	Kaunas
20	rc	A	Karčiupis	Kaunas
21	rc	A	Girininkai	Kaunas
22	rc	I	Rašnava	Kaunas
23	rc	I	Ūdrija	Alytus
24	rc	I	Revai	Alytus
25	rc	O	Pamaraziai	Vilnius
26	rc	I	Kuksos	Utena
27	rc	I	Dysna	Utena
28	rc	I	Pašaminės	Vilnius
29	rc	I	Ukmergé	Vilnius
30	qs	A	Kuniškiai-Anykščiai	Utena
31	rc	I	Rubikiai	Utena
32	rc	I	Vikonys	Utena
33	rc	I	Pajiešmeniai	Panevėžys



Raw material
qs silica sand
rc red clays

Status of deposit
A active mine
I inactive mine
O occurrence

Moldova

Among the glass and ceramic raw materials, only red clays and silica sand are mined in Moldova for the domestic industry. In addition, the extraction of bentonite has been reported, as well as the potential presence of feldspathic fluxes [1,2].

Red clays are extracted in two dozen deposits distributed throughout Moldova [1] with a production of 141,000 tpa, as 2015-2024 average [3]. In general, these are clays with a prevalence of illite and smectite [4], mostly intended for the production of bricks, roof tiles and expanded clay aggregates. They are obtained by excavating Neogene marine deposits and Quaternary alluvial and fluvio-glacial deposits. Reserves are about 190 million tonnes [3,5,6]. Clays for lightweight aggregates are also obtained from Paleogene shales in the northernmost part of the country [1]. Production of expandable clay has varied considerably over the last decade; the reserves are indicated to about 60 million tonnes [3,5].

Bentonite deposits are found in both Miocene (central Moldova) and Pliocene (southern Moldova) sedimentary units [7]. Although three mines are active, Moldovan production is discontinuous and very limited. Reserves are scheduled at 5.9 million tonnes [3].

Silica sand is excavated in two quarries, operating on Neogene sediments in Ocnița and Florești [1]. The production is 30,000 tpa (mean 2015-2024) while reserves amount to over 51 million tonnes [3].

Finally, the granite currently extracted at Soroca, as building material, might act as a feldspathic flux.

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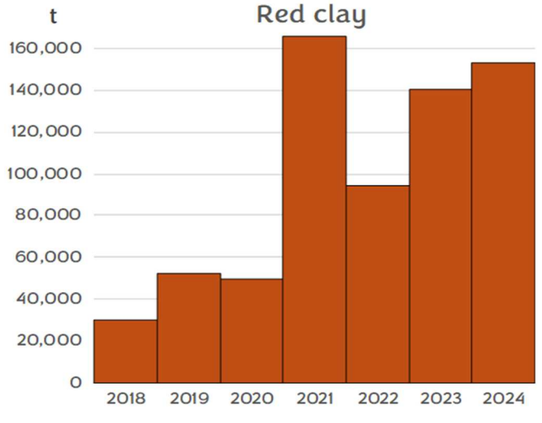
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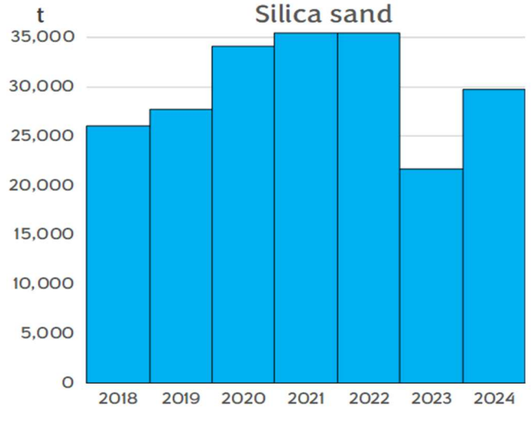
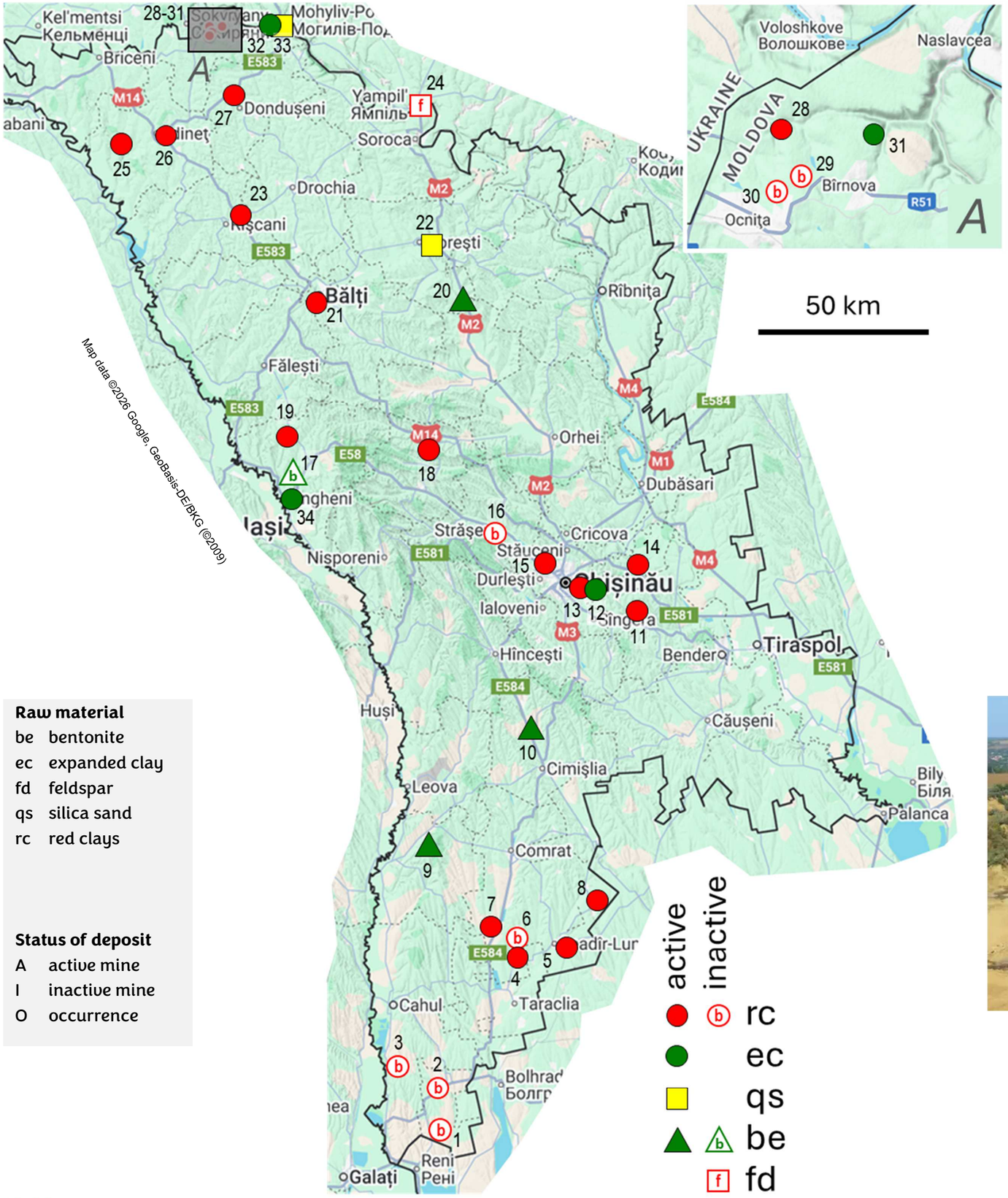


Table MD-a: deposits of raw materials for the ceramic and glass industries in Moldova.

#	raw material	st	deposit	district
1	rc	I	Cișmichioi	Găgăuzia
2	rc	I	Vulcănești	Găgăuzia
3	rc	I	Colibași	Cahul
4	rc	A	Cazaclia	Găgăuzia
5	rc	A	Ceadîr-Lunga	Găgăuzia
6	rc	I	Baurci	Găgăuzia
7	rc	A	Congaz	Găgăuzia
8	rc	A	Tvardița	Taraclia
9	be	A	Lărguța	Cantemir
10	be	A	Valea Perjei	Cimișlia
11	rc	A	Chirca	Anenii Noi
12	ec	A	Humulești	Chișinău
13	rc	A	Bubuieci	Chișinău
14	rc	A	Bălăbănești	Criuleni
15	rc	A	Truseni	Chișinău
16	rc	I	Strășeni	Strășeni
17	be	I	Bușilia	Ungheni
18	rc	A	Hogineşti	Călărași
19	rc	A	Pîrlița	Ungheni
20	be	A	Prodănești	Florești
21	rc	A	Bălții	Bălții
22	qs	A	Florești	Florești
23	rc	A	Riscani	Rîșcani
24	fd	O	Cosăuți	Soroca
25	rc	A	Gordinești	Edineț
26	rc	A	Edineț I	Edineț
27	rc	A	Corbu	Dondușeni
28	rc	A	Ocnița II	Ocnița
29	rc	I	Ocnița I	Ocnița
30	rc	I	Ocnița III	Ocnița
31	ec	A	Naslavcea	Ocnița
32	ec	A	Vălcineț	Ocnița
33	qs	A	Vălcineț	Ocnița
34	ec	A	Ungheni	Ungheni



Raw material

be	bentonite
ec	expanded clay
fd	feldspar
qs	silica sand
rc	red clays

Status of deposit

A	active mine
I	inactive mine
O	occurrence



Courtesy © Resursele minerale din Republica Moldova



Courtesy © Cariera Cosăuți

Montenegro

The Montenegrin mining industry is essentially focused on bauxite, of which it is the fourth largest producer in the Euro-Mediterranean area, thanks to abundant deposits in the carbonate formations of Dinarides that feed an aluminum production chain. In addition, red clays are extracted for the manufacture of bricks. There are also currently unexploited deposits of barite, bentonite and silica sand [1-3].

Bauxite: over 350 deposits and occurrences of karstic deposits, ranging in age from Triassic to Eocene, are reported in the Montenegrin territory [3,4]. Two types of bauxite are currently mined for a total production of 567,000 tpa (mean 2015-2024) while estimated reserves are around 35 million tonnes [3]. The most important is red bauxite (Jurassic) that is extensively exploited in the Nikšićka župa region (*Map MN-1A*), both in the Vojnik-Maganik and Prekornica districts [3-5]. White bauxite (Cretaceous) is being extracted in the mining districts of Cevo and western Montenegro. In contrast, Triassic deposits have been little explored due to their lower quality, while Eocene deposits, occurring along the Adriatic coast, have not yet been mined [3,4].

Red clay is currently extracted to feed the domestic brick industry (production data not disclosed) at three sites, with reserves assessed to 1.3 million tonnes [6]. The sources of clay raw materials are Pliocene lacustrine-palustrine sediments in eastern Montenegro and recent alluvial deposits on the western side of the country [4].

Deposits are reported of **barite** and **bentonite**, whose exploitation has long been abandoned, and occurrences of **silica sand** in Miocene sediments [1,3].

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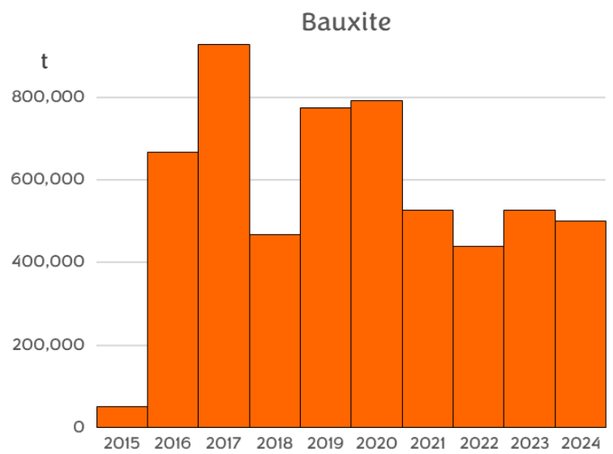


Table MN-a: deposits of raw materials for the ceramic and glass industries in Montenegro.

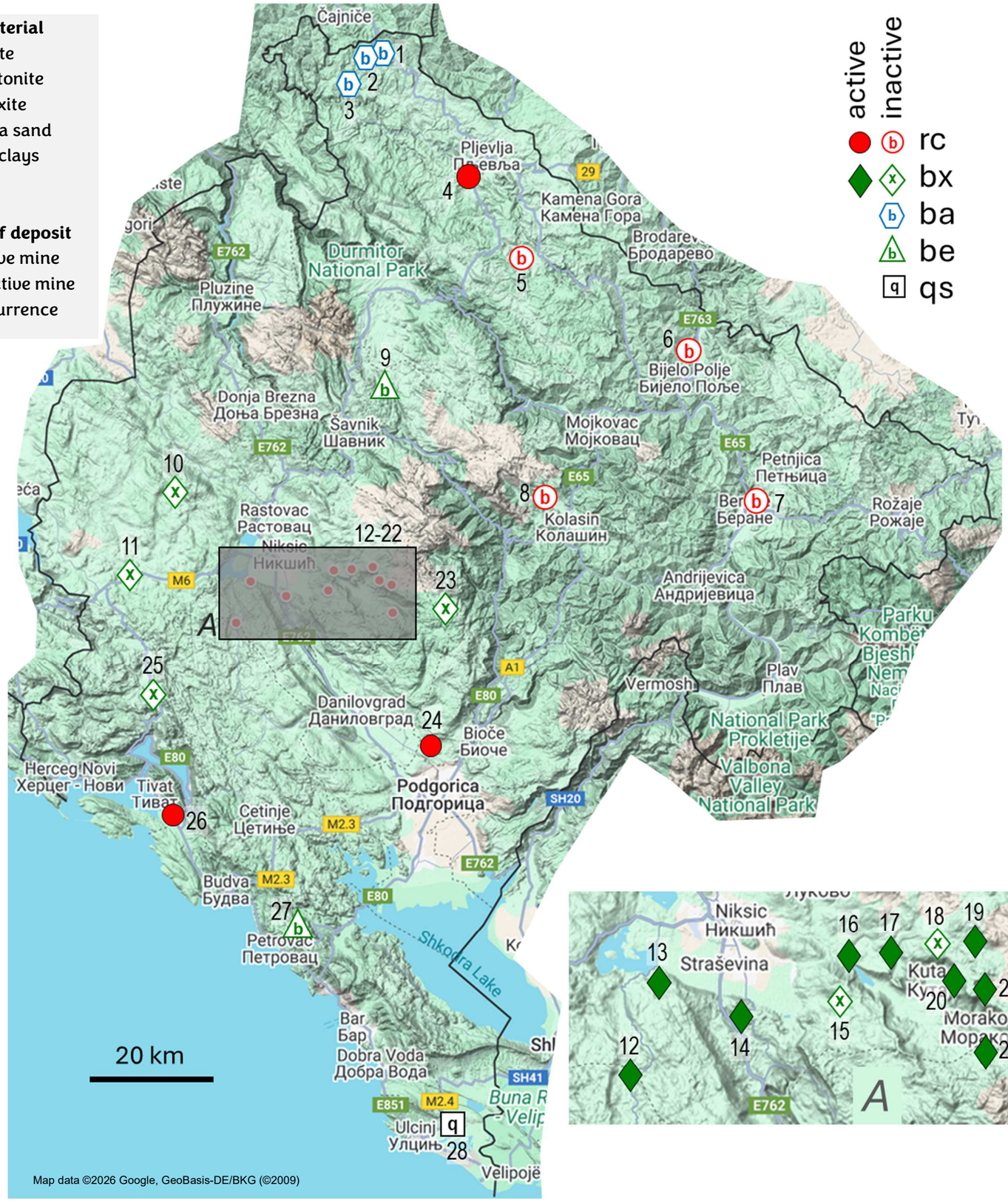
#	raw material	st	deposit	municipality
1	ba	I	Plani-Arslanovina	Pljevlja
2	ba	O	Potkovac-Rajišići	Pljevlja
3	ba	O	Plakali	Pljevlja
4	rc	A	Maljevac	Pljevlja
5	rc	O	Maoče	Pljevlja
6	rc	O	Kukavicji vrh	Bijelo Polje
7	rc	I	Jasikovac	Berane
8	rc	I	Donje Lipovo	Kolašin
9	be	I	Donja Bukovica	Šavnik
10	bx	O	Crvena Kita	Nikšić
11	bx	O	Maočići	Nikšić
12	bx	A	Bijele Poljane	Cetinje
13	bx	A	Široka ulica	Nikšić
14	bx	A	Međeđe	Nikšić
15	bx	I	Bršno	Nikšić
16	bx	A	Liverovići	Nikšić
17	bx	A	Zagrad	Nikšić
18	bx	I	Kutsko Brdo	Nikšić
19	bx	A	Đurakov	Nikšić
20	bx	A	Biočki stan	Nikšić
21	bx	A	Štitovo	Nikšić
22	bx	A	Bolova Brda	Danilovgrad
23	bx	I	Grebenici	Kolašin
24	rc	A	Spuz	Podgorica
25	bx	I	Dragalj	Kotor
27	rc	A	Tivat	Tivat
27	be	O	Bijelo polje	Antivari
28	qs	O	Zoganje	Ulcinj

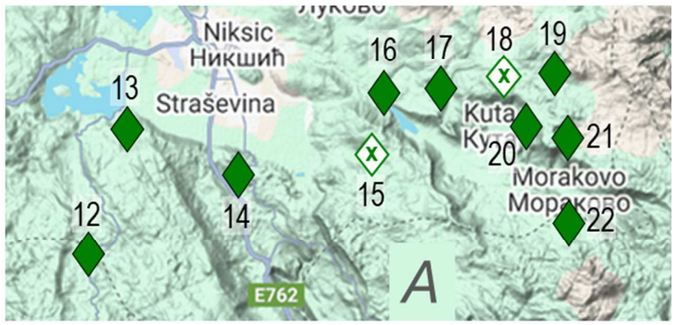
Raw material

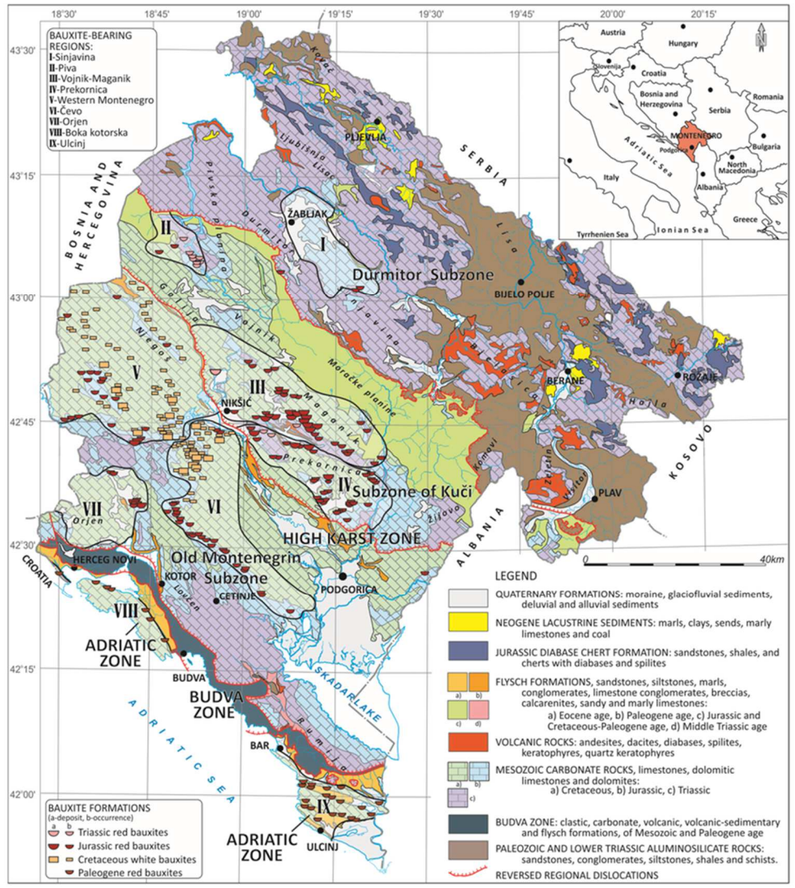
ba barite
be bentonite
bx bauxite
qs silica sand
rc red clays

Status of deposit

A active mine
I inactive mine
O occurrence







Geological map of Montenegro with bauxite-bearing regions [4]

Morocco

Along being the leading producer of barite in the Euro-Mediterranean area, Morocco is in the top ten of suppliers of feldspar and bentonite. In addition, the Moroccan industry is extracting undisclosed amounts of red clays, silica sand, andalusite, perlite, pyrophyllite, and white clay. Furthermore, a considerable spectrum of resources for the ceramic and glass industries is claimed, but they are no longer (celestine, chromite, talc) or not yet (kaolin, magnesite, zircon, nepheline syenite) exploited [1,2].

Barite is currently extracted in at least a dozen mines (885,000 tpa, mean 2015-2024). Most deposits consist of hydrothermal veins cutting Lower Paleozoic sandstones and shales in the Eastern Anti-Atlas [3-5], the High Atlas [6,7], and the Meseta [8]. Moreover, karst-type mineralizations are hosted in calcareous series (Carboniferous and Jurassic) in the Meseta [8.9]. Barite is also obtained from hydrothermal veins cutting Cenozoic sequences of the Rif.

Feldspar production (309,000 tpa on average) expanded from 32,000 tonnes (2015) to nearly 800,000 tonnes in 2024 due to the strong demand for Taroudant albitites, linked to Variscan intrusions into the High Atlas Mountains [10]. Several occurrences of feldspathic materials are reported but not yet exploited: pegmatites and aplites from various localities [11,12]; granite in the Meseta [13-15]; syenites and nepheline syenites from the Eocene Tamazeght complex, High Atlas [16,17]; Neoproterozoic nephelinites and phonolites from the Moroccan Anti-Atlas [18]; synnyrites from the Archean Awsard massif, South Morocco [19,20].

Bentonite is extracted by a dozen mines (127,000 tpa, mean 2015-2024) mainly operating in the Eastern Rif [1,2], where Miocene pyroclastics, pertaining to the Gourougou strato-volcano and its satellite massifs, were argillified by hydrothermal fluids [21-23]. Bentonite deposits are hosted in rhyolitic tuffs of the Tidiennit [21-24], Cap des Trois Fourches [25] and Gourougou massifs [26], as well as in latitic tuffs and Messinian sediments of the Amjar and Beni Bou Ifrour massifs [27-29] and Kert Basin [30,31]. In addition, the Jbel Rhassoul deposit is mined in the Middle Atlas, where a peculiar Mg-smectite is found in Miocene lacustrine sediments of the Missour Basin [32-34]. Further bentonites are reported in the Agadir area [35]. **Perlite** deposits are being exploited in the Tidiennit rhyolitic massif [21,36].

Red clays are mostly excavated in the Tangier-Tetouan area, the Saïss basin (Fez-Meknes-Salé), the Moroccan Meseta and the Western High Atlas. At least forty quarries feed brick industries and potteries, exploiting a wide range of geological sources [37-40]. The most important are: Neogene marls [38,39,41-50]; Cretaceous [39,45,51-55], Jurassic [46] and Triassic marls and shales [15,38,42,53,56-59]; Quaternary alluvial, colluvial and eluvial deposits [38,60-62]; Lower Paleozoic shales and schists [38,59,63].

Silica sand is recovered essentially from Quaternary aeolian deposits in the Meseta [64,65].

Pyrophyllite is extracted in two areas: the Central Anti-Atlas Range (Isk n'Oudadène and Boumadine mines) where Neoproterozoic felsic volcanics underwent epithermal alteration followed by metamorphism [66-68], and the Guenfouda deposit in the Tell Atlas, which was formed by epithermal alteration of Carboniferous dacite with a marked lateral zonation (including topaz formation in some places) and subsequent weathering [69,70].

Andalusite is apparently mined in the Sidi Bou Othmane deposit, while only exploration work has been carried out at Tarmilet prospect. These deposits originated from high-grade contact metamorphism due to Variscan granitic intrusions at Oulmès [14,71] and in the Paleozoic Jebilet Massif [11,72].

White clay is extracted at Jbel Kharrou in the Western Plateau, where an Ordovician marine sequence (Drioukat and Demja formations) contain illitic clay horizons [73]. **Fireclay** is the product of an intense hydrothermal alteration of Variscan granitic pluton in Oulmès [14,15]. **Kaolin** occurs in the Tellian Atlas as a weathering product of the Variscan Béni-Snassène granodiorite massif [74]. Another resource is represented by halloysite layers found in a Messinian volcano-sedimentary sequence within the Gourougou area [75]. Neither has been exploited so far.

Talc was mined until 2013 in the Anti-Atlas Range (peak production 48,000 tonnes in 2004) at the Sirwa and Saghro inliers. The archetypal talc deposit (Nkob) formed by a combination of contact metamorphism on Neoproterozoic siliceous dolostones and a low temperature hydrothermal stage [76]. A different resource is given by talc-white mica assemblages in low-grade metamorphic rocks, which are reported from the Triassic Beni Mezala phyllites in the Rif [77]. **Celestine** was extracted until 2011 (top 7,500 tonnes in 2000) at the Jbel Kifane deposit (Taounate).

Chromite podiform deposits occur in the Bou Azzer-El Graara inlier (Anti-Atlas) associated with Neoproterozoic ophiolites [78,79]. Only a small production of chrome ore was carried out until 1995 [2], despite a growing interest given by associated Platinum group elements [80,81]. Other chromitites are reported [82] in the Beni Bou Izra ultrabasic massif (Rif), where also **magnesite** deposits have been identified, probably formed after peridotite serpentinization [83,84]. **Zircon** is reported in placers along the Atlantic coastline near Tarfaya, where heavy minerals (mostly ilmenite and leucoxene) derive from the dismantling of Precambrian rocks in the Meseta basement and Anti-Atlasic buttonholes [85].

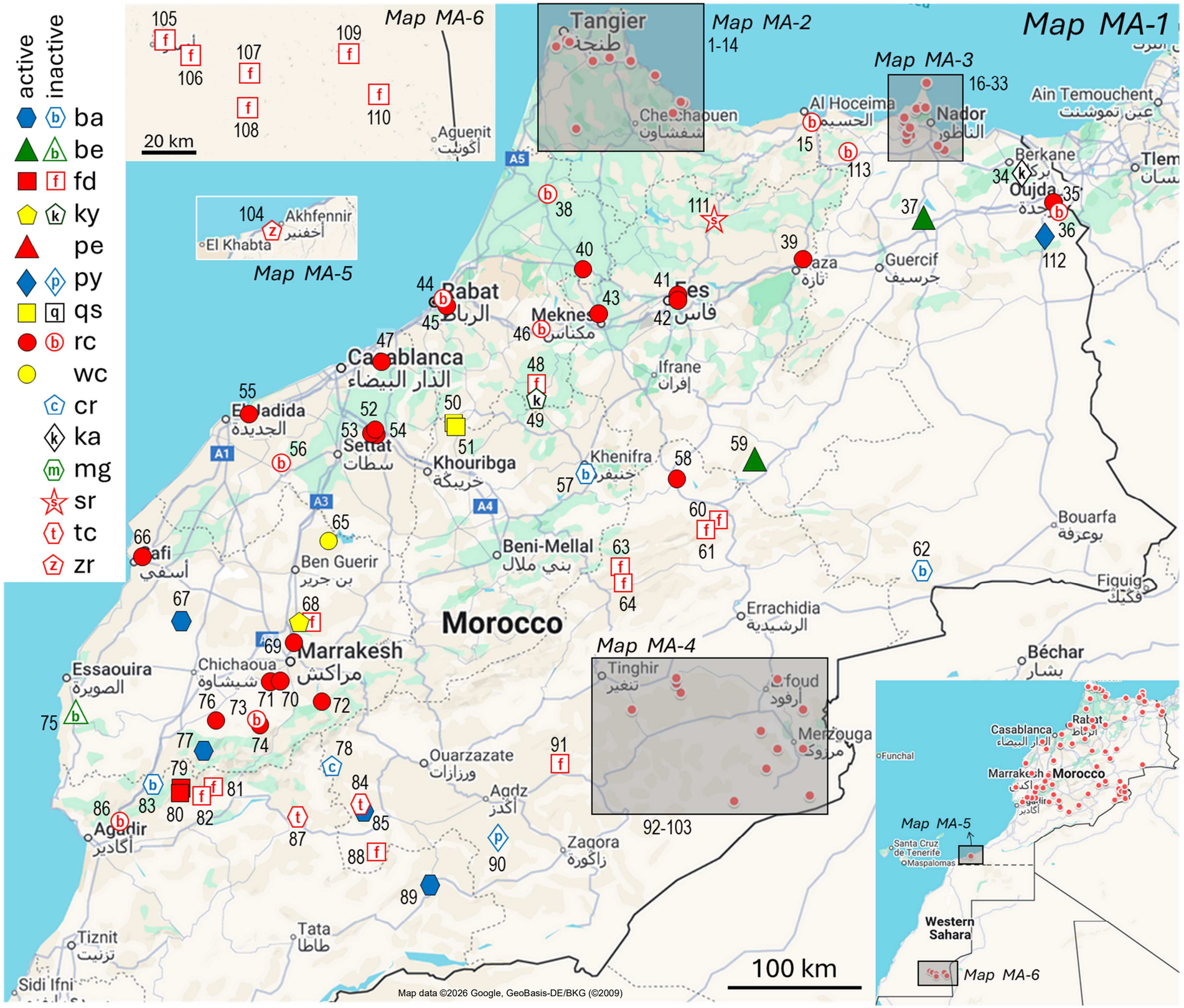
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Table MA-a: deposits of raw materials for the ceramic and glass industries in Morocco.

#	r. m.	st	deposit	region
1	br	A	Tangier	Tangier-Tetouan-EH
2	br	I	Laaouama	Tangier-Tetouan-EH
3	br	A	Ain Meznoud	Tangier-Tetouan-EH
4	br	A	Daimouss*	Tangier-Tetouan-EH
5	br	A	Kanouat	Tangier-Tetouan-EH
6	br	A	Ain Lahcen	Tangier-Tetouan-EH
7	br	A	Souk Kdim	Tangier-Tetouan-EH
8	br	A	Tétouan*	Tangier-Tetouan-EH
9	br	A	Wilaya	Tangier-Tetouan-EH
10	br	I	Oued Laou	Tangier-Tetouan-EH
11	mg	O	Bni Bouzra	Chefchaouen
12	cr	O	Bni Bouzra	Chefchaouen
13	mg	O	Boudkek	Chefchaouen
14	ba	I	Jbel Sidi Abdallah	Tangier-Tetouan-EH
15	br	I	Azghar	Tangier-Tetouan-EH
16	be	O	Cap de Trois Fourches	Nador
17	be	I	Afrah	Nador
18	ka	O	Farkhana	Nador
19	be	I	Tizza	Nador
20	be	A	Ikasmeouène	Nador
21	br	A	Izarrouan	Nador
22	be	I	Bouhoua	Nador
23	be	A	Ihammachène	Nador
24	ba	A	Tidiennit	Nador
25	be	A	Tisla	Nador
26	be-pe	A	Trebia	Nador
27	be	A	Providencia	Nador
28	be	O	Hayrat'Ali	Nador
29	be	A	Ibourardhain	Nador
30	be	I	Oued Zemmour	Nador
31	br	A	Louta	Nador
32	br	A	Azzouzate*	Nador
33	be	A	Moulay Rachid	Nador
34	ka	I	Béni-Snassène	Oujda
35	br	A	Oujda	Oujda
36	br	I	Angad	Oujda
37	be	A	Melg el Ouidan	Nador
38	br	I	Souk El Arbaa	Kénitra
39	br	A	Taza	Taza
40	br	A	Sidi Kacem	Settat
41	br	A	Sidi Hrazem	Fes
42	br	A	Benjlikh	Fes
43	br	A	Dkhissa*	Meknes
44	br	I	Bettana	Salé
45	br	A	Oulja	Salé
46	br	I	Sidi el Ghandour	Khémisset
47	br	A	Bni Yakhlef	Mohammédia
48	fd	O	Oulmès	Khémisset
49	and	O	Tarmilet	Khémisset
50	qs	A	Laghoualem	Khémisset
51	qs	A	Oulad Ftata	Khourigba
52	br	A	Ryah 1	Berrechid
53	br	A	Ryah 2	Berrechid
54	br	A	Bouguargouh*	Settat
55	br	A	Oued Akrach	El Jadida
56	br	O	Ouled Sidi Ali Ben Youssef	El Jadida
57	ba	O	Bou Ouzzal	Khénifra
58	br	A	Zaida	Midelt
59	be	A	Jbel Rhassoul	Boulemane
60	fd	O	Tamazeght	Midelt
61	ns	O	Tamazeght	Midelt
62	ba	O	Bateun Jeudari	Figuig
63	fd	O	Tirrhist	Midelt
64	fd	O	Anefgou	Midelt
65	wc	A	Jebel Kharrou	Rhamna
66	br	A	Sidi Abderrahman	Safi
67	ba	A	Tlet Ighoud	Youssoufia
68	and-fd	A	Sidi Bou Othmane	Rhamna
69	br	A	Ouahat Sidi Brahim	Marrakesh
70	br	A	Tamesloht	Al Haouz
71	br	A	Agafay	Marrakesh
72	br	A	Ourika	Marrakesh
73	br	I	Amezmiz	Marrakesh
74	br	A	Amizmiz	Al Haouz
75	be	O	Amsittene	Essaouira
76	br	A	Mzouda	Marrakesh
77	ba	A	Seksaoua	Shishawa
78	cr	O	Inguejem	Amerzgane
79	fd	A	Agounsa	Taroudant
80	fd	A	Inbdi	Taroudant
81	fd	O	Jbel Boufounas	Taroudant
82	fd	O	Goundacha	Taroudant
83	ba	I	Argana	Taroudant
84	tc	I	Nkob	Ouarzazate
85	ba	A	Nkob	Ouarzazate
86	br	O	Ameskroud	Agadir
87	tc	I	Taliouine	Ouarzazate
88	fd	O	Zenaga	Amerzgane
89	ba	A	Foum Zguid	Tala
90	py	O	Chouichiat	Zagora
91	ns	O	Saghro	Tazarine
92	ba	A	Ait El Farsi	Tinghir
93	tc	I	Tinejdad	Errachidia
94	py	A	Isk n'Oudadène	Errachidia
95	py	A	Boumadine	Errachidia
96	qs	O	Erfoud	Errachidia
97	ba	I	Njakh	Errachidia
98	ba	I	Boumaiz	Errachidia
99	ba	I	Chaib Ras	Errachidia
100	ba	A	M'fis	Errachidia
101	ba	A	Tijjekht	Errachidia
102	ba	A	Bouizrane	Errachidia
103	ba	A	Ras Kammouna	Errachidia
104	zr	O	Tarfaya	Tarfaya
105	ns	O	Awsard	Awsard
106	ns	O	Tadardourte	Awsard
107	ns	O	Lesyuat	Awsard
108	ns	O	Eii	Awsard
109	ns	O	Lechuaf	Awsard
110	ns	O	Gebel Admar	Awsard
111	sr	I	Jbel Kifane	Taounate
112	py	A	Guenfouda	Jerada
113	br	A	Midar	Driouch
		*	cluster of deposits	

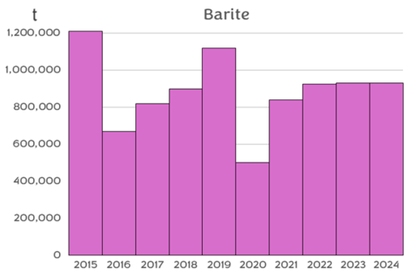


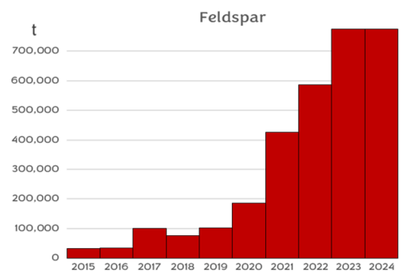
Raw material

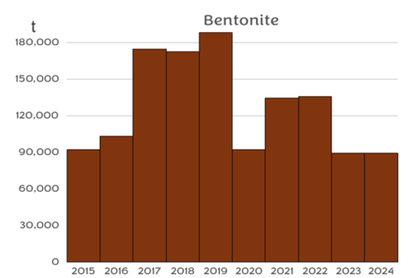
ba	barite
be	bentonite, smectitic clays
cr	chromite
fd	feldspar, feldspathic rocks
ka	kaolin
ky	andalusite, kyanite
mg	magnesite
pe	perlite
py	pyrophyllite
qs	silica sand
rc	red clays
sr	celestine (strontium)
tc	talc, steatite
wc	white clay
zr	zirconium minerals

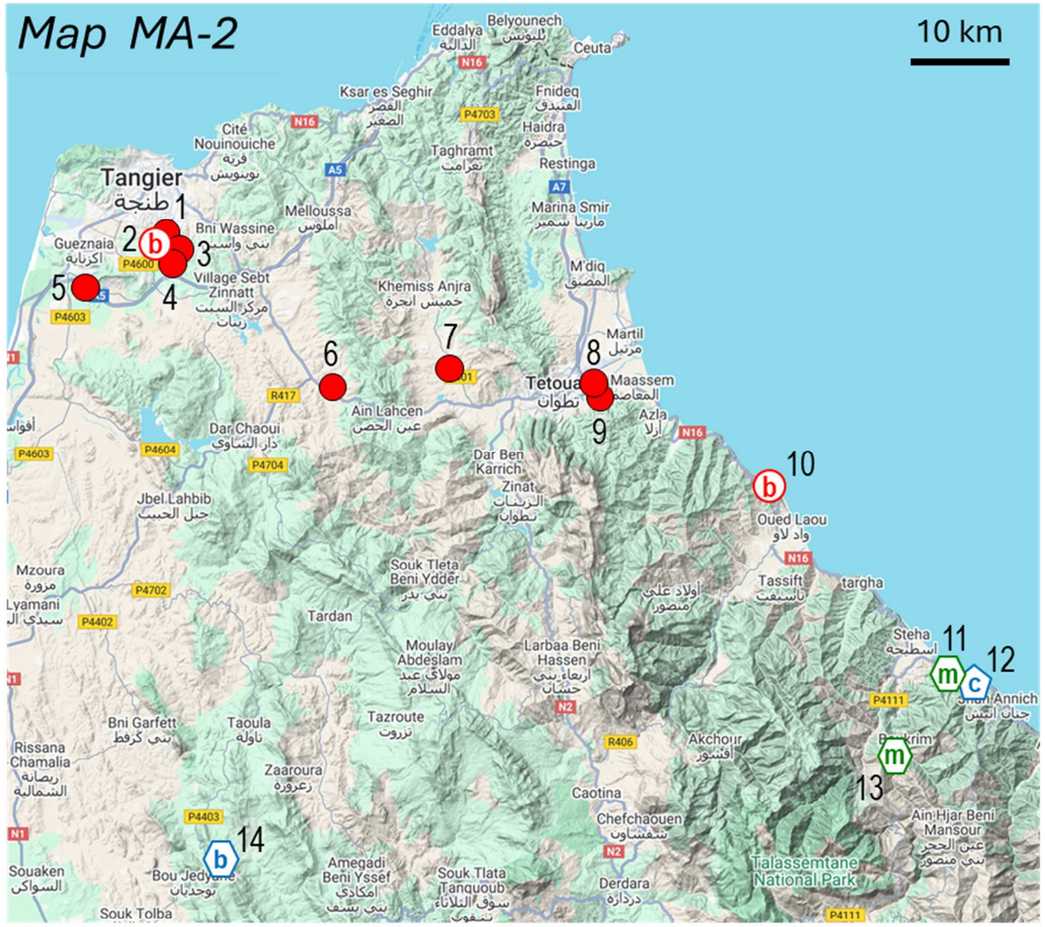
Status of deposit

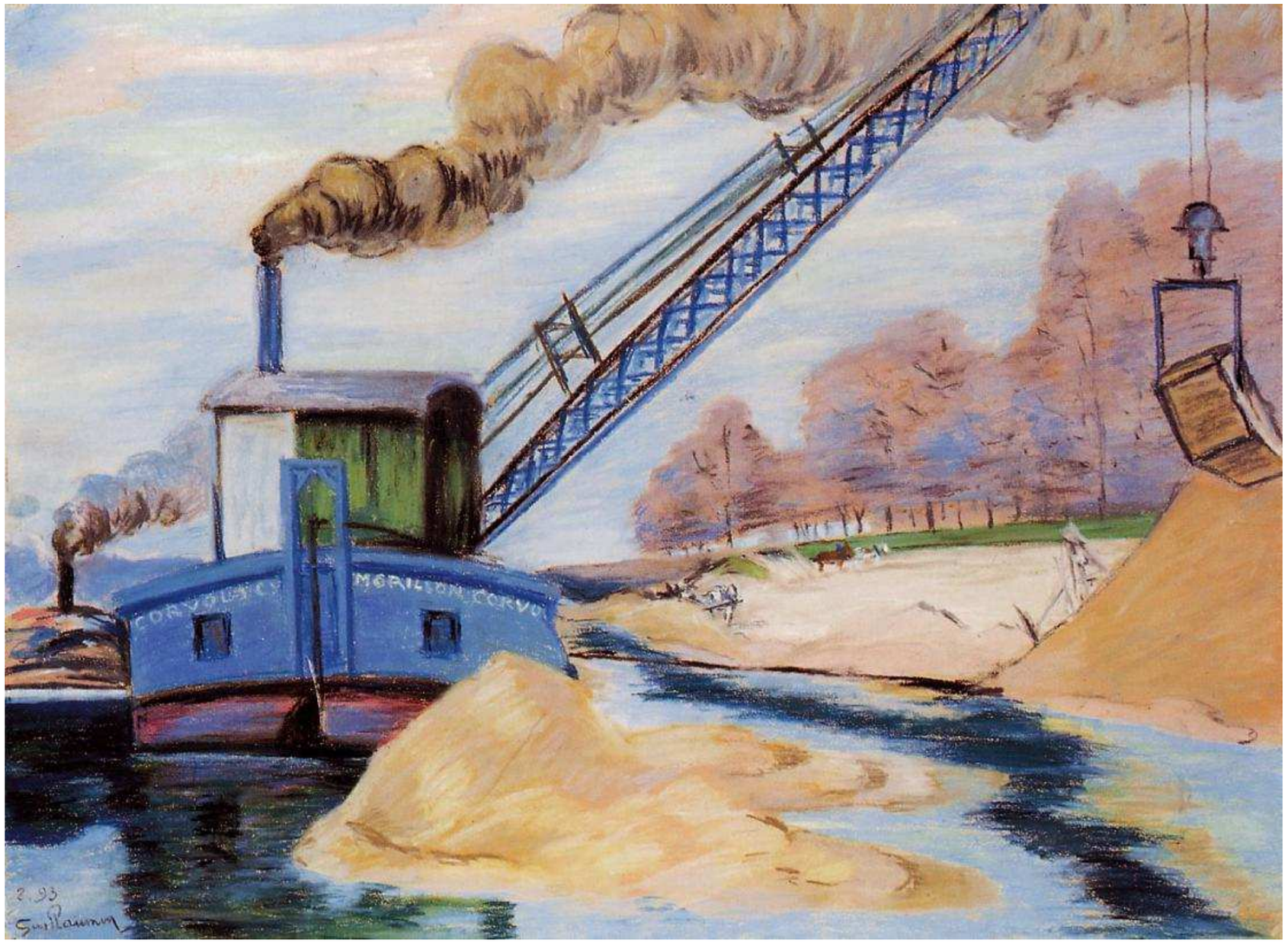
A	active mine
I	inactive, mine closed
O	occurrence








Map MA-2
10 km
Tangier
طنجة
Tetouan
تطوان
Oued Laou
Souk Tlata Beni Ydder
Tardan
Moulay Abdeslam
Larbaa Beni Hassen
Tassift
Steha
Akchour
Talassemtane National Park
Chefchaouen
Derdara
Souk Tlata Tanquoub
Amegadi Beni Yssef
Bou Jedyane
Souaken
Rissana Chamalia
Zaaroura
Taoula
Bni Garfett
Tazroute
Caotina
Ain Hjar Beni Mansour
Ceuta
Belyounech
Ksar es Seghir
Fnideq
Haidra
Taghramt
Restinga
Marina Smir
Melloussa
Cité Nouinouiche
Gueznaia
Bni Wassine
Village Sebt Zinnatt
Khemiss Anjra
M'diq
Martil
Maassem
Azla
Ain Lahcen
Dar Chaoui
Dar Ben Karrich
Zinat
Jbel Lahbib
Mzoura
Lyamani
Souk Tlata Beni Ydder
Moulay Abdeslam
Larbaa Beni Hassen
Tazroute
Akchour
Bni Garfett
Taoula
Rissana Chamalia
Zaaroura
Souaken
Souk Tolba
Amegadi Beni Yssef
Bou Jedyane
Chefchaouen
Derdara
Talassemtane National Park
Ain Hjar Beni Mansour
Annich
Boukrim
Steha
Tassift
Oued Laou
Tetouan
Ain Lahcen
Dar Chaoui
Dar Ben Karrich
Zinat
Jbel Lahbib
Mzoura
Lyamani



The Sand Quarry

Armand Guillaumin (1841–1927)

Netherlands

Red clay and silica sand are the only glass and ceramic raw materials quarried in the Netherlands, which cover only part of the demand from the Dutch industry.

Red clay is utilized to manufacture clay bricks, roof tiles, and vitrified drainage pipes, at the rate of approximately 2 million tpa (average 2015–2024). Although clay resources are huge – exploitable stock in the Netherlands was estimated to range from 12 to 18 km³ [1] – the Dutch ceramic industry has been making increasing recourse, in recent years, to imports from Germany and Belgium (up to ~370,000 tpa, i.e., about a quarter of red clay demand). Most brickworks are located in Gelderland and Limburg. About two thirds of the Dutch clay production comes from Quaternary fluvial sediments of Rhine and Meuse rivers. Further sources are Oligocene-Miocene marine clays, Pliocene fluvial deposits, Pleistocene fluvio-glacial loams, and Holocene tidal deposits [1-3].

Silica sand is mined in southern Limburg, from beach and tidal flat deposits of Miocene age pertaining to the Breda and Oosterhout formations [4,5]. The average production was 24,000 tpa in the period 2015–2024, denoting a sharp decline from 71,000 tonnes (2015) to about 10,000 tonnes of recent years [6]. Prospective areas have been identified in the Limburg, Noord-Brabant, Gelderland and Overijssel provinces, where silica sand deposits occur at the top of the Oosterhout Formation [5].

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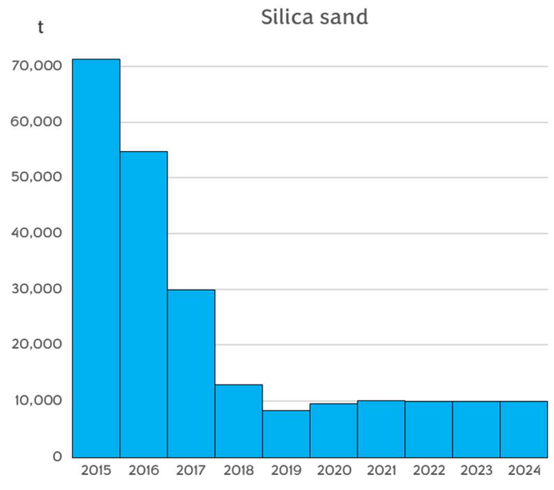
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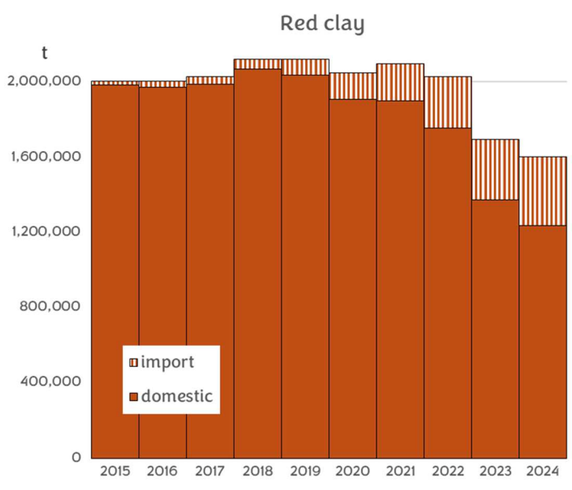


Table NL-a: deposits of raw materials for the ceramic and glass industries in the Netherlands.

#	raw material	st	deposit	province
1	rc	A	Oude Pekela	Groningen
2	qs	I	Markelo	Overijssel
3	rc	A	Worden	Utrecht
4	rc	A	Winterswijk	Gelderland
5	rc	A	Azewijn	Gelderland
6	rc	A	Spijk	Gelderland
7	rc	A	Tolkamer	Gelderland
8	rc	A	Kijfwaard-Pannerden	Gelderland
9	rc	A	Angeren	Gelderland
10	rc	A	Gendt en Rossum	Gelderland
11	rc	A	Erlecom	Gelderland
12	rc	A	Haalderen	Gelderland
13	rc	A	Heteren E	Gelderland
14	rc	A	Heteren W	Gelderland
15	rc	A	Wolfswaard	Gelderland
16	rc	A	Opheusden	Gelderland
17	rc	A	Vogelensangh: Deest	Gelderland
18	rc	A	Deest	Gelderland
19	rc	A	Echteld	Gelderland
20	rc	A	Schipperswaard	Gelderland
21	rc	A	Zennewijnen	Gelderland
22	rc	A	Haaften	Gelderland
23	rc	A	Nederhemert	Gelderland
24	rc	A	Hedikhuizen	Noord Brabant
25	rc	A	Nuance Afferden	Limburg
26	qs	O	Goirle	Noord Brabant
27	rc	A	Oeffelt en Panningen	Limburg
28	rc	A	Tegelen	Limburg
29	rc	A	Beesel	Limburg
30	rc	A	Panningen	Limburg
31	rc	A	Thorn	Limburg
32	rc	A	Beek	Limburg
33	rc	A	Brunssum	Limburg
34	qs	A	Heerlerheide	Limburg
35	qs	A	Heerenweg	Limburg
36	qs	A	Sigrano	Limburg
37	rc	I	Eygelshoven	Limburg
38	rc	A	Kerkrade	Limburg
39	rc	A	Maastricht	Limburg
40	rc	A	Kessel	Limburg





Raw material

qs silica sand

rc red clays

Status of deposit

A active mine

I inactive mine

O occurrence

active inactive

rc

qs



North Macedonia

The mining activity for ceramics and glass in North Macedonia concerns feldspar, quartz raw materials, and red clays, as well as bentonite and talc (whose extraction has recently been abandoned). In addition, deposits of barite, kyanite, magnesite, perlite, pyrophyllite, and white clay are reported [1-3].

Feldspar is mined from albitites of the Ograzden deposit near Strumica (26,000 tpa, average 2015-2024) occurring in the Serbian-Macedonian massif, where reserves are estimated at 3.5 million tonnes [1,4]. In addition, there are limited occurrences of mostly potassic feldspar in pegmatites and syenites of the Pelagonian Zone [5-8] for total reserves of 0.5 million tonnes [1].

Quartz raw materials are obtained from silica sands, extracted from continental sediments in Markova Reka (Miocene) and Lakavica (Pliocene), while quartzites and flint are reported in the Palaeozoic basement of the Serbian-Macedonian Zone. Total reserves are estimated to be about 19 million tonnes [1].

Red clays are used for bricks (amount of production not disclosed) with active quarries exploiting Miocene fluvio-lacustrine sediments of the Skopje, Veles and Kočani basins (reserves for over 10 million tonnes). The clay materials in the Pehčevo Basin (reserves for 8 million tonnes) are no longer exploited [1,9].

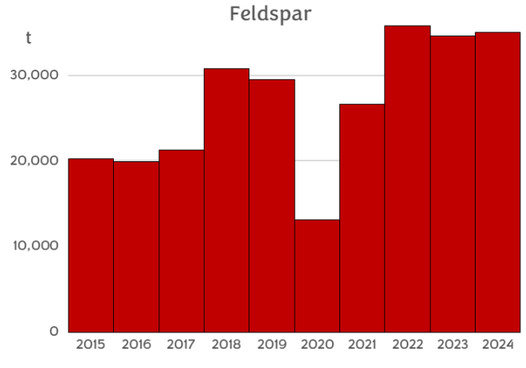
Bentonite: although production has gradually decreased from 30,000 tpa (in the 1997-2000 period) to officially cease in 2022 [4], some deposits result to be active. They took origin from the transformation of volcaniclastics in Oligocene to Pliocene sediments at Rankovce, Veles and Negotino [10,11]; about 18 million tonnes of reserves are indicated [1].

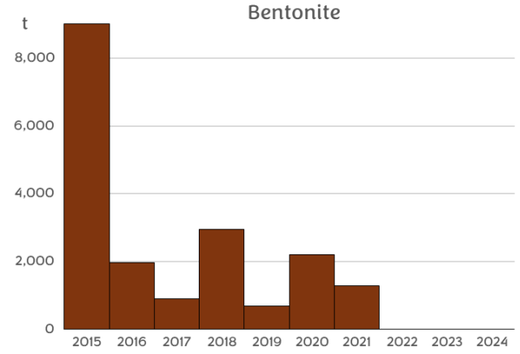
Talc extraction has been stopped since 2019 in Izvor, where production peaked to 15,000 tpa in 1993 [4], even though reserves are valued at around 1 million tonnes [1].

Magnesite: the Pčinja deposit was never developed, also because of modest reserves (150,000 tonnes) [1]. **White clay** is reported in an epithermal deposit (Bazernik) where Ordovician porphyry was altered to sericite-chlorite [12]. Again in the western Macedonian Palaeozoic basement, a **pyrophyllite** mineralisation is known (Babino) with reserves close to one million tonnes [1]. **Perlite** is reported from Cenozoic volcanics in the Markovo area [13]. Finally, deposits of **barite** (Nezhilovo) as well as **kyanite** schist (Prilepec) are present in the Precambrian metamorphic complex of the Pelagonian massif; kyanite reserves are estimated at 760 thousand tonnes [1].

Table NM-a: deposits of raw materials for the ceramic and glass industries in North Macedonia.

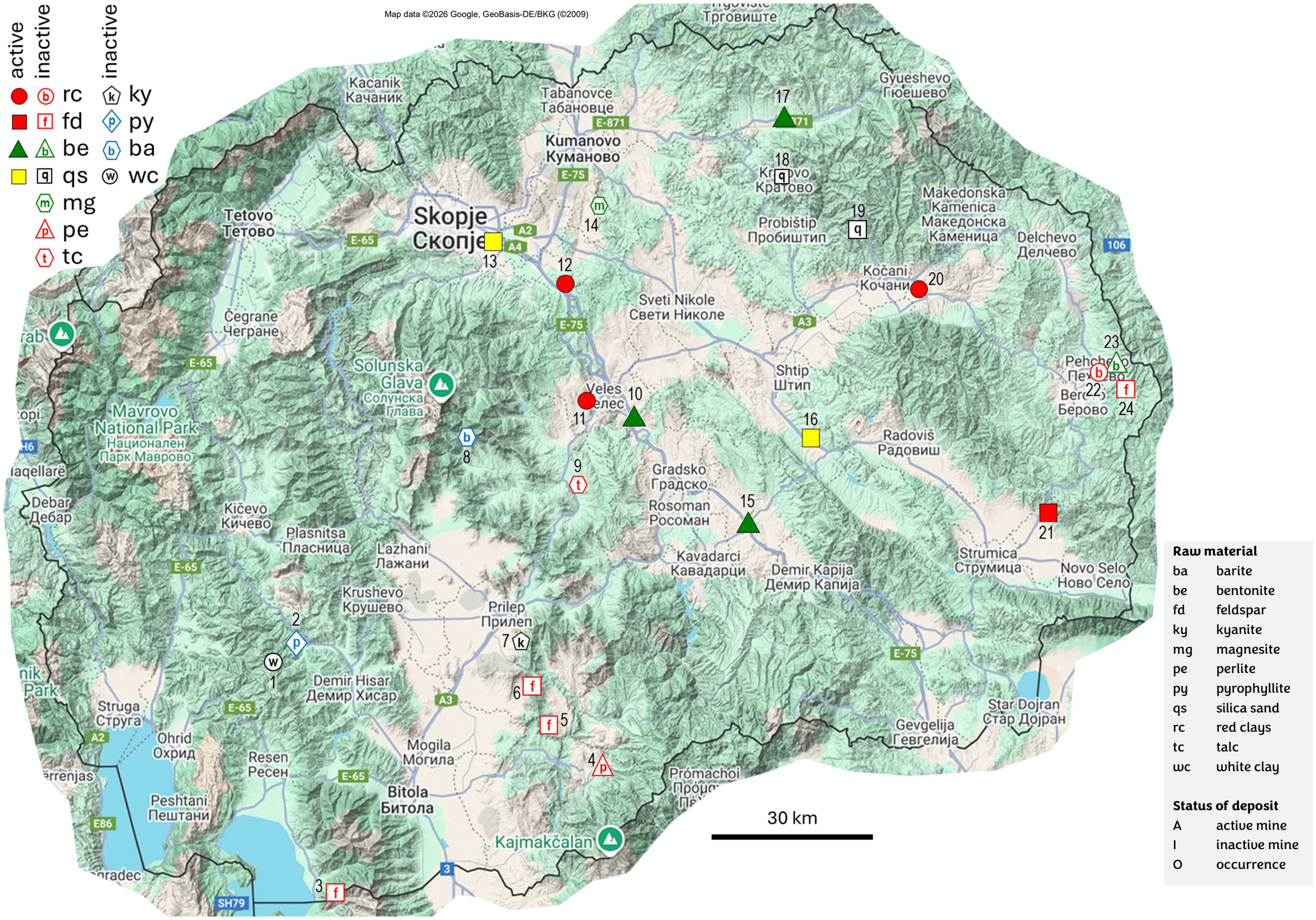
#	raw material	st	deposit	region
1	wc	I	Bazernik	Demir Hisar
2	py	O	Babino	Demir Hisar
3	fd	O	Dolno Dupeni	Bitola
4	pe	O	Gradešnica	Bitola
5	fd	O	Čanište	Prilep
6	fd	O	Bonče	Prilep
7	ky	O	Prilepec	Prilep
8	ba	O	Nezhilovo	Čaška
9	tc	O	Izvor	Čaška
10	be	A	Gorna Brca-Rakovec	Veles
11	rc	A	Rashtani	Veles
12	rc	A	Katlanovo	Petrovec
13	qs	A	Markova Reka	Skopije
14	mg	O	Pčinja	Kumarovo
15	be	A	Progun	Negotino
16	qz	A	Lakavica	Stip
17	be	A	Ginovci	Rankovce
18	qz	O	Crn Vrv	Kratovo
19	qz	O	Sinkovica	Kocani
20	rc	A	Vinica	Vinica
21	fd	A	Ograzden-Hamzali	Strumica
22	rc	I	Pehčevo	Pehčevo
23	be	O	Elata	Pehčevo
24	fd	I	Ravna Reka	Pehčevo





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Raw material

ba	barite
be	bentonite
fd	feldspar
ky	kyanite
mg	magnesite
pe	perlite
py	pyrophyllite
qs	silica sand
rc	red clays
tc	talc
wc	white clay

Status of deposit

A	active mine
I	inactive mine
O	occurrence

Norway

Norway is the leading producer of nepheline syenite for glass and ceramics (as well as anorthosite) in the Euro-Mediterranean area. In addition, industrial silica (including high-purity quartz), olivine, feldspar and red clay for lightweight aggregates are extracted. Furthermore, deposits of talc, magnesite, and kyanite-andalusite-sillimanite, currently unexploited, are reported [1-3].

Nepheline syenite is mined on the Island of Stjernøya, about 150 km southwest of North Cape (300,000 tpa of concentrates as an average of the last decade). Syenite lenticular bodies and veins, intruded within a series of peridotites, basic rocks and carbonatites, were subsequently metasomatized with nepheline formation [4,5].

Feldspar: thousands of granitic pegmatites have been reported in the Proterozoic Sweco-Norwegian Gneissic Province, located in particular in Agder County [1-3,6,7]. Among the many small deposits exploited in the past, the mines in Beinmyr and Li currently remain in operation (mean 68,000 tpa of concentrates, with declining trend over 2015-2024). There are also occurrences of potassium feldspar in Precambrian metarhyolites [8].

Anorthosite, even if mainly used by cement and asphalt industries (around 400,000 tpa), has been also employed in stone wool manufacturing. The deposits are present in two distinct geological domains [1,2,9,10]: Precambrian basement (Hellvik) and Paleozoic Caledonian nappes (Raudberget and Jordalsnuten).

Quartz (also of high purity) is massively extracted (1,230,000 tpa, mean 2015-2024, with increasing trend) from both hydrothermal dykes in north-central Norway and granitic pegmatites from the southern area [1,11-13].

Olivine is produced (approximately 1,400,000 tpa) from ultramafic intrusions in the Western Gneiss Region of the Møre og Romsdal and Vestland counties [1].

Red clays are obtained from Pleistocene glacial deposits in the Oslo graben [14,15] and utilized for the manufacture of lightweight aggregates [16].

Talc was extracted, in association with **magnesite**, until 2013 (peak production 100,000 tonnes in 1984) from various deposits in the Caledonian nappes (Altermark, Linnajärvi, Raudberget) which were formed by metasomatism of ultrabasic rocks representing mantle fragments embedded in the Upper Allochthonous [1,17-19].

Several occurrences of Al_2SiO_5 minerals are known [20,21]: **kyanite** quartzites hosted in Paleoproterozoic granitic gneisses or as felsic metavolcanics; **andalusite** deposits formed into contact metamorphic aureoles of gabbro complexes in the central Norwegian Caledonides; Proterozoic paragneisses in southern Norway, affected by medium-high grade metamorphism, have little potential for **sillimanite** mining.

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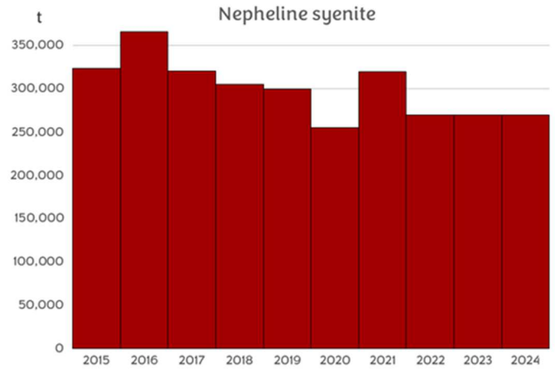
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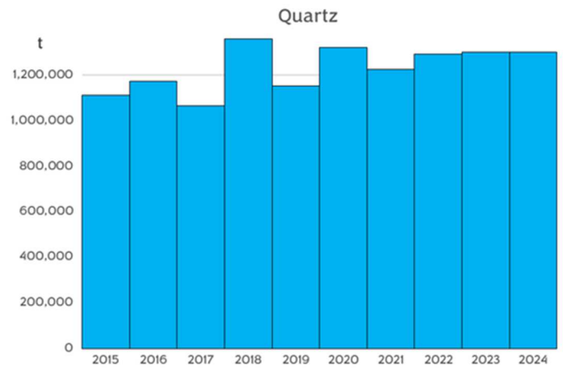
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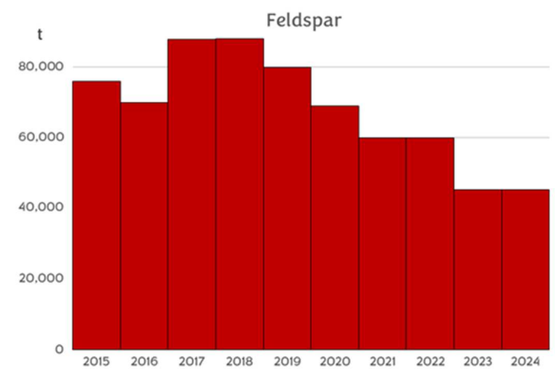
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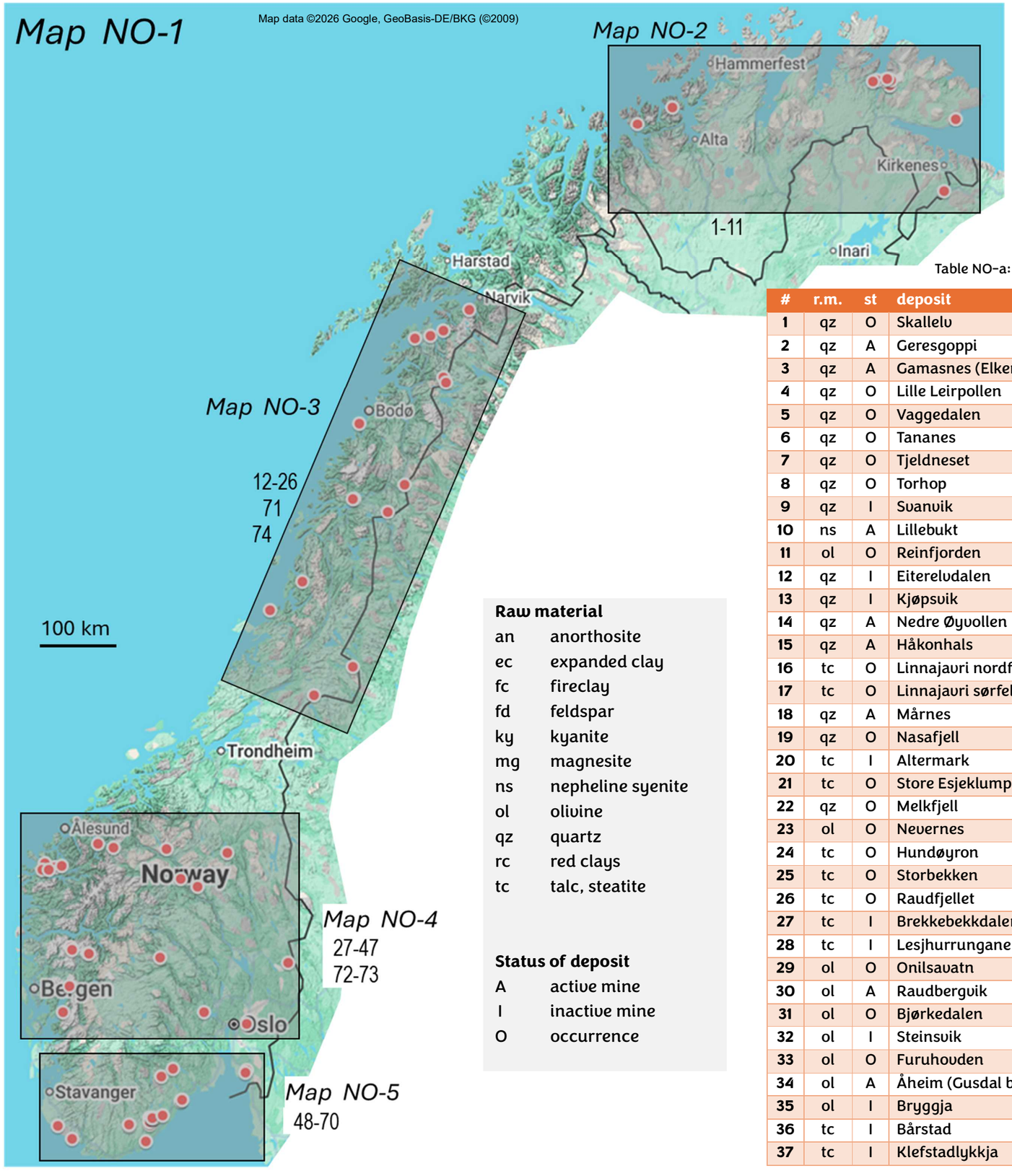
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Raw material

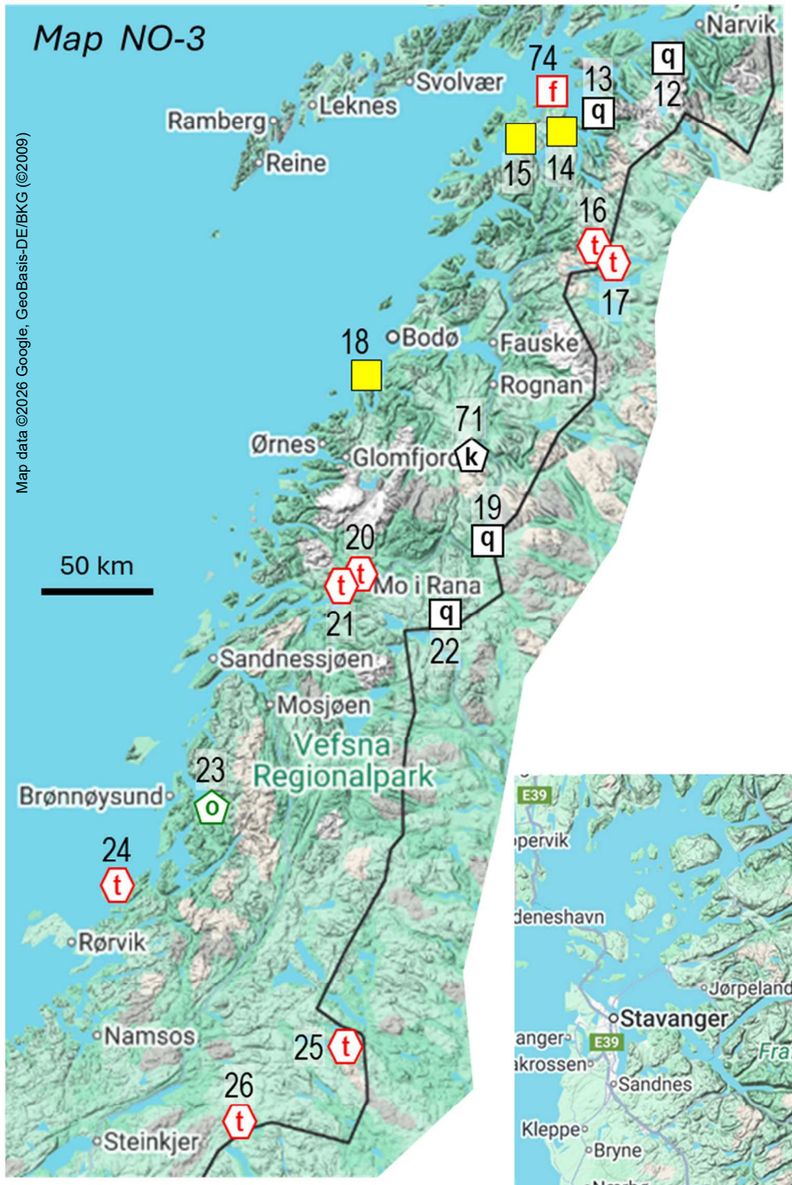
an	anorthosite
ec	expanded clay
fc	fireclay
fd	feldspar
ky	kyanite
mg	magnesite
ns	nepheline syenite
ol	olivine
qz	quartz
rc	red clays
tc	talc, steatite

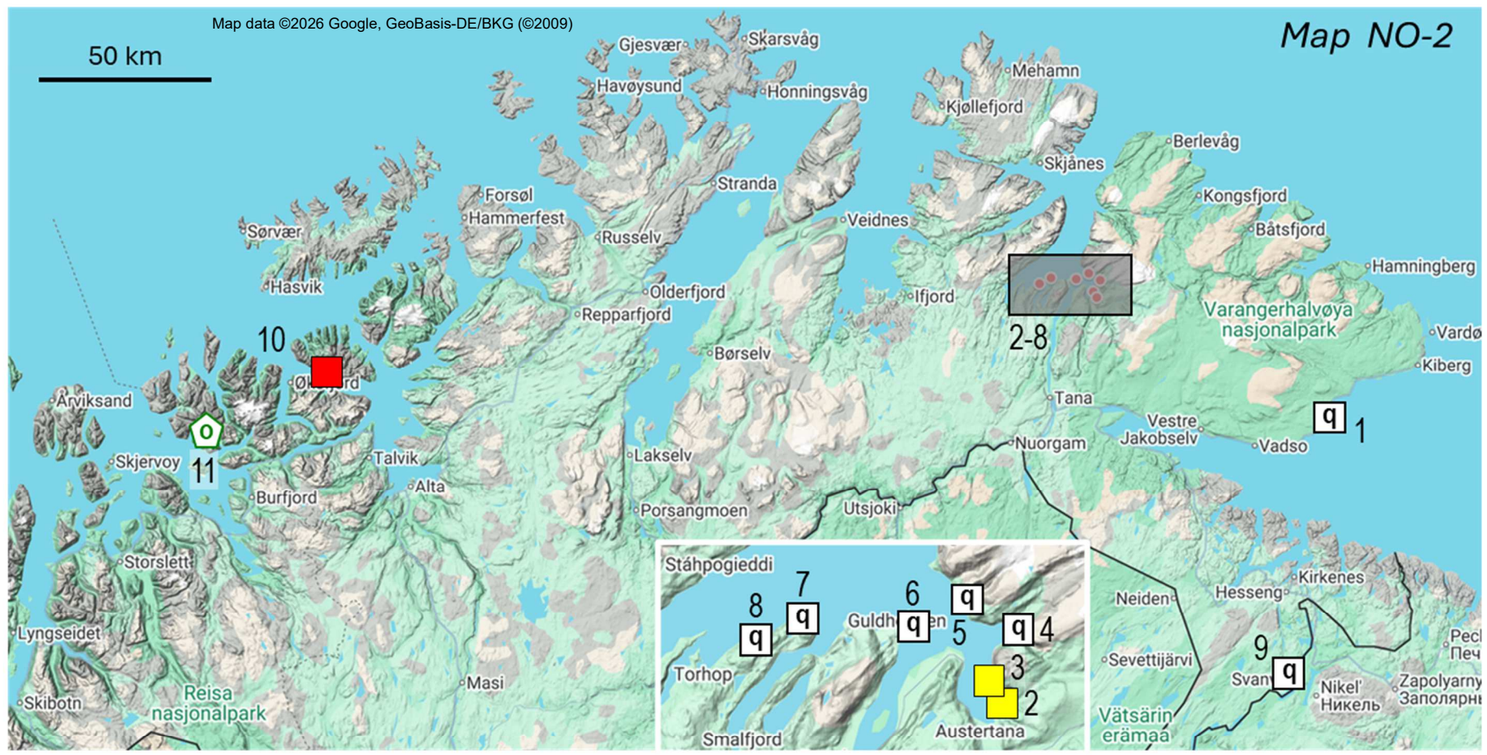
Status of deposit

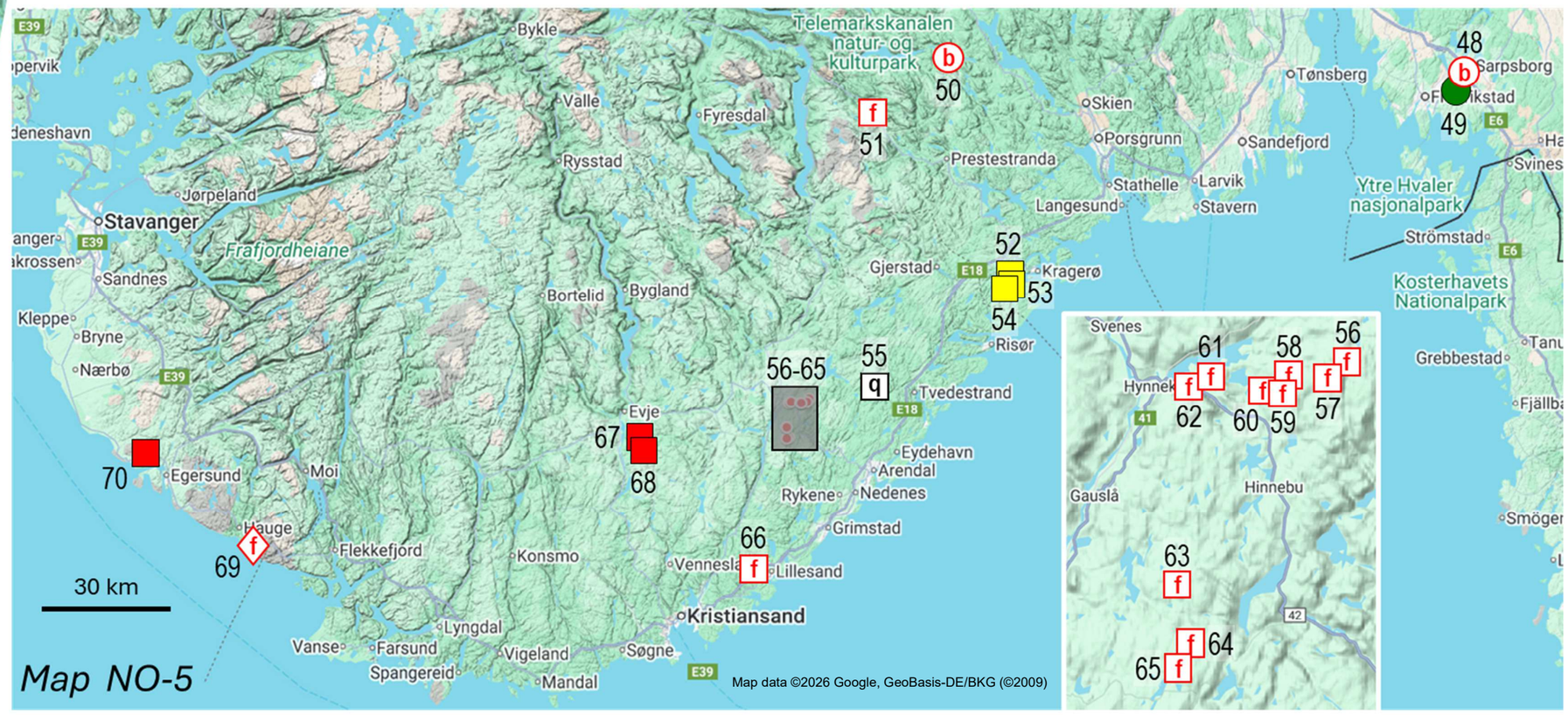
A	active mine
I	inactive mine
O	occurrence

Table NO-a: deposits of raw materials for the ceramic and glass industries in Norway.

#	r.m.	st	deposit	county
1	qz	O	Skallelv	Finnmark
2	qz	A	Geresgoppi	Finnmark
3	qz	A	Gamasnes (Elkem Tana)	Finnmark
4	qz	O	Lille Leirpollen	Finnmark
5	qz	O	Vaggedalen	Finnmark
6	qz	O	Tananes	Finnmark
7	qz	O	Tjeldneset	Finnmark
8	qz	O	Torhop	Finnmark
9	qz	I	Svanvik	Finnmark
10	ns	A	Lillebukt	Finnmark
11	ol	O	Reinfjorden	Troms
12	qz	I	Eiterelvdalen	Nordland
13	qz	I	Kjøpsvik	Nordland
14	qz	A	Nedre Øyvollen	Nordland
15	qz	A	Håkonhals	Nordland
16	tc	O	Linnajavri nordfelt	Nordland
17	tc	O	Linnajavri sørfelt	Nordland
18	qz	A	Mårnes	Nordland
19	qz	O	Nasafjell	Nordland
20	tc	I	Altermark	Nordland
21	tc	O	Store Esjeklumpen	Nordland
22	qz	O	Melkfjell	Nordland
23	ol	O	Nevernes	Nordland
24	tc	O	Hundøyron	Trøndelag
25	tc	O	Storbekken	Trøndelag
26	tc	O	Raudfjellet	Trøndelag
27	tc	I	Brekkebekkdalen	Innlandet
28	tc	I	Lesjhurrungane	Innlandet
29	ol	O	Onilsavatn	Møre og Romsdal
30	ol	A	Raudbergvik	Møre og Romsdal
31	ol	O	Bjørkedalen	Møre og Romsdal
32	ol	I	Steinsvik	Møre og Romsdal
33	ol	O	Furuhovden	Vestland
34	ol	A	Åheim (Gusdal bruddet)	Møre og Romsdal
35	ol	I	Bryggja	Vestland
36	tc	I	Bårstad	Innlandet
37	tc	I	Klefstadlykkja	Innlandet
38	ky	O	Gullsteinberget	Innlandet
39	an	A	Raudberget	Buskerud
40	tc	O	Raudberget	Vestland
41	tc	O	Vetle Raudberget	Vestland
42	an	A	Jordalsnuten	Vestland
43	an	O	Nærøydalen	Vestland
44	tc	I	Høyviken gruber	Vestland
45	qz	O	Nesodden	Vestland
46	mg	I	Dypingdal	Buskerud
47	ec	A	Raelingen	Akershus
48	rc	I	Årum	Østfold
49	ec	A	Borgen	Østfold
50	rc	I	Lunde	Telemark
51	fd	I	Høydalen	Telemark
52	qz	A	Snekkevik	Telemark
53	qz	A	Litangen	Telemark
54	qz	A	Bøleråsen	Telemark
55	qz	O	Våland	Agder
56	fd	O	Nordre Teigen sør	Agder
57	fd	O	Søndre Teigen	Agder
58	fd	O	Nordre Våtåstjern	Agder
59	fd	O	Våtåstoppen	Agder
60	fd	O	Våtåskammen	Agder
61	fd	O	Bjorvassheia vest	Agder
62	fd	I	Setetjern	Agder
63	fd	O	Lauvrak	Agder
64	fd	I	Hellheia midte	Agder
65	fd	I	Hellheia søndre	Agder
66	fd	I	Glamsland	Agder
67	fd	A	Beinmyr	Agder
68	fd	A	Li	Agder
69	fc	O	Dydland	Rogaland
70	an	A	Hellvik	Rogaland
71	ky	O	Saltfjell	Nordland
72	ky	O	Fongen-Hyllingen	Trøndelag
73	ky	O	Tverrådalen	Møre og Romsdal
74	fd	O	Bognes-Tysfjord	Nordland

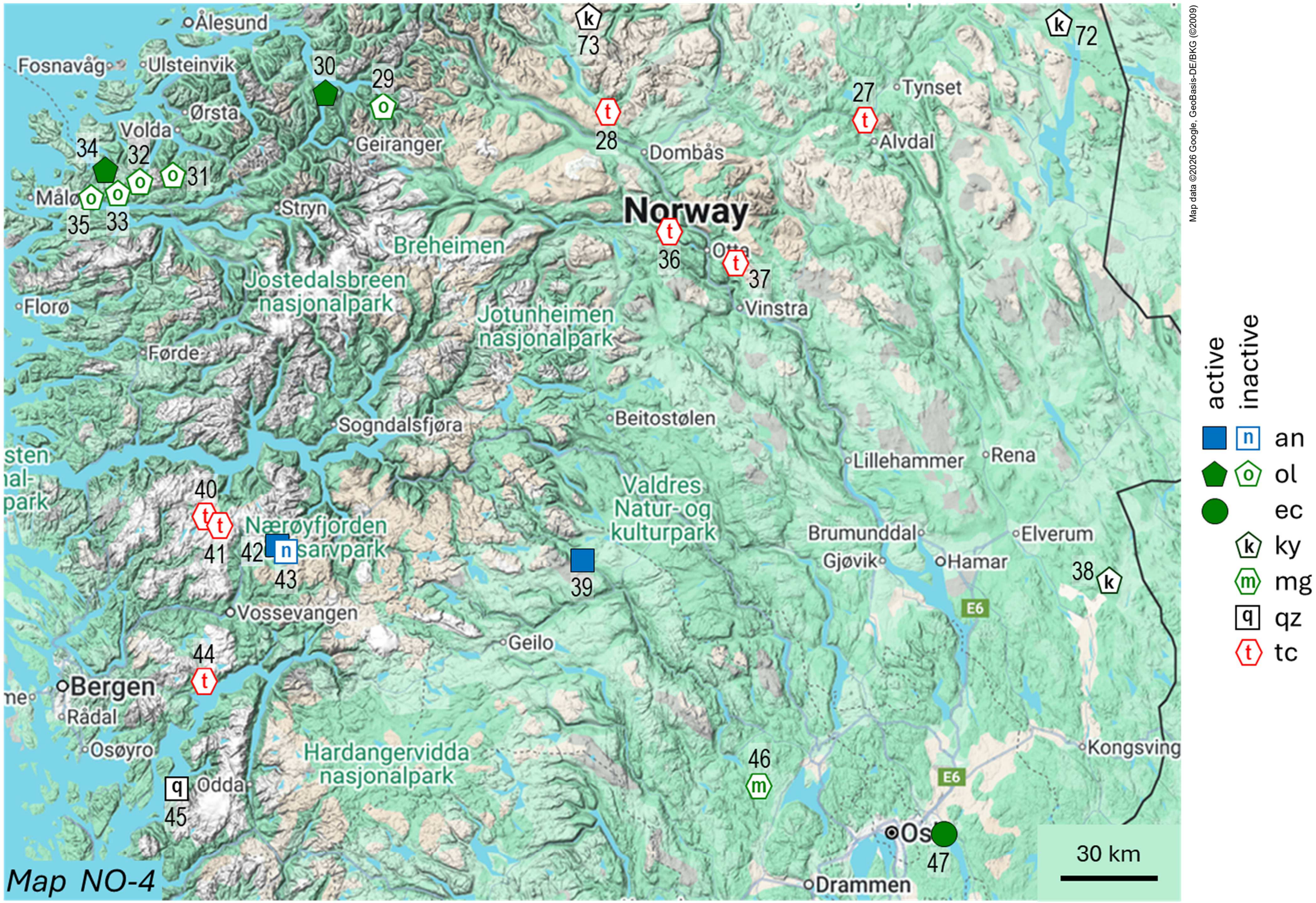






active / inactive

	f	fd		f	fc
	q	qz		o	ol
		an	inactive	b	rc
		ec	inactive	t	tc


Ålesund
Fosnavåg
Ulsteinvik
Ørsta
Volda
Geiranger
Måløy
Stryn
Breheimen
Jostedalsbreen nasjonalpark
Florø
Førde
Jotunheimen nasjonalpark
Sogndalsfjøra
Dombås
Norway
Tynset
Alvdal
Otta
Vinstra
Beitostølen
Lillehammer
Rena
Valdres Natur- og kulturpark
Brumunddal
Elverum
Gjøvik
Hamar
Nærøyfjorden
Vossevangen
Geilo
Bergen
Rådal
Osøyro
Odda
Hardangervidda nasjonalpark
Kongsving
Drammen
E6
30 km
Map NO-4
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)
active
inactive
an
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mg
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Poland

Poland produces mainly synthetic soda ash (third major supplier in the Euro-Mediterranean area), silica sands (7th position in Europe), kaolin, ball clays, refractory clays, red clays for bricks and lightweight aggregates, feldspar, magnesite, and bentonite. Additional resources, currently unexploited, concern barite and celestine [1-3].

Kaolin: Polish production (292,000 tpa on average) comes entirely from Silesia, where several deposits resulting from the kaolinization of granites (e.g., Żarów, Gola, Śmiałowice) or basalt (Dunino) have been recorded [1,4-6]. The only active mines are Maria III (from which the vast majority of Polish kaolin comes) and Dunino (which provides halloysite). Reserves amount to 44 million tonnes [1].

Silica sands are excavated in eight quarries, which exploit Cretaceous (Łódz and Silesia), Miocene (Lubusz) and Quaternary sediments (Greater Poland). Polish production amounts to 2,844,000 tpa (average 2015-2024) while reserves are as high as 117 million tonnes [1,7,8].

Red clays for stoneware tiles are excavated from Triassic sediments in southern Silesia and the Świętokrzyskie and Masovian voivodeships [1,9-13]. Production averages 235,000 tpa and there are reserves for 4.8 million tonnes [1]. Furthermore, red clays are used in the production of bricks and lightweight aggregates from around eighty active quarries (3,208,000 tpa) located throughout the country, with reserves equal to 4044 million tonnes plus 321 million tonnes for expanded clay [1]. The major source is represented by the Quaternary cover of glacial origin (glacio-lacustrine, loess, fluvio-glacial) integrated by Neogene continental sediments [14-16].

White clay deposits are found in two distinct areas of the country: western Silesia (kaolinitic clays of Cretaceous lacustrine successions) and Masovia, where Jurassic continental sediments are exploited [17-23]. There are currently three active mines: one for ball clay (161,000 tpa from Janina in western Silesia) and two for fireclay (72,000 tpa from Rusko-Jaroszów in Silesia and Borkowice-Radestów in Masovia). Reserves are estimated at 61 million tonnes of ball clays and 51 million tonnes of refractory clays [1].

Feldspar: known deposits are distributed across Silesia and Lesser Poland [24,25]. These are leucocratic granites south of Wrocław (Stary Łom and Pagórki Wschodnie, the only two active mines, producing an average of 48,000 tpa); porphyric granites in the Jelenia Gora area; arkose and trachyte near Kraków [26-29]. Reserves amount to 8.3 million tonnes [1].

Magnesite: half a dozen vein deposits, found in ophiolite-related ultramafic rocks, are reported in the northeastern Bohemian Massif [30,31]. Only one mine is actually in operation (74,000 tpa, average 2015-2024) with reserves of 3.2 million tonnes [1].

Bentonite: some deposits are known in southern Silesia and in the Świętokrzyskie, two of which are actively exploited with average production of ~500 tpa and reserves of 1.2 million tonnes [1]. They consist of a thick bentonite layer occurring within the Miocene limestones of the Pińczów Formation [32].

Soda ash: about 1.2 million tpa is produced in two plants near Inowroclaw [33-35].

Barite extraction peaked at 98,000 tpa in 1987 and ceased in 2008 [36] even though reserves amount to 5.7 million tonnes [1]. Barite occurs in hydrothermal veins, in paragenesis with sulphides, found in lower Silesia and in the Holy Cross Mountains [1].

Celestine concentrations have been found in Miocene sulphate deposits of the Carpathian Foredeep, near Kraków and Tarnów, as well as in Zechstein carbonate and sulphate deposits of the Polish Lowlands [31].

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Map PL-1

100 km

Poland

Map PL-2

Map PL-3

Map PL-4

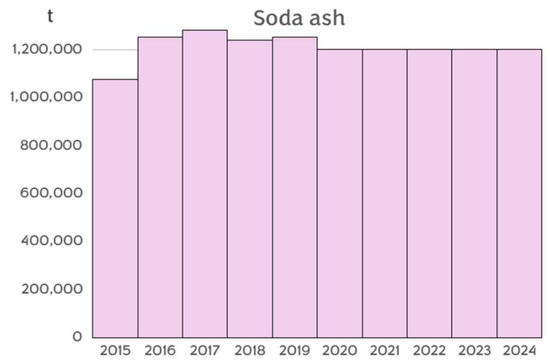
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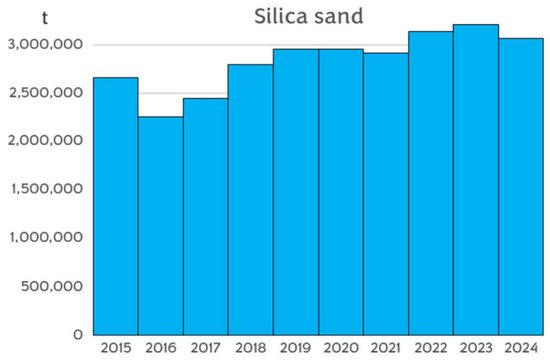
ba be ec fc fd ka mg qs rc

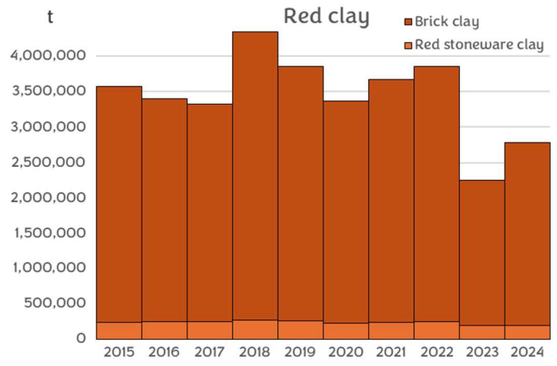
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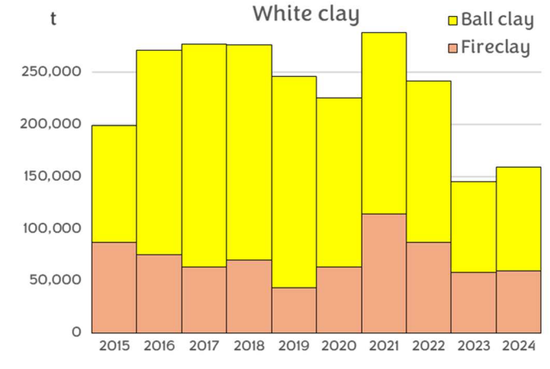


Table PL-a: deposits of raw materials for the ceramic and glass industries in Poland.

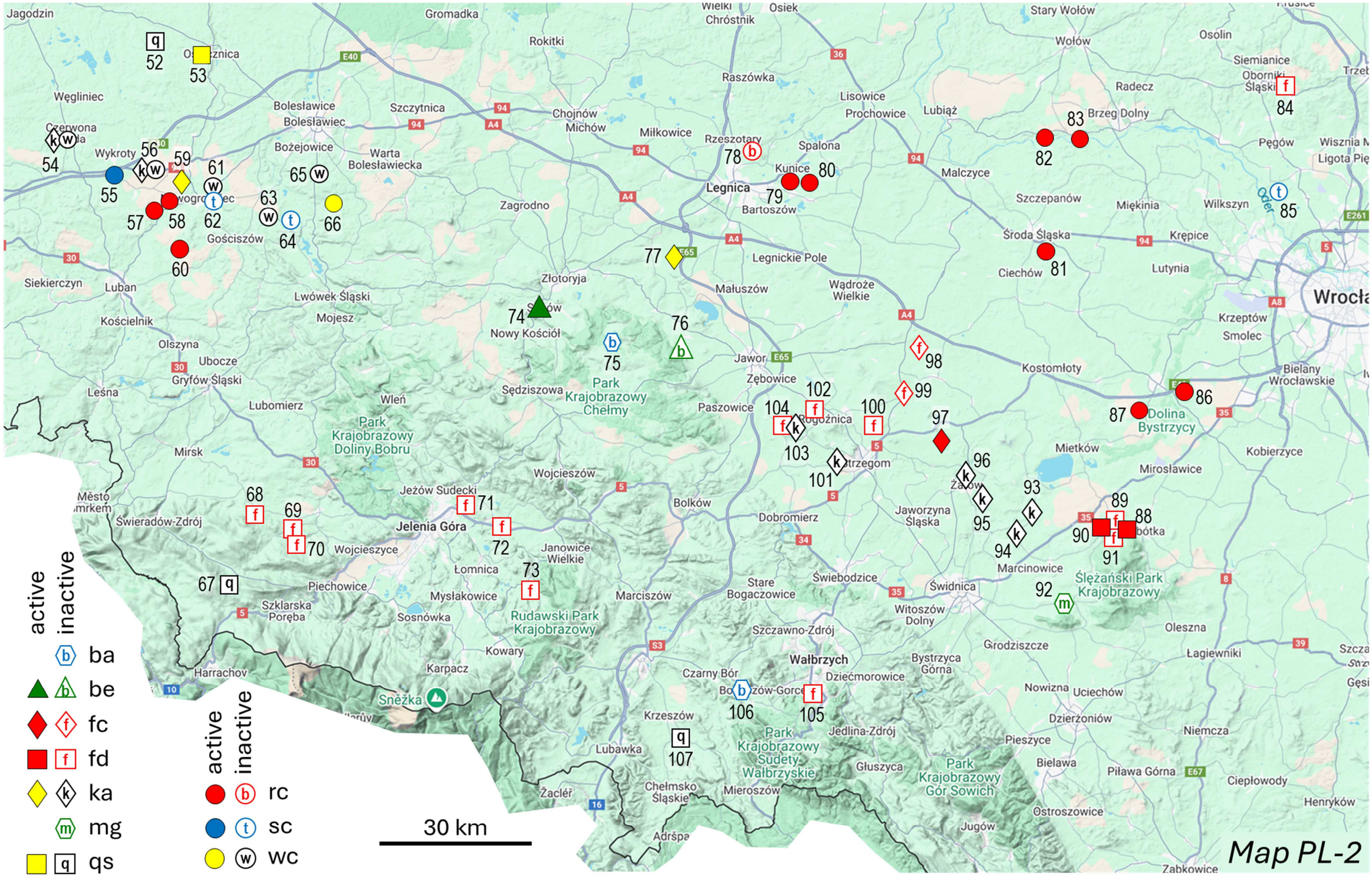
#	raw material	st	deposit	voivodeship
1	rc	A	Lębork	Pomorskie
2	rc	A	Kębłowo Nowowiejskie	Pomorskie
3	rc	A	Nowa Wieś Lęborska	Pomorskie
4	ec	O	Machowinko	Pomorskie
5	rc	A	Pieńkowo	Zachodniopomorskie
6	qs	I	Sulechowo	Zachodniopomorskie
7	rc	I	Złocieniec	Zachodniopomorskie
8	ec	I	Bukowo	Zachodniopomorskie
9	qs	A	Mirosław	Wielkopolskie
10	qs	I	Ujście	Wielkopolskie
11	rc	A	Czajcze	Wielkopolskie
12	rc	A	Przysieka	Wielkopolskie
13	rc	I	Stopka	Kujawsko-Pomorskie
14	sa	A	Janikowo	Kujawsko-Pomorskie
15	sa	A	Inowroclaw	Kujawsko-Pomorskie
16	rc	A	Kozłowo	Kujawsko-Pomorskie
17	rc	I	Opalenie	Pomorskie
18	ec	A	Gniew	Pomorskie
19	rc	A	Sągnity	Warmińsko-Mazurskie
20	ec	I	Łęgajny	Warmińsko-Mazurskie
21	rc	A	Lewkowo Stare	Podlaskie
22	rc	A	Tadeuszów-Rudzienko	Mazowieckie
23	qs	I	Wyszków-Skuszew	Mazowieckie
24	qs	I	Mostówka	Mazowieckie
25	rc	A	Chajęty	Mazowieckie
26	rc	A	Łosie	Mazowieckie
27	rc	I	Nasierowo	Mazowieckie
28	ec	A	Budy Mszczonowskie	Mazowieckie
29	rc	A	Barcik	Mazowieckie
30	rc	A	Michałów	Łódzkie
31	rc	A	Kiełmina	Łódzkie
32	rc	A	Leonardów	Łódzkie
33	rc	A	Dąbrówka Strumiany	Łódzkie
34	ec	A	Piaskowice	Łódzkie
35	rc	A	Dąbrowa Duża	Wielkopolskie
36	rc	A	Cienia	Wielkopolskie
37	rc	A	Rojów	Wielkopolskie
38	rc	I	Lenartowice	Wielkopolskie
39	ec	O	Grabowo-Kołaczkowo	Wielkopolskie
40	rc	I	Witaszyce	Wielkopolskie
41	rc	I	Brzostów	Wielkopolskie
42	rc	I	Krotoszyn	Wielkopolskie
43	rc	I	Nietążkowo	Wielkopolskie
44	fc	I	Małomice	Lubuskie
45	rc	I	Jasień	Lubuskie
46	fc	I	Chwaliszowice	Lubuskie
47	fc	I	Łęknica	Lubuskie
48	rc	A	Borowe	Lubuskie
49	rc	A	Gozdnica	Lubuskie
50	qz	I	Jędrzychowice	Dolnośląskie
51	fc	I	Turów	Dolnośląskie
52	qs	I	Parowa	Dolnośląskie
53	qs	A	Osiecznica	Dolnośląskie
54	ka-wc	I	Czerwona Woda	Dolnośląskie
55	sc	A	Zebrzydowa Zachód	Dolnośląskie
56	ka-wc	O	Zofia	Dolnośląskie
57	rc	A	Słowiany	Dolnośląskie
58	rc	A	Ołdrzychów	Dolnośląskie
59	ka	A	Maria III	Dolnośląskie
60	rc	A	Radostów Dolny	Dolnośląskie
61	sc	I	Weronika	Dolnośląskie
62	wc	I	Bolko	Dolnośląskie
63	wc	O	Ocice	Dolnośląskie
64	sc	O	Anna-Włodzice Małe	Dolnośląskie
65	wc	O	Nowe Jaroszowice	Dolnośląskie
66	wc	A	Janina	Dolnośląskie
67	qz	I	Stanislaw	Dolnośląskie
68	fd	O	Proszowa-Kwieciszowice	Dolnośląskie
69	fd	O	Kamienica Mała	Dolnośląskie
70	fd	O	Kopaniec	Dolnośląskie
71	fd	O	Góra Sośnia	Dolnośląskie
72	fd	I	Maciejowa	Dolnośląskie
73	fd	I	Karpniki	Dolnośląskie
74	be	A	Krzeniów	Dolnośląskie
75	ba	I	Stanisławów	Dolnośląskie
76	be	O	Jawor-Męcinka	Dolnośląskie
77	ka	A	Dunino	Dolnośląskie
78	rc	I	Legnica-pole Wschodnie	Dolnośląskie
79	rc	A	Kunice W	Dolnośląskie
80	rc	A	Kunice E	Dolnośląskie
81	rc	A	Pogolewo Małe	Dolnośląskie
82	rc	A	Grodzanów	Dolnośląskie
83	rc	A	Chwalimierz	Dolnośląskie
84	fd	O	Kowalska Gora	Dolnośląskie
85	sc	I	Kraniec	Dolnośląskie
86	rc	A	Sośnica	Dolnośląskie
87	rc	A	Kąty Wrocławskie	Dolnośląskie
88	fd	A	Pagórki Wschodnie	Dolnośląskie
89	fd	I	Pagorki Zachodnie	Dolnośląskie
90	fd	A	Stary Łom	Dolnośląskie
91	fd	I	Strzeblow	Dolnośląskie
92	mg	I	Wiry	Dolnośląskie
93	ka	I	Goła	Dolnośląskie
94	ka	I	Śmiałowice	Dolnośląskie
95	ka	O	Antoni	Dolnośląskie
96	ka	I	Żarów	Dolnośląskie
97	fc	A	Rusko-Jaroszów	Dolnośląskie
98	fc	I	Różana	Dolnośląskie
99	fc	I	Lusina-Udanin	Dolnośląskie
100	fd	I	Graniczna	Dolnośląskie
101	ka	O	Kazimierz	Dolnośląskie
102	fd	I	Rogoźnica	Dolnośląskie
103	ka	O	Michał	Dolnośląskie
104	fd	I	Gniewków	Dolnośląskie

Raw material

ba barite
be bentonite
ec expanded clay
fc refractory clays
fd feldspar
ka kaolin
mg magnesite
qs glass sand
qz quartz
rc red clays
sa soda ash
sc red stoneware clays
sr celestine
wc white clays

Status of deposit

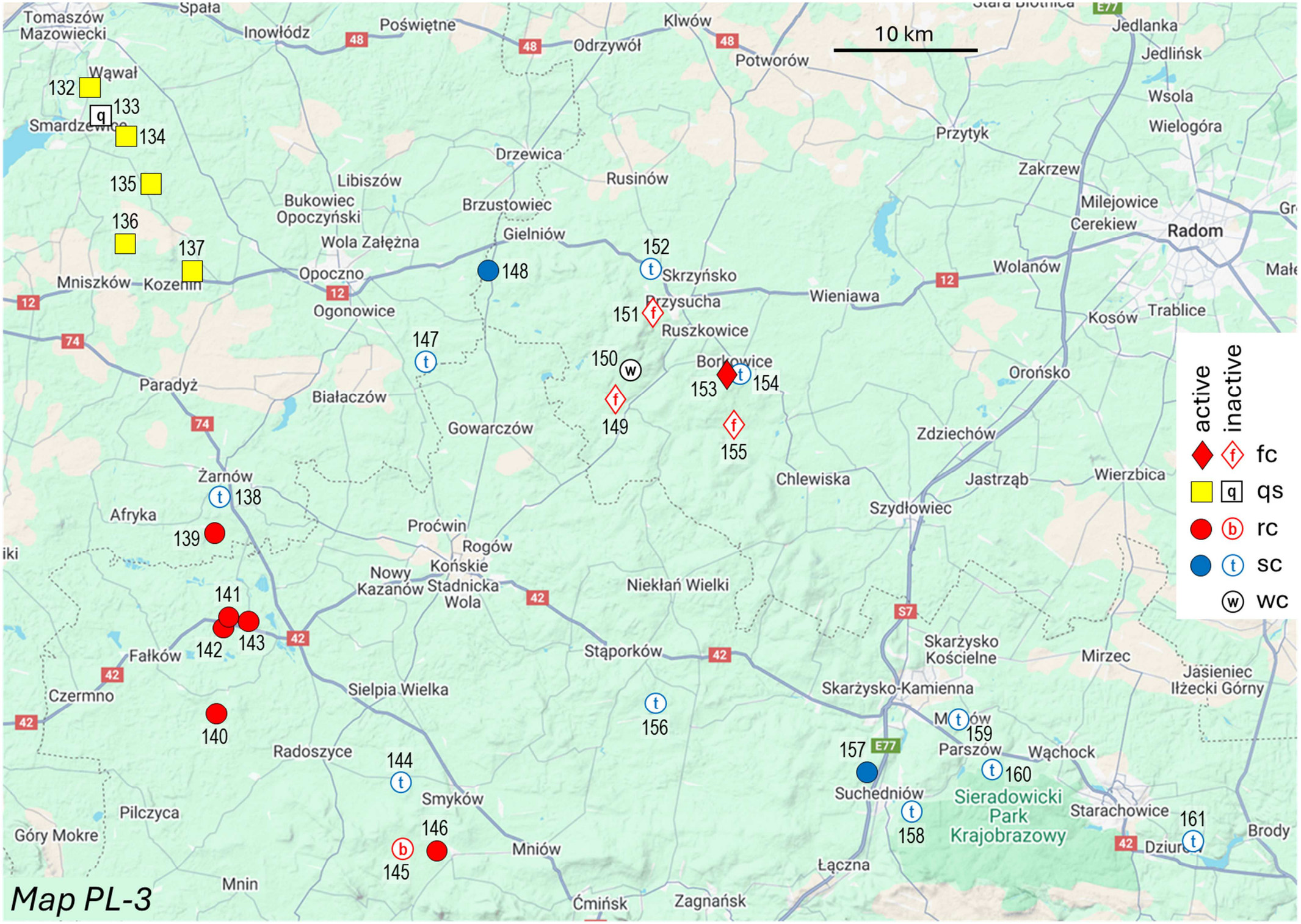
A active mine
I inactive mine
O occurrence



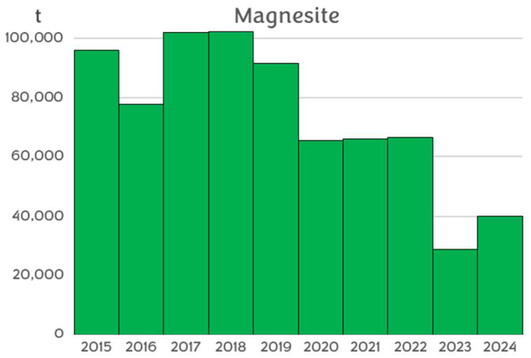
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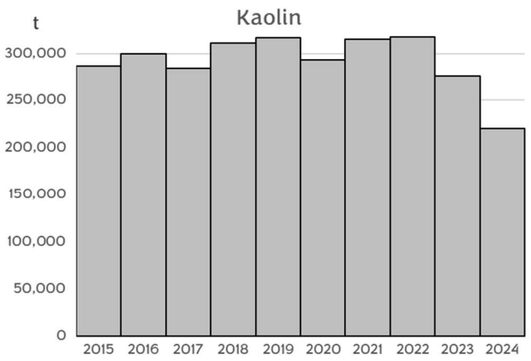
Table PL-b: deposits of raw materials for the ceramic and glass industries in Poland.

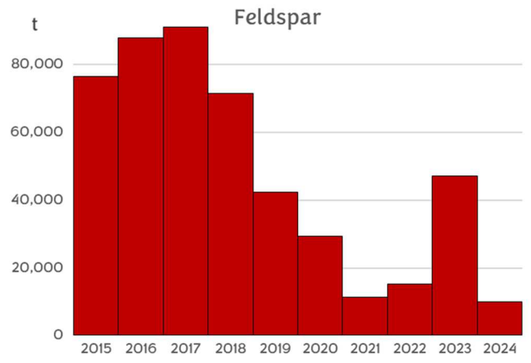
#	raw material	st	deposit	voivodeship
105	fd	I	Wałbrzych	Dolnośląskie
106	ba	I	Boguszów	Dolnośląskie
107	qs	I	Krzeszówek	Dolnośląskie
108	mg	I	Grochów	Dolnośląskie
109	mg	A	Braszowice	Dolnośląskie
110	rc	A	Paczków	Opolskie
111	fd	I	Sławniowice	Opolskie
112	rc	I	Wesele	Opolskie
113	rc	I	Komprachcice	Opolskie
114	rc	A	Mokrsko	Łódzkie
115	rc	A	Czerwone Osiedle	Opolskie
116	rc	A	Patoka	Śląskie
117	rc	A	Kotary	Śląskie
118	rc	A	Pacanów	Śląskie
119	rc	A	Bogumiła	Śląskie
120	rc	A	Gnaszyn	Śląskie
121	rc	I	Żarki	Śląskie
122	rc	A	Ogrodzieniec	Śląskie
123	rc	A	Sierakowice	Śląskie
124	rc	I	Gliwice	Śląskie
125	rc	A	Łąka	Śląskie
126	qs	I	Bukowno	Małopolskie
127	rc	A	Sławków	Śląskie
128	fd	O	Wygietzow	Małopolskie
129	fd	I	Siedlec-Krzeszowice	Małopolskie
130	sr	I	Posądza	Świętokrzyskie
131	be	O	Jawor	Świętokrzyskie
132	qs	A	Biała Góra - Wschód	Łódzkie
133	qs	I	Unewel-Wschód	Łódzkie
134	qs	A	Unewel-Zachód-Nowy	Łódzkie
135	qs	A	Unewel Grudzeń Las	Łódzkie
136	qs	A	Piaskownica-Zajączków	Łódzkie
137	qs	A	Wygnanów	Łódzkie
138	sc	I	Żarnów	Łódzkie
139	rc	A	Chełsty	Łódzkie
140	rc	A	Szkucin	Świętokrzyskie
141	rc	A	Wyszyna Fałkowska N	Świętokrzyskie
142	rc	A	Wyszyna Fałkowska S	Świętokrzyskie
143	rc	A	Wyszyna Rudzka	Świętokrzyskie
144	sc	I	Kozów	Świętokrzyskie
145	rc	I	Filipy	Świętokrzyskie
146	rc	A	Pałęgi-Gościniec	Świętokrzyskie
147	sc	I	Paszkowice	Łódzkie
148	sc	A	Rozwady	Mazowieckie
149	fc	I	Kryzmanówka	Mazowieckie
150	wc	I	Żapniów	Mazowieckie
151	fc	I	Jakubów	Mazowieckie
152	sc	O	Zawada	Mazowieckie
153	fc	A	Borkowice-Radestów	Mazowieckie
154	sc	I	Borkowice-Radestów E	Mazowieckie
155	fc	I	Rusinów	Mazowieckie
156	sc	O	Włochów	Świętokrzyskie
157	sc	A	Baranów	Świętokrzyskie
158	sc	I	Wierzbka	Świętokrzyskie
159	sc	I	Majków	Świętokrzyskie
160	sc	O	Parszów-Szkleniec	Świętokrzyskie
161	sc	I	Adamów	Świętokrzyskie
162	ec	I	Klementowice	Lubelskie
163	qs	A	Niedźwiada	Lubelskie
164	qs	A	Leszkowice	Lubelskie
165	ec	I	Żulin	Lubelskie
166	rc	A	Słodków	Lubelskie
167	rc	A	Bojanówka	Lubelskie
168	rc	A	Suchynia	Lubelskie
169	rc	I	Niziny	Lubelskie
170	be	I	Opoka Duża	Lublin
171	rc	A	Borów	Lubelskie
172	rc	A	Janiszów	Lubelskie
173	be	O	Górki	Świętokrzyskie
174	rc	A	Wrzawy	Podkarpackie
175	rc	A	Zalesie Gorzyckie	Podkarpackie
176	rc	A	Trześń-Łabuda	Podkarpackie
177	rc	A	Chmielów	Podkarpackie
178	rc	A	Siedleszczany-Lachowski	Podkarpackie
179	qs	I	Piaseczno	Świętokrzyskie
180	rc	A	Osiek-Grabowiec	Świętokrzyskie
181	rc	A	Rytwiany	Świętokrzyskie
182	be	A	Drugnia Rządowa	Świętokrzyskie
183	be	I	Wierzbie	Świętokrzyskie
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185	rc	A	Oleśnica	Świętokrzyskie
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187	sr	I	Czarkowy	Świętokrzyskie
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189	rc	A	Przecław-Podlesie	Podkarpackie
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191	rc	I	Hadykówka	Podkarpackie
192	rc	A	Kolbuszowa-Kupno	Podkarpackie
193	rc	A	Rakszawa-Pikor	Podkarpackie
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196	rc	I	Frampol	Lubelskie
197	rc	A	Olszanka	Lubelskie
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201	rc	I	Tarnogród	Lubelskie
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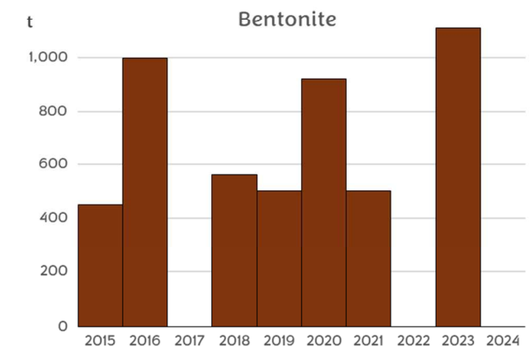


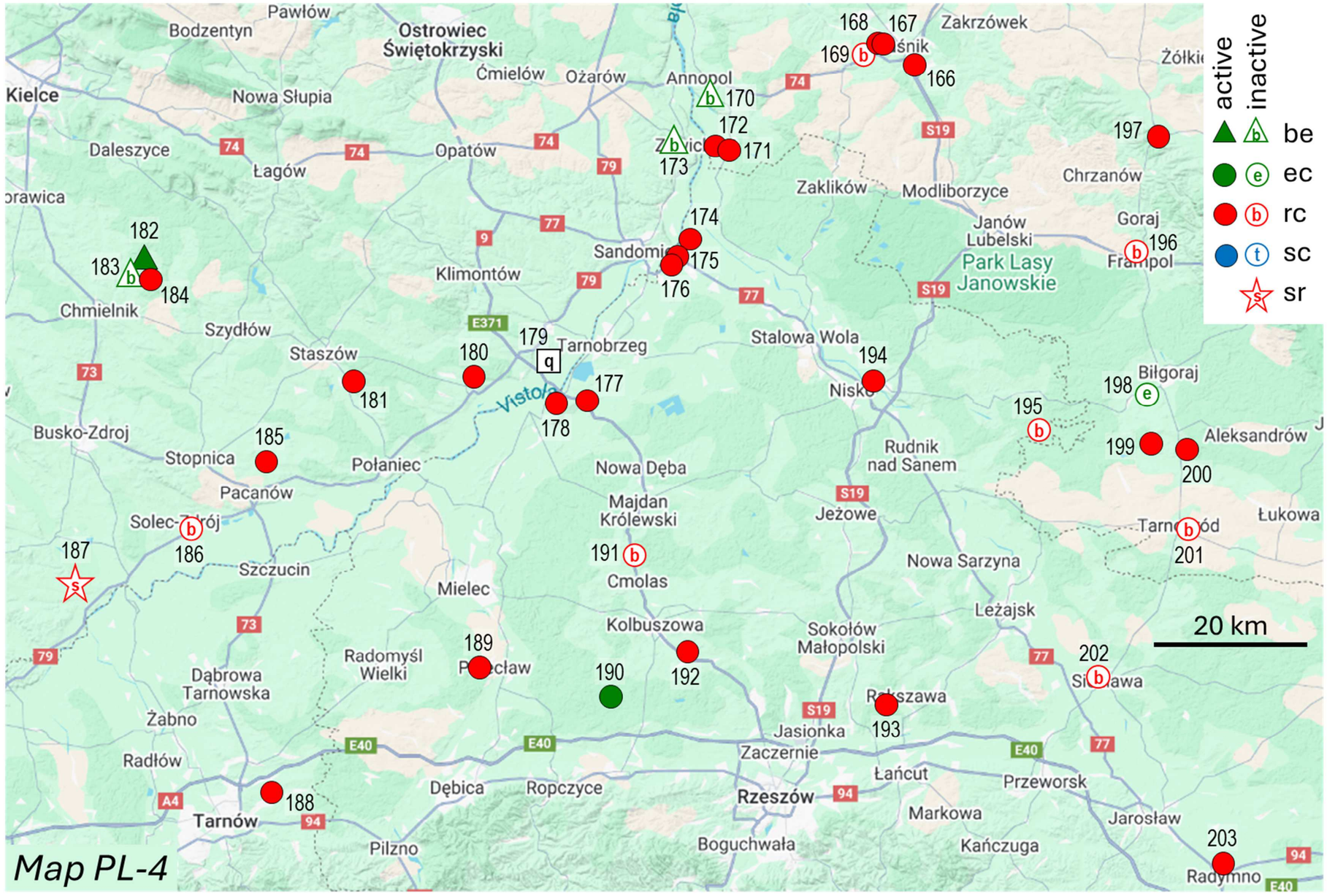
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Portugal

Portugal is a major producer of ceramic and glass raw materials, mainly intended to feed domestic industry, but with increasing export shares. The Portuguese mining industry is the leading producer of lithium minerals in the Euro-Mediterranean zone, and is among the top ten suppliers of kaolin, feldspar, white clays, quartz sand, talc, and an important producer of red clays. Moreover, occurrences of barite, bentonite, chromite, and zirconium minerals have been reported [1-5].

Lithium minerals: are currently extracted as *pegmatite with lepidolite* (34,700 tpa, mean 2015-2024), often together with feldspar and quartz [1-3], at several places in northern and central Portugal [6-10]. The main objective of the Portuguese mining strategy is to valorise the important lithium resources occurring in the Central Iberian Zone and the Galicia-Trás-Os Montes Zone, with reserves as high as 484,000 tonnes of Li_2O [11,12]. The main targets are pegmatites containing spodumene in Barroso [13], lepidolite in Alvarrões [14] or petalite in Sepela-Romano [6], as well as microgranite with Li-phosphates in Argemela [15].

Ball clays and fireclays are present, together with red clays, in two Pliocene-Pleistocene sedimentary basins of fluvio-palustrine environment [16-18]. About twenty mines exploit the Barracão Formation in the Pombal area (Leiria) and a dozen mines extract the Barro Negro de Aguada in Anadia-Águeda-Oliveira do Bairro (Aveiro). Portuguese production is on average 276,000 tpa but widely fluctuating in recent years [3].

Kaolin: fifteen deposits are under exploitation along the Atlantic coast, from Peniche to the Minho River, for average output of 354,000 tpa of washed kaolin, increasing in latest years [1-3]. Two main areas with different genesis are recognized [19-21]: hydrothermal kaolinization with meteoric overprint [22-24] of granites (e.g., Alvarães, Campados), pegmatites (e.g., Tojal) or gneiss-migmatites (e.g., Vista Alegre); lacustrine deposits [25], e.g. the Cretaceous Vale de Lobos Formation (Mosteiros, Casal dos Braçais).

Feldspar: aplitic and pegmatitic bodies, individually of modest volume, are very numerous in a NW-SE oriented belt between Viana do Castelo and Guarda [6,26]. A dozen deposits are currently under exploitation, often with potential for lithium [1,2]: they are distributed in the Galicia-Trás-Os Montes Zone, between Braga and Chaves [27,28], and in the Central Iberian Zone: around Viseu [29,30], between Guarda and Fundão [31,32], and near the Spanish border [8]. From these deposits, 246,000 tpa [3] of predominantly potassium feldspar are extracted, although sodium and mixed types are also produced. Alongside the Variscan pegmatites, there are significant resources of feldspathic sands, e.g., Seixoso and Casal do Frade [33].

Quartzous raw materials are obtained, together with feldspar, from aplites and pegmatites of the Variscan massif (e.g., Portela) and from silica sands in northern (Formigoso) and southern (e.g., Nasce Água) Portugal [1,2]. Quartz is also obtained from hydrothermal veins, as a by-product of the extraction of metal ores [34]. Total production is on average 1,306,000 tpa, increasing over the last decade [3].

Red clays are intended for the production of bricks, roof tiles and lightweight aggregates and are extracted (1,670,000 tpa) from a wide range of formations of various geological ages [16]. Marine clays and marls (littoral to platform) are widely exploited from Jurassic [35-37], Cretaceous [38-41] and Paleogene [42] units, as well as Miocene-Pliocene sediments settled in fluvio-palustrine to deltaic-estuarine environments [43]. Quaternary or Paleozoic deposit are also sometimes excavated [44].

Talc is obtained from small deposits in Trás-os-Montes (Salselas, Sete Fontes, Vale da Porca) formed by the alteration of ultrabasics [1,2,45]. Production averages 9,300 tpa, with a declining trend in the 2015-2024 period [3].

Barite occurrences are reported as hydrothermal filling of late- to post-Variscan faults cutting the Paleozoic basement, either barite veinlets (e.g. , Clérigos [1]) or Ba-Pb-Zn quartz veins (e.g. , Segura [46]). Barite extraction, peaking at 1,900 tonnes in 1989, ceased in 2009 [47].

Bentonite: the largest known deposit in continental Portugal was formed by weathering of granitoids from the Benavila igneous massif (Silurian) in Alentejo [48].

Chromite is found in small lenses within serpentinized peridotites of the Bragança Massif [1].

Zirconium minerals occur as zircon paleoplacers in the Ordovician Quartzito Armoricano Formation [1] and in the Serra de Monchique nepheline syenite [49].

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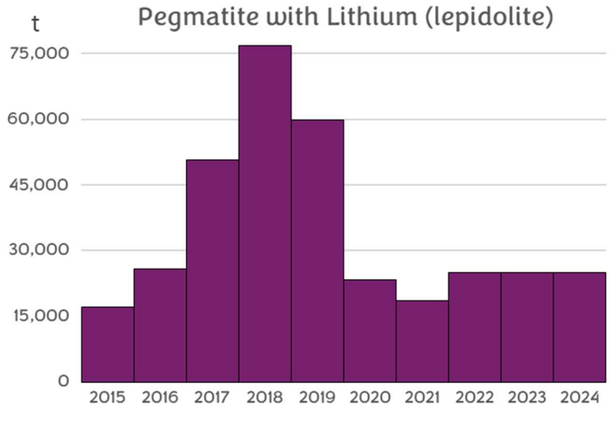
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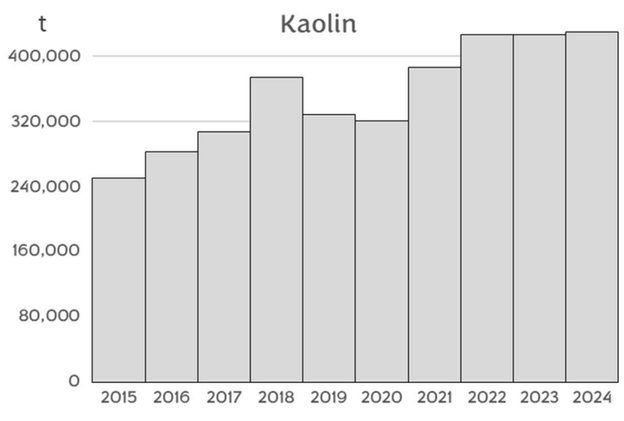
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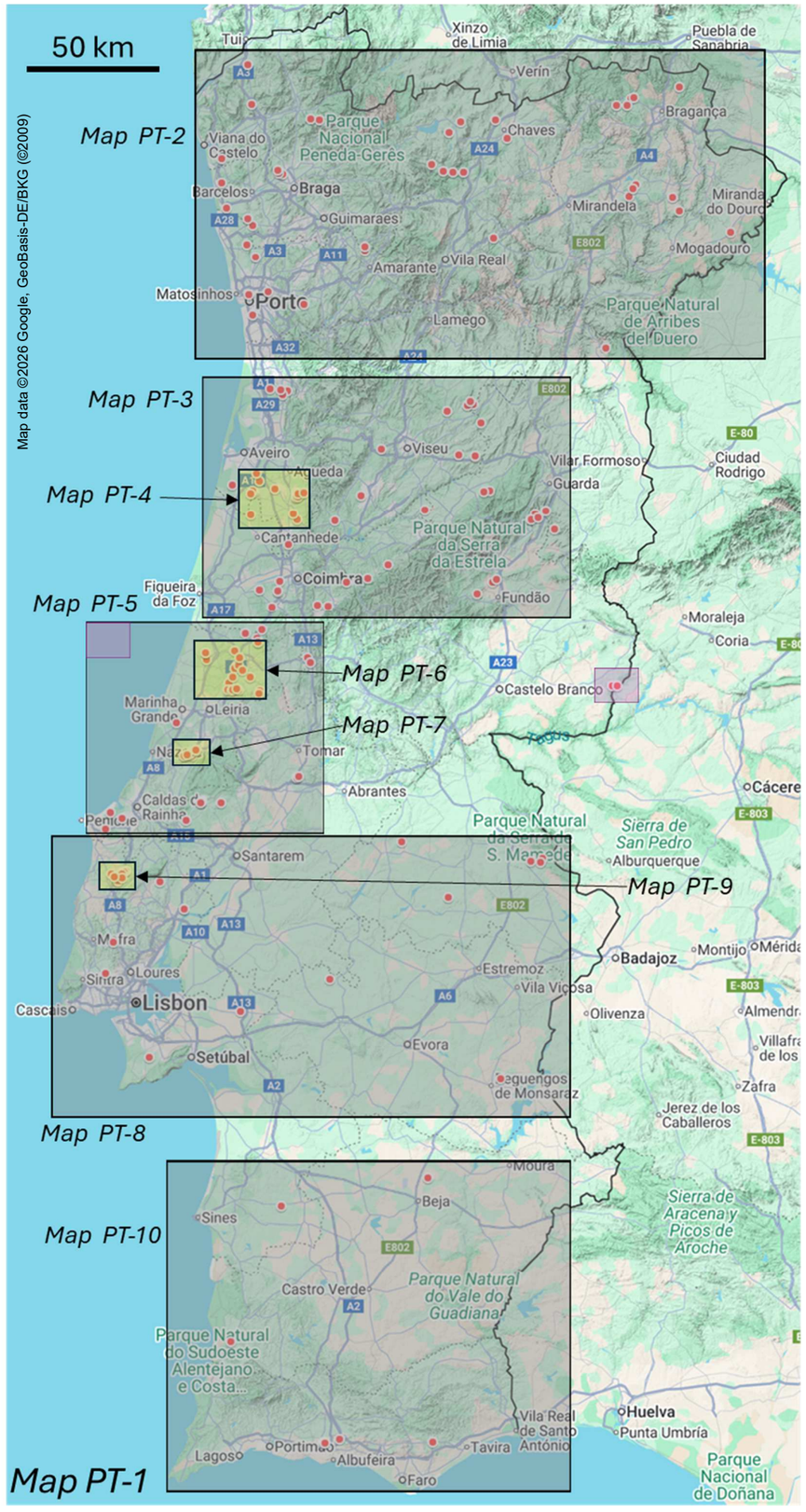
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Map PT-2

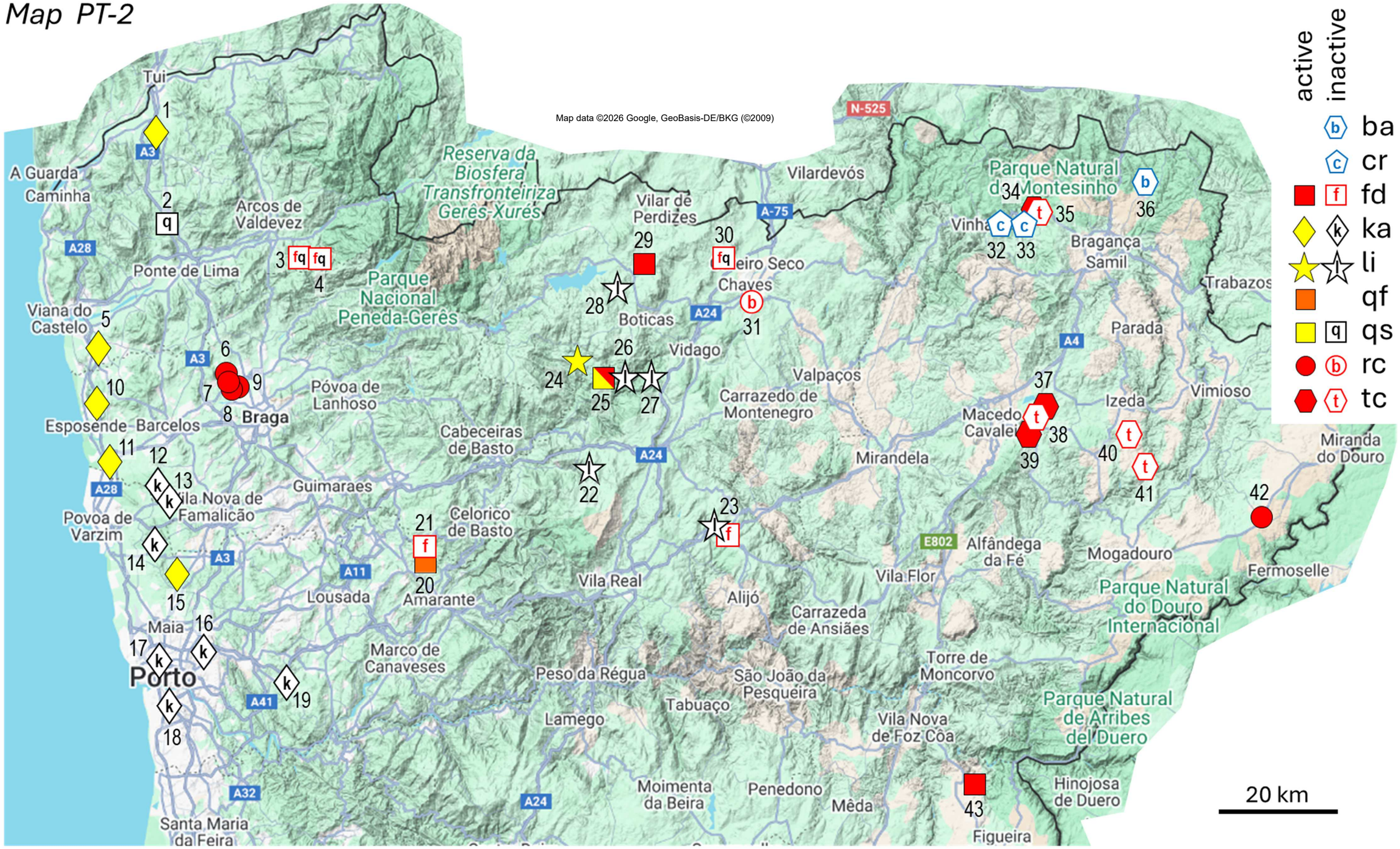
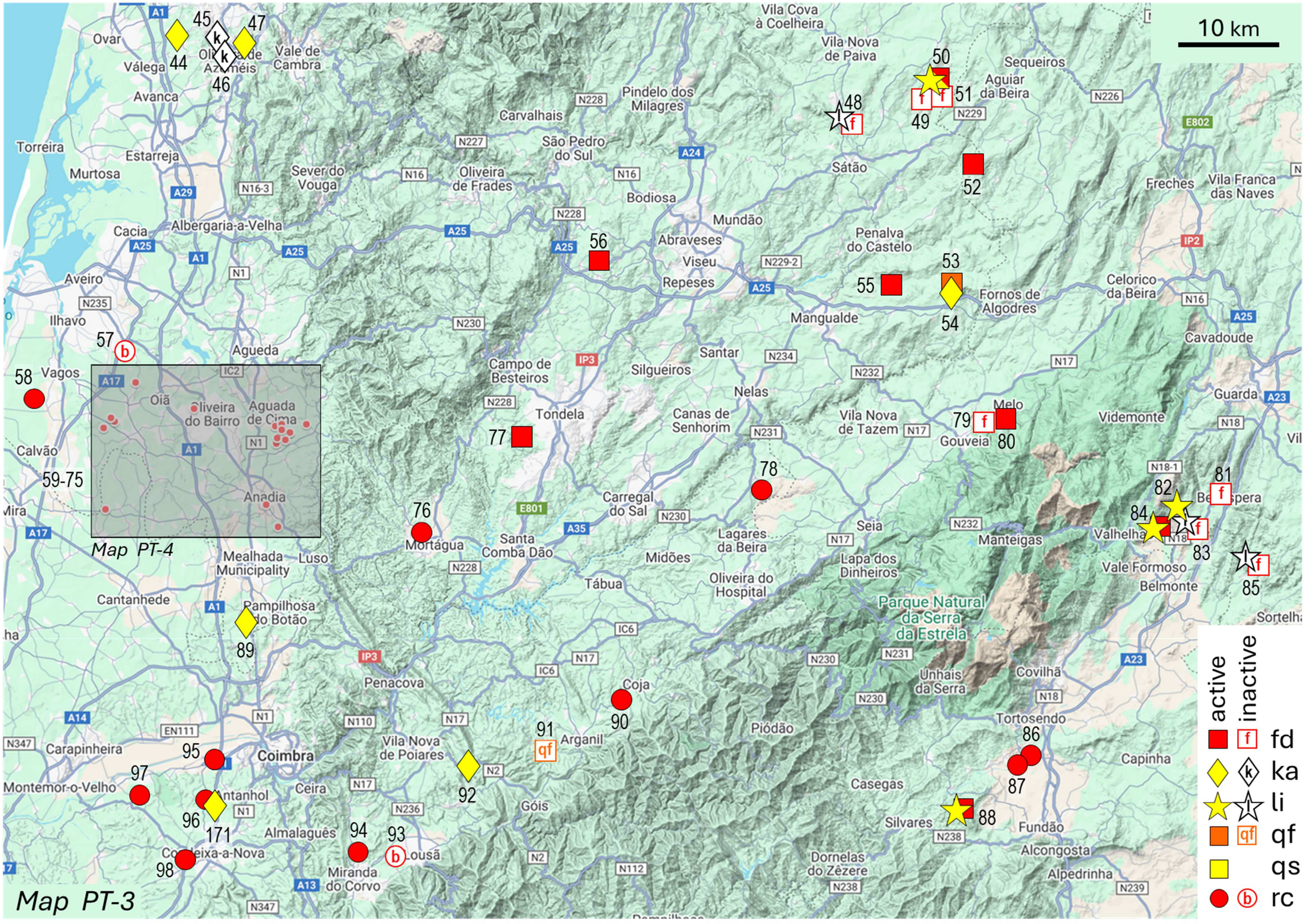
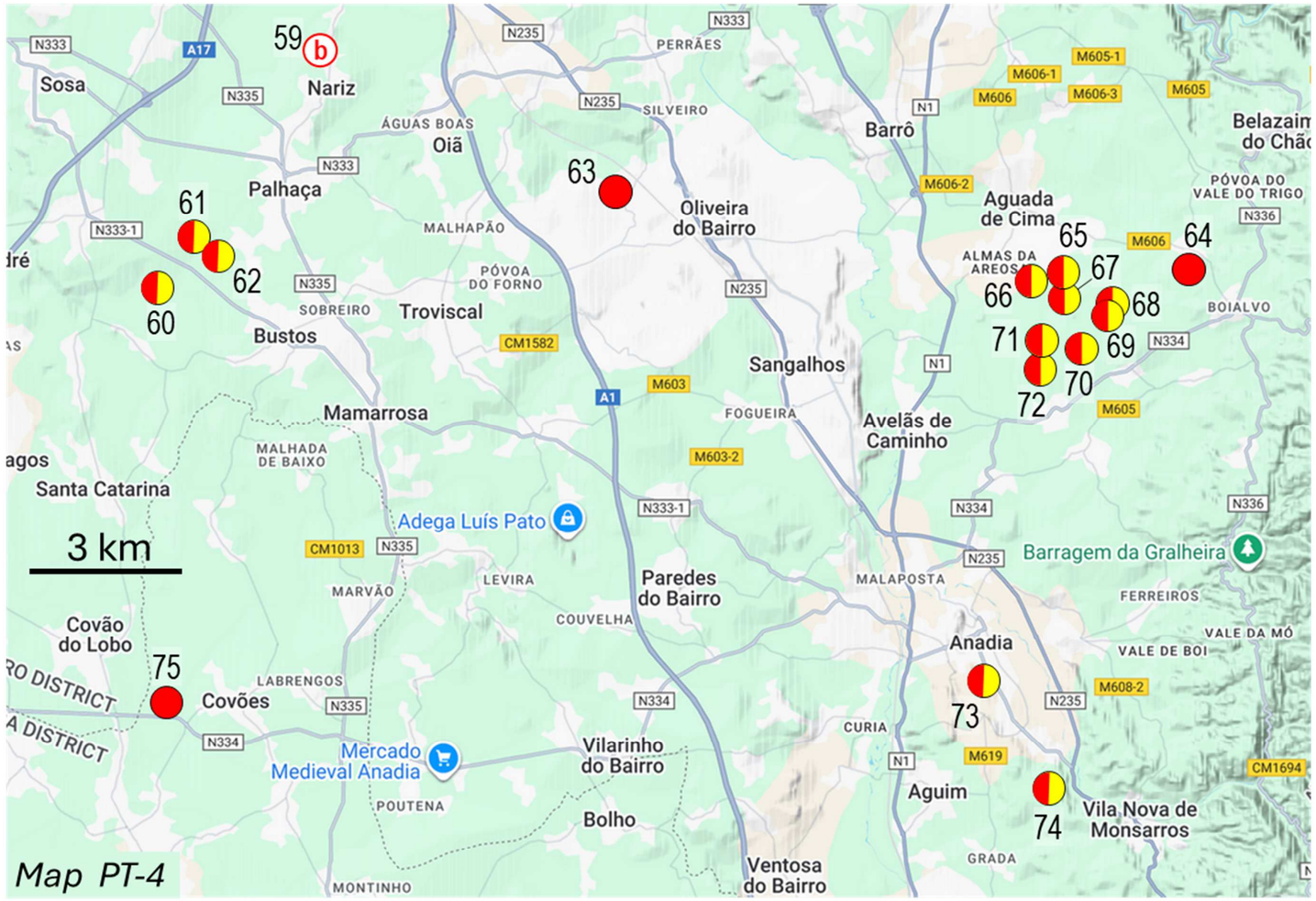
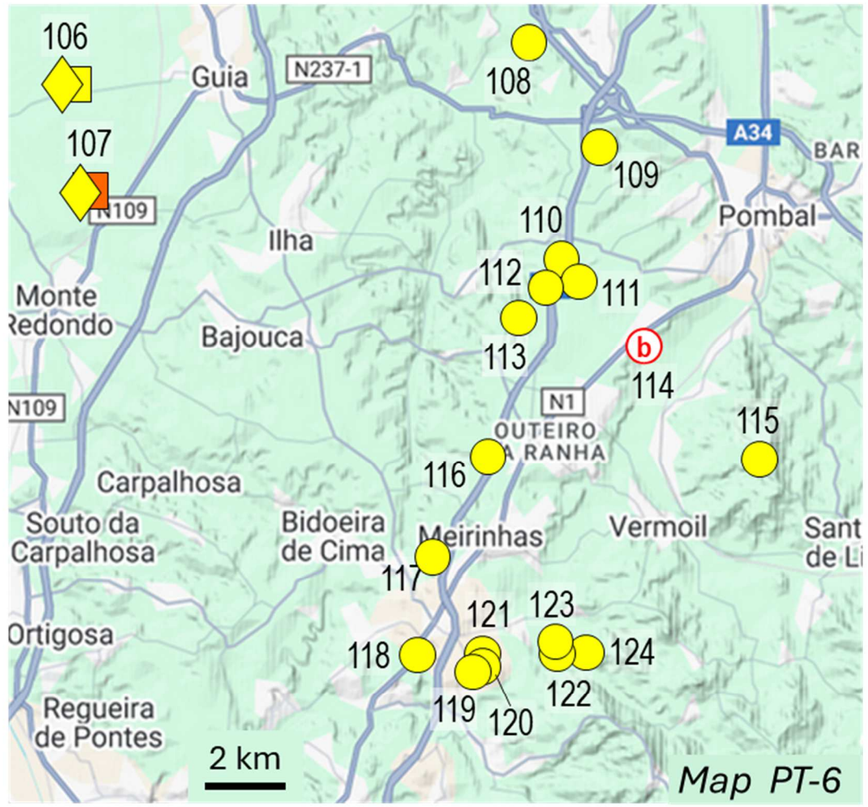

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Esposende
Barcelos
Braga
Póvoa de Lanhoso
Guimaraes
Vila Nova de Famalicão
Povoa de Varzim
Maia
Porto
Santa Maria da Feira
Reserva da Biosfera Transfronteiriza Gerês-Xurés
Parque Nacional Peneda-Gerês
Vilar de Perdizes
Boticas
Chaves
Vidago
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Trabazos
Parada
Izeda
Vimioso
Miranda do Douro
Macedo de Cavaleiros
Mirandela
Vila Real
Alijó
Carrazeda de Ansiães
Vila Flor
Alfândega da Fé
Mogadouro
Fermoselle
Parque Natural do Douro Internacional
Parque Natural de Arribes del Duero
Torre de Moncorvo
São João da Pesqueira
Peso da Régua
Tabuaço
Lamego
Vila Nova de Foz Côa
Carrazedo de Montenegro
Valpaços
Moimenta da Beira
Penedono
Mêda
Figueira
Hinojosa de Duero
A-75
N-525
A24
A3
A28
A11
A41
A32
E802
A4
20 km

Table PT-a: deposits of raw materials for the ceramic and glass industries in Portugal.

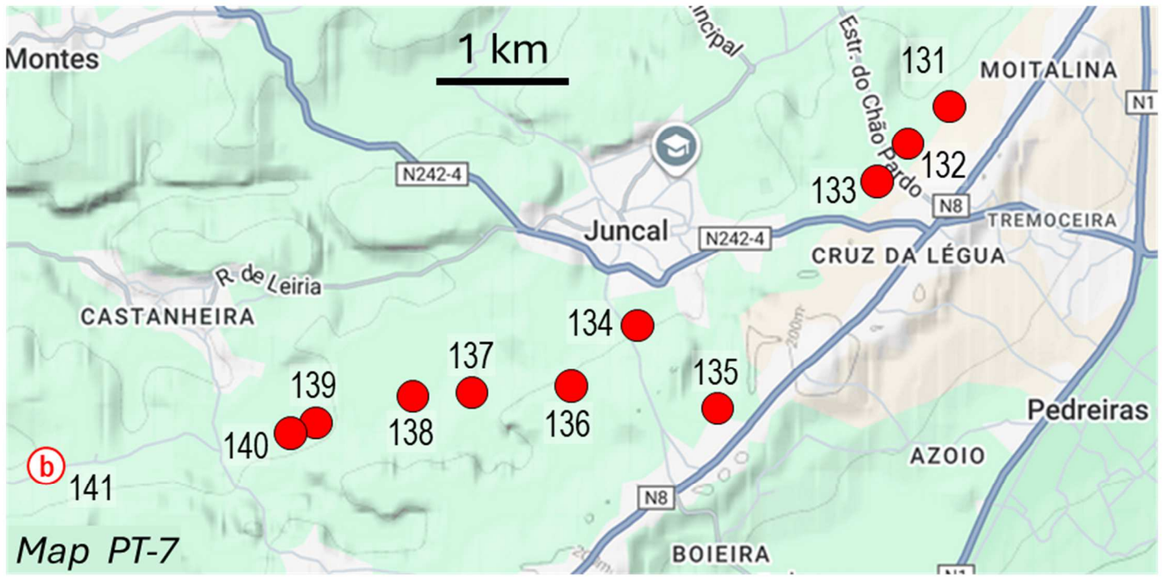
#	raw material	st	deposit	district
1	ka	A	Passos	Viana do Castelo
2	qs	A	Formigoso	Viana do Castelo
3	qz-fd	I	Pedra da Moura	Viana do Castelo
4	qz-fd	I	Mata da Galinheira	Viana do Castelo
5	ka	A	Alvarães e Valverde	Braga
6	rc	A	Santa Marinha	Braga
7	rc	A	S. Gens	Braga
8	rc	A	Bouça das Telheiras	Braga
9	rc	A	Papagaios	Braga
10	ka	A	Campados	Braga
11	ka	A	Quinta da Antónia (Barqueiros)	Braga
12	ka	I	Cumieira	Braga
13	ka	I	Carreiro	Braga
14	ka	I	Cunha	Porto
15	ka	A	Quelhas das Borralhas	Porto
16	ka	I	Crasto	Porto
17	ka	I	Matosinhos (Senhora da Hora)	Porto
18	ka	I	Telheira	Porto
19	ka	I	Castromil	Porto
20	qf	A	Seixoso	Porto
21	fd	I	Fraguiças	Porto
22	li	I	Lousas	Vila Real
23	fd-li	I	Seixigal	Vila Real
24	li	A	Barroso-Alvão	Vila Real
25	qz-fd	A	Portela	Vila Real
26	li	I	Alto Tâmega	Vila Real
27	li	I	Adagói	Vila Real
28	li	I	Sepeda (Romano)	Vila Real
29	fd	A	Outeiro dos Mouros	Vila Real
30	qz-fd	O	Serra do Ferro e da Olga	Chaves
31	rc	I	Sanoano	Vila Real
32	cr	O	Vale da Cega e Vila Verde	Bragança
33	cr	O	Cabeço de Medeiros	Bragança
34	tc	A	Sete Fontes	Bragança
35	tc	O	Pena Maquieira	Bragança
36	ba	O	Alto da Carroceira	Bragança
37	tc	A	Salselas	Bragança
38	tc	I	Prado	Bragança
39	tc	A	Vale da Porca	Bragança
40	tc	O	Talhinhas	Bragança
41	tc	O	Talhas	Bragança
42	rc	A	Barriais	Bragança
43	fd	A	Bajoca-Almendra	Guarda
44	ka	A	Vista Alegre	Aveiro
45	ka	I	Mouquinho e Cruzeiro	Aveiro
46	ka	A	Quinta do Covo	Aveiro
47	ka	I	Brejo e Abolembra	Aveiro
48	fd-li	I	Queiriga	Viseu
49	fd-li-qz	A	Nossa Senhora da Assunção	Vila Real
50	fd	I	Carrasqueira	Vila Real
51	fd	I	Pestarenga	Viseu
52	fd	A	Gralheira	Guarda
53	qf	A	Vila Seca	Viseu
54	ka	A	Tojal	Viseu
55	fd	A	Real	Viseu
56	fd	A	Salgueiral	Viseu
57	rc	I	Relvão	Aveiro
58	rc	A	Raso (Lugar da Quinta)	Aveiro
59	rc	I	Costeira	Aveiro
60	wc	A	Vale de Canas	Aveiro
61	wc	A	Barroquinha	Aveiro
62	wc	A	Barrinho	Aveiro
63	rc	A	Barrocos	Aveiro
64	rc	A	Bustelo	Aveiro
65	wc	A	Vale de Água	Aveiro
66	wc	A	Vale da Alagoa	Aveiro
67	wc	A	Vidoeiro	Aveiro
68	wc	A	Pinhal da Guarita	Aveiro
69	wc	A	Costa Ciranda	Aveiro
70	wc	A	Vale da Silveira	Aveiro
71	wc	A	Vale Salgueiro-Vale da Erba	Aveiro
72	wc	A	Uchas	Aveiro
73	wc	A	Serra da Póvoa	Aveiro
74	wc	A	Centeais	Aveiro
75	rc	A	Monte Arcado	Coimbra
76	rc	A	Valedo Sobral	Viseu
77	fd	A	Vale Grande	Viseu
78	rc	A	Seixo da Beira	Coimbra
79	fd	I	Seixinhos	Guarda
80	fd	A	Sangas-Saibro	Guarda
81	fd	I	Covão	Guarda
82	li	A	Alvarrões-Seixo Amarelo	Guarda
83	li-fd-qz	I	Gonçalo Sul	Guarda
84	fd-li	A	Castanho	Guarda
85	fd-li-qz	I	Fonte da Cal	Guarda
86	rc	A	Paia	Castelo Branco
87	rc	A	Dominguizo	Castelo Branco
88	fd-li	A	Cabeço da Argemela	Castelo Branco
89	ka	A	Quintas de Mala	Aveiro
90	rc	A	Machorro	Coimbra
91	qf	I	Casal do Frade	Coimbra
92	ka	A	Chão	Coimbra
93	rc	I	Portelas	Coimbra
94	rc	A	Pisca	Miranda do Corvo
95	rc	A	Barreiro das Malpicas	Coimbra
96	rc	A	Vale das Covadas	Coimbra

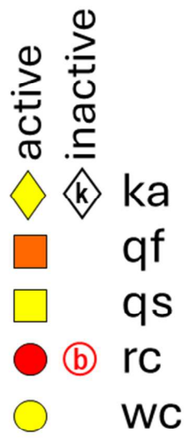

10 km
active
inactive
fd
ka
li
qf
qs
rc
Map PT-4
Map PT-3
Parque Natural da Serra da Estrela
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)

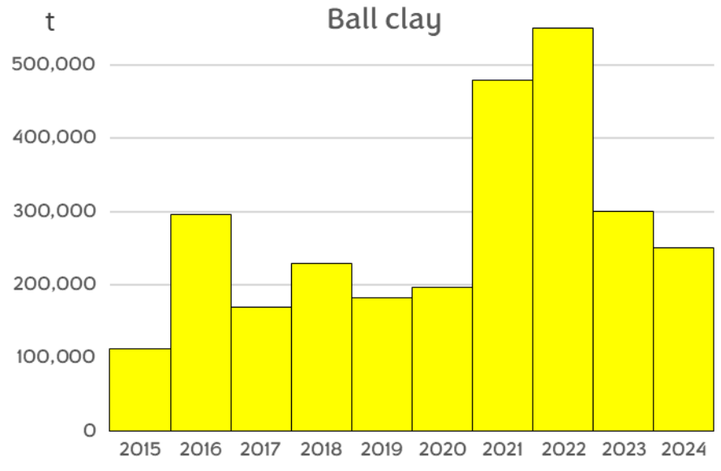


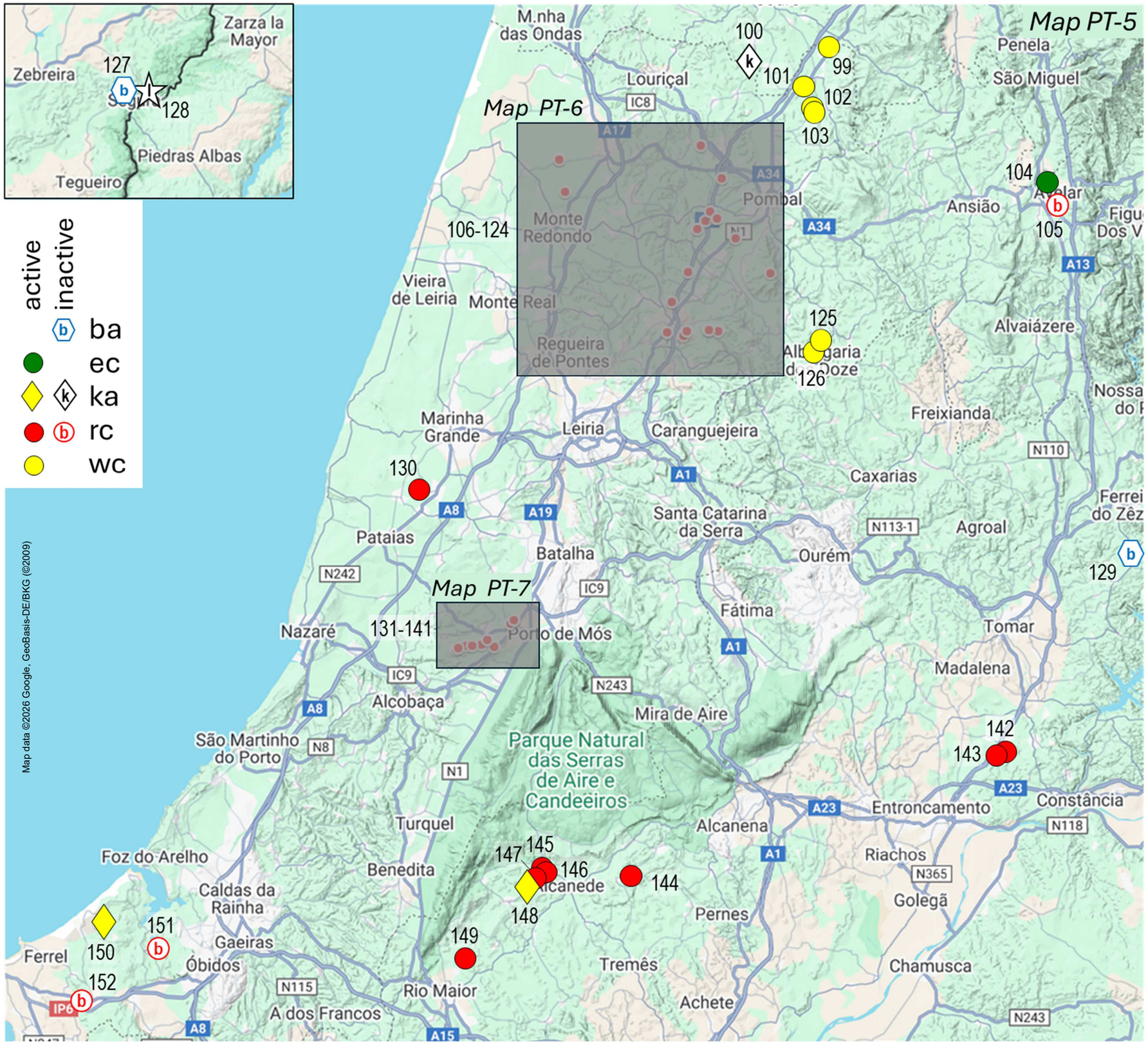


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Raw material

ba	barite
be	bentonite, smectitic clays
cr	chromite
ec	expanded clay
fd	feldspar
ka	kaolin
li	lithium minerals
qf	quartz-feldspathic sand
qs	silica sand
qz	quartz
rc	red clays
tc	talc, steatite
wc	white clays, ball clay
zr	zirconium minerals

Status of deposit

A	active mine
I	inactive mine
O	occurrence

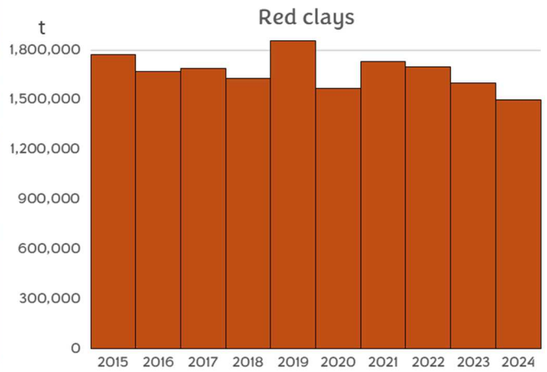
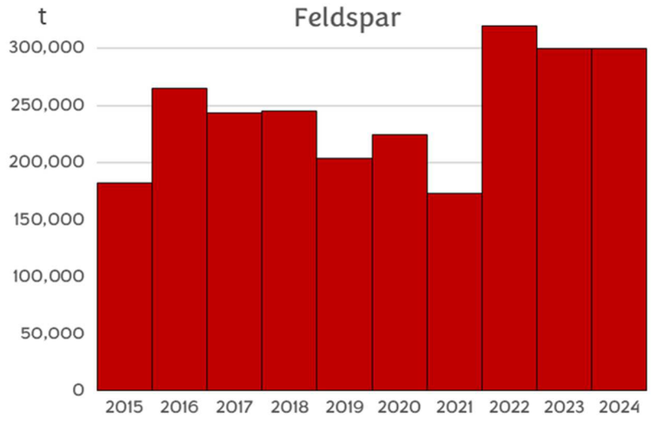
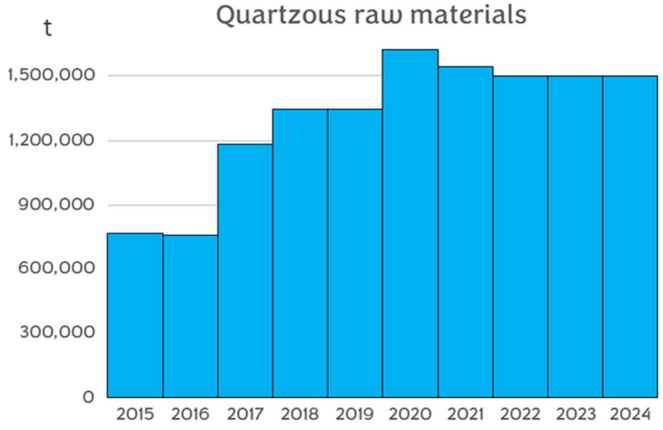
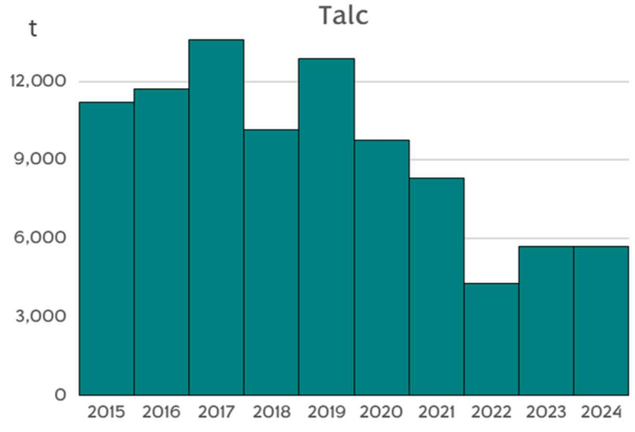


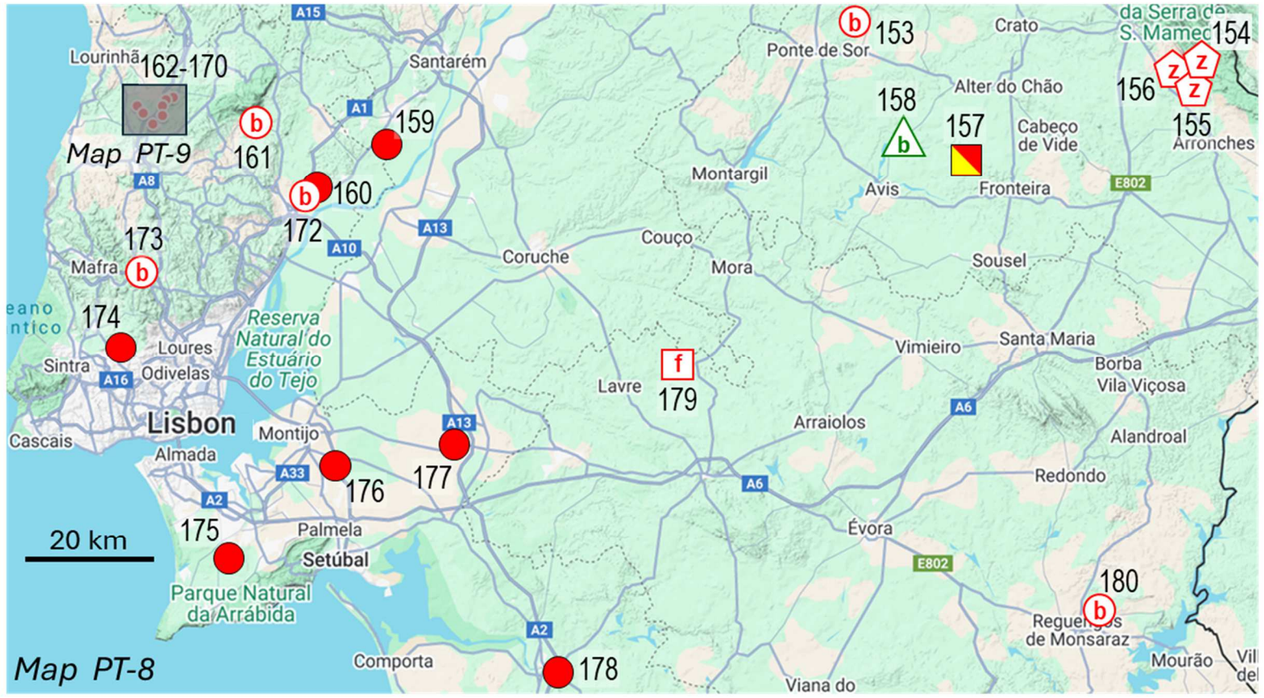
Table PT-b: deposits of raw materials for the ceramic and glass industries in Portugal.

#	raw material	st	deposit	district
97	rc	A	Traveiro	Coimbra
98	rc	A	Barrio	Coimbra
99	wc	A	Casconho	Leiria
100	ka	I	Quinta dos Netos	Coimbra
101	wc	A	Barreiras Altas	Leiria
102	wc	A	Vale Moleiro	Leiria
103	wc	A	Fontanheira	Leiria
104	ec	A	Avelar	Leiria
105	rc	I	Rascoia	Leiria
106	ka-qs	A	Nasce Água	Leiria
107	ka-qf	A	Monte Redondo	Leiria
108	wc	A	Assanha da Paz	Leiria
109	wc	A	Roussa	Leiria
110	wc	A	Roussa de Cima	Leiria
111	wc	A	Vale de Coimbra	Leiria
112	wc	A	Crespos	Leiria
113	wc	A	Mendes	Leiria
114	rc	I	Travasso	Leiria
115	wc	A	Madorna-Andrés	Leiria
116	wc	A	Outeiro da Ranha	Leiria
117	wc	A	Vale Galego	Leiria
118	wc	A	Paialvo	Leiria
119	wc	A	Barro Branco 6	Leiria
120	wc	A	Cerro-Barracão	Leiria
121	wc	A	Barro Branco 8	Leiria
122	wc	A	Igreja Velha	Leiria
123	wc	A	Pinheirinhos	Leiria
124	wc	A	Crasto	Leiria
125	wc	A	Vale de André	Leiria
126	wc	A	Vale de Nelas	Leiria
127	ba	O	Segura W	Castelo Branco
128	li	O	Segura E	Castelo Branco
129	ba	O	Clérigos	Setubal
130	rc	A	Rocadas	Leiria
131	rc	A	Moitalina	Leiria
132	rc	A	Lagoa Seca	Leiria
133	rc	A	Lagos 1-2	Leiria
134	rc	A	Relvinha	Leiria
135	rc	A	Barreira da Gracinda	Leiria
136	rc	A	Chocalhão II	Leiria
137	rc	A	Ribeira do Grou 1	Leiria
138	rc	A	Ribeira do Grou 2	Leiria
139	rc	A	Senhora da Luz	Leiria
140	rc	A	Carregueira N1	Leiria
141	rc	I	Vale do Amieiro	Leiria
142	rc	A	Asseiceira 1-2	Santarém
143	rc	A	Tojeiras	Santarem
144	rc	A	Abra	Santarém
145	rc	A	Figueiras Vastas	Santarém
146	rc	A	Mosteiros	Santarém
147	rc	A	Xartinho	Santarém
148	ka	A	Mosteiros	Santarem
149	rc	A	Vale Fernando	Santarém
150	ka	A	Casal dos Braçais	Leiria
151	rc	I	Casais do Rio	Leiria
152	rc	I	Pais Gatinhos	Leiria
153	rc	I	Condado da Tor	Portalegre
154	zr	I	Vale de Cavalos-Esperança	Portalegre
155	zr	O	Tapada do Manguês	Portalegre
156	zr	O	Condessinha	Portalegre
157	qz-fd	I	Fronteira	Portalegre
158	be	O	Benavila	Portalegre
159	rc	A	Cruz do Campo	Santarém
160	rc	A	Vila Nova da Rainha	Lisboa
161	rc	I	Cabanas de Chãos	Lisboa
162	rc	A	Quinta da Bogalheira 2	Lisboa
163	rc	A	Quinta da Bogalheira 1	Lisboa
164	rc	A	Quinta da Bogalheira 3	Lisboa
165	rc	A	Quinta da Bugalheira-Sul	Lisboa
166	rc	A	Barreira Grande	Lisboa
167	rc	I	Valeira	Lisboa
168	rc	A	Ramalhal 3	Lisboa
169	rc	A	Ramalhal 2	Lisboa
170	rc	A	Ramalhal 1	Lisboa
171	ka	A	Alto da Serra Norte	Coimbra
172	rc	I	Arneiro	Lisboa
173	rc	I	Matoutinho	Lisboa
174	rc	A	Feteira III	Lisboa
175	rc	A	Da Ribeira	Setúbal
176	rc	A	Charnequinha	Setúbal
177	rc	A	Pegões Velhos	Setúbal
178	rc	A	Herdade da Barrosinha	Setúbal
179	fd	I	Pedras Pintas	Evora
180	rc	I	Faias	Évora
181	qz-fd	O	São Matias	Beja
182	rc	I	Escavada	Setúbal
183	rc	I	São Teotónio	Beja
184	rc	A	Barreira dos Vales	Faro
185	rc	A	Vales N 4	Faro
186	rc	A	Vales N 5	Faro
187	rc	I	Mem Moniz	Faro
188	rc	A	Montes e Lagares	Faro
189	rc	O	Pias-Barrancos	Beja
190	zr	O	Serra do Monchique	Faro







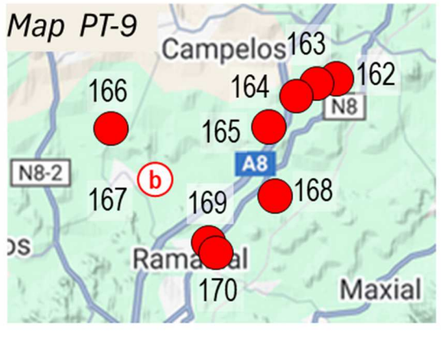




active inactive

- ba
- be
- cr
- ec
- fd
- ka
- li
- qf
- qs
- rc
- tc
- wc
- zr

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Romania

Romanian production of ceramic and glass raw materials includes synthetic alumina and soda ash (sixth largest supplier of the Euro-Mediterranean area), plastic and refractory white clays, quartzous materials, bentonite and feldspar, plus unspecified quantities of kaolin, wollastonite, bauxite, and red clays. There are also resources, no longer exploited, of talc, magnesite, and barite, as well as occurrences of chromite and celestine [1-4].

Alumina is produced (360,000 tpa, mean 2015-2024) at the Tulcea plant on the Danube Delta [5].

Soda ash was manufactured at a rate of over 500,000 tpa until 2020, when the Ramnicu Valcea plant was shut down for a period [5].

Kaolin: the Aghireșu deposit, which exploits kaolinized arkosic sands of Oligocene-Miocene age, appears to have ceased activity in 2020 (~30,000 tpa until 2017) [6], although the reserves are around 65 million tons, but located at depth [7]. Other deposits, derived from kaolinization of Neogene volcanics at Parva and Cornaita, are inactive [8].

Ball clay deposits are located in Cretaceous lacustrine sediments near Medgidia (Dobrogea). There are two mines in operation (Cuza Vodă and Țibrinu) with production that has increased from 10,000 to over 700,000 tpa in the last decade; reserves are around 6 million tons [7,9]. **Refractory clays**: numerous deposits are known in western Romania, with variable alumina and iron contents, which could provide both fireclay and ball clay [7,10-13]. Currently, some mines are active near Șuncuiuș (reserves of approximately 98 million tons) as well as in Boteşti and Brănești, where the clays have illitic-kaolinitic composition with abundant smectite. Other clay deposits, mostly fireclays, are reported in the Transylvanian Alps, within Lower Jurassic lake successions, in association with coal (e.g. Anina), and in Cenozoic sediments in the Apuseni Mountains, e.g. Leștioara (Hălmagiu).

Bentonite is mined in three deposits, with a total production of 43,000 tpa, as mean of 2015-2024 [6]. The Orașu-Nou one exploits altered rhyodacitic tuffs of Miocene age [14].

Red clays: about fifteen quarries are in operation, distributed throughout the country, to supply the clay bricks and roof tiles industry. The deposits exploit a range of resources: from Quaternary alluvial sediments of Wallachia and the Pannonian Basin to Pliocene-Miocene marine sediments [11-13,15]. Reserves are around 650 million tons [16].

Feldspar is extracted from granitic pegmatites (several known sites, of which very few are active). The deposits are small and distributed between the Transylvanian Alps and the Apuseni mountains [17-19] where mixed sodium-potassium feldspathic fluxes (16,000 tpa, mean 2015-2024) are extracted [6]. Reserves are 22 million tons [16].

Lithium minerals (mainly spodumene) are present in some pegmatites, particularly in the Cibin Mountains (Southern Carpathians) but there is no data on the consistency of the deposits [19-23].

Industrial silica is recovered (566,000 tpa, on average) from a range of geological sources: quartzites (Tulcea), hydrothermal veins (Mehedinți), pegmatites (Hunedoara), and in perspective also from silica sand (Cluj Napoca) [24].

Wollastonite is mined in Băița-Plai in the Apuseni Mountains, from a skarn deposit [25] of which neither production nor reserves are known.

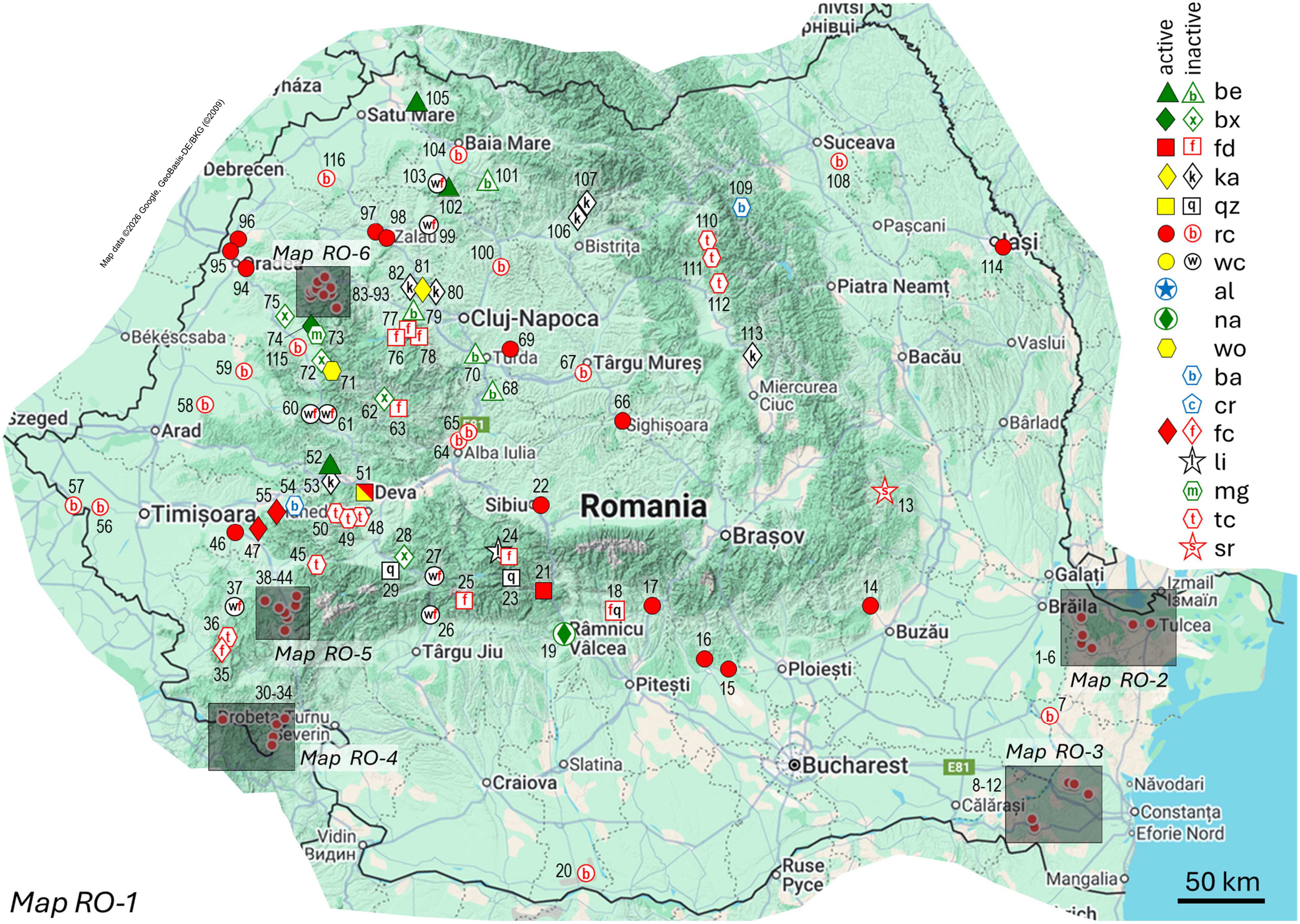
Talc was extracted until 2013 (peak production of 65,000 tpa in 1986-1987) from various deposits in the Poiana Ruscă mountains (Cerișor, etc.) and in the province of Caraș-Severin (Marga, etc.) with reserves around 1.8 million tons [7]; mineralizations consist of talc-carbonate lenses formed by hydrothermal and metasomatic action on dolomitic rocks [26].

Bauxite: karstic deposits are known in Jurassic and Cretaceous formations of the Apuseni Mountains [27,28] of which a couple seem in operation, although Romanian production (peaking at 435,000 tons in 1988) was abandoned way back in 1999 [6].

Barite was mined from deposits in the Carpathians and Dobrogea [1-3] where the peak production was of 75,000 tpa in 1984-1988 and the last activity ceased in 2008 [6]. In Vrancea, a **celestine** occurrence within a Miocene evaporitic formation is known [29]. **Magnesite** (Apuseni Mountains) and **chromite** (Mehedinți) mineralizations in ophiolitic complexes, currently unexploited, have also been reported [30].

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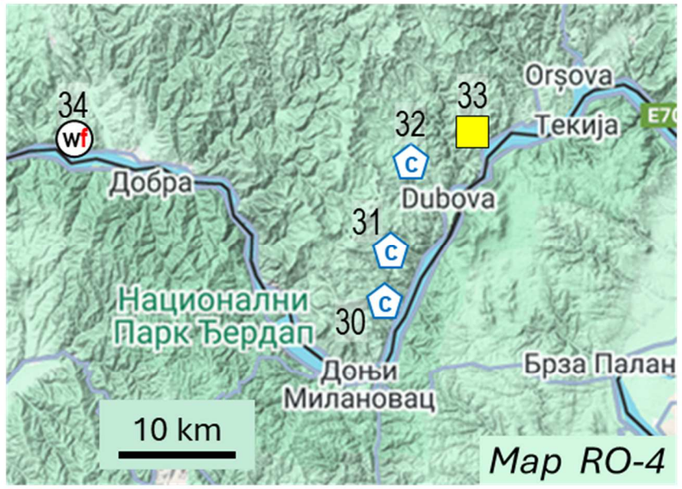
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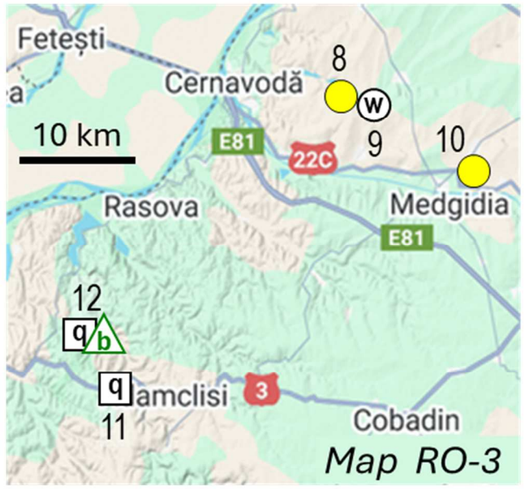

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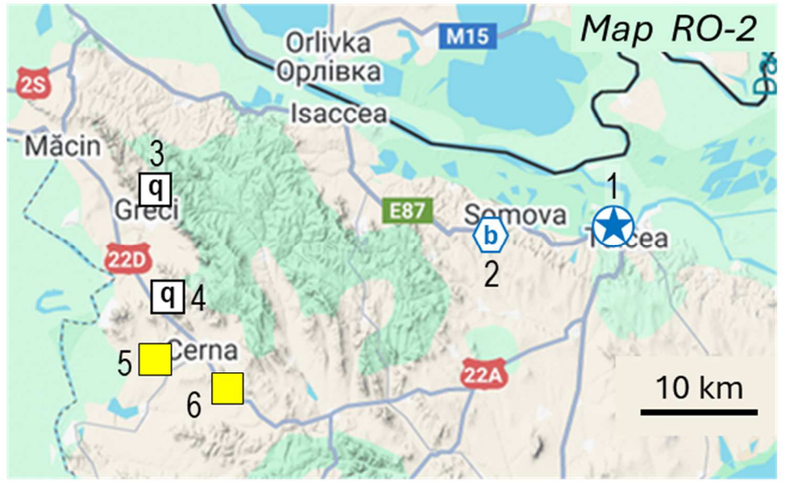
Romania

Table RO-a: deposits of raw materials for the ceramic and glass industries in Romania.

#	r.m.	st	deposit	county
1	al	A	Tulcea	Tulcea
2	ba	I	Cortelu-Somova	Tulcea
3	qzt	I	Greci	Galați
4	qzt	I	Priopcea	Tulcea
5	qzt	A	Piatra Roșie	Tulcea
6	qzt	A	Dealul Cernei	Tulcea
7	rc	O	Hârșova	Constanța
8	wc	A	Țibrinu	Constanța
9	wc	I	Defcea	Constanța
10	wc	A	Cuza Vodă	Constanța
11	qs	I	Adamclisi	Constanța
12	qs-be	I	Adancata	Constanța
13	sr	O	Valea Sării-Andreiașu	Vrancea
14	rc	A	Sătuc	Berca
15	rc	A	Gura Ocnitei	Târgoviște
16	rc	A	Doicești	Târgoviște
17	rc	A	Campulung	Arges
18	qz-fd	O	Valea Valsanului	Hunedoara
19	na	A	Ramnicu Valcea	Vâlcea
20	br	I	Vișina	Olt
21	fd	A	Vasilatu-Brezoi	Vâlcea
22	rc	A	Gușterița	Sibiu
23	qz	O	Voinești̦a	Hunedoara
24	fd-li	I	Conțu-Negovanu	Caraș-Severin
25	fd	O	Novaci	Gorj
26	wc-fc	I	Viezuroi	Gorj
27	wc-fc	I	Petroșani	Hunedoara
28	bx	I	Ohaba-Ponor	Hunedoara
29	qz	O	Hobita	Hunedoara
30	cr	O	Tișoviț̦a	Mehedinți
31	cr	O	Ciucaru Mare-Mraconia	Mehedinți
32	cr	O	Plaviseviț̦a	Mehedinți
33	qz	A	Ogradena-Orșova	Mehedinți
34	wc-fc	I	Sicheviț̦a	Caraș-Severin
35	fc	I	Anina	Caraș-Severin
36	tc	I	Parvova	Anina
37	wc-fc	I	Doman	Caraș-Severin
38	fd	A	Teregova	Caraș-Severin
39	fd	I	Armeniș	Caraș-Severin
40	fd	O	Sat Batran	Caraș-Severin
41	fd	O	Slatina-Timiș	Caraș-Severin
42	qz	O	Ilova	Caraș-Severin
43	qz	O	Buchin-Nemanu	Caraș-Severin
44	qz	O	Varciorova	Caraș-Severin
45	tc	I	Marga-Vojslova	Caraș-Severin
46	rc	A	Lugoj	Timiș
47	fc	A	Botești	Timiș
48	tc	I	Govajdia	Poiana Ruscă
49	tc	I	Cerișor	Poiana Ruscă
50	tc	I	Lelese	Poiana Ruscă
51	qz-fd	A	Cozia	Hunedoara
52	be	A	Gurasada	Hunedoara
53	ka	I	Mihăiești-Dealul Varului	Hunedoara
54	ba	I	Românești	Timiș
55	fc	A	Brănești	Timiș
56	rc	I	Cărpiniș	Timiș
57	rc	I	Jimbolia	Timiș
58	rc	I	Pancota	Arad
59	rc	I	Beliu	Arad
60	wc-fc	I	Talagiu	Arad
61	wc-fc	I	Leștioara-Hălmagiu	Arad
62	bx	I	Sohodol-Campeni	Alba Iulia
63	fd	I	Roșia Montană	Alba Iulia
64	br	I	Sântimbru	Alba Iulia
65	br	I	Bărăbanț	Alba Iulia
66	rc	A	Viilor	Sighisoara
67	br	I	Târgu Mureș	Târgu Mureș
68	be	I	Banta-Ocna Mures	Cluj Napoca
69	rc	A	Bolduț	Cluj Napoca
70	be	I	Săndulești	Cluj Napoca
71	wo	A	Băița-Plai	Bihor
72	bx	O	Măgura	Bihor
73	bx	A	Meziad	Bihor
74	mg	I	Budureasa	Bihor
75	bx	O	Cornet	Bihor
76	fd	I	Cornu	Cluj Napoca
77	fd	I	Valea Bedeciului	Cluj Napoca
78	fd	I	Râșca-Muntele Rece	Cluj Napoca
79	be	O	Căpușu Mic	Cluj Napoca
80	ka	I	Cornești	Cluj Napoca
81	ka	A	Aghireș	Salaj
82	ka	I	Aghireșu-Storari	Cluj Napoca
83	bx	A	Remeți	Bihor
84	wc-fc	A	Remeți	Bihor
85	bx	O	Bratca	Bihor
86	wc-fc	A	Bratca-Lorau	Bihor
87	wc-fc	O	Damiș-Rosia-Albioara	Bihor
88	wc-fc	A	Carmazan	Bihor
89	wc-fc	A	Mărcești	Bihor
90	wc-fc	A	Runcului	Bihor
91	wc-fc	A	Șuncuiuș	Bihor
92	wc-fc	O	Vadu Crișului	Bihor
93	wc-fc	O	Valea Neagra de Cris	Bihor
94	rc	A	Calea Clujului	Oradea
95	rc	A	Episcopia Bihor	Oradea
96	rc	A	Biharia	Oradea
97	rc	A	Recea	Zalău
98	rc	I	Zalău	Zalău
99	wc-fc	O	Surduc	Salaj
100	br	I	Gherla	Cluj Napoca
101	be	I	Răzoare	Maramureș
102	be	A	Valea Chioarului	Maramureș
103	wc-fc	O	Stejera	Maramureș
104	br	I	Satu Nou de Jos	Maramureș
105	be	A	Orașu-Nou	Satu Mare
106	ka	O	Parva	Bistrița-Năsăud
107	ka	O	Cornaita	Bistrița-Năsăud
108	br	I	Udești	Suceava
109	ba	I	Ostra-Alanis	Suceava
110	tc	O	Drăgoiasa	Suceava
111	tc	O	Bilbor	Hargita
112	tc	O	Borsec	Hargita
113	ka	I	Sandominic	Hargita
114	rc	A	Vlădiceni	Iași
115	br	I	Beiuș	Bihor
116	br	I	Tășnad	Satu Mare

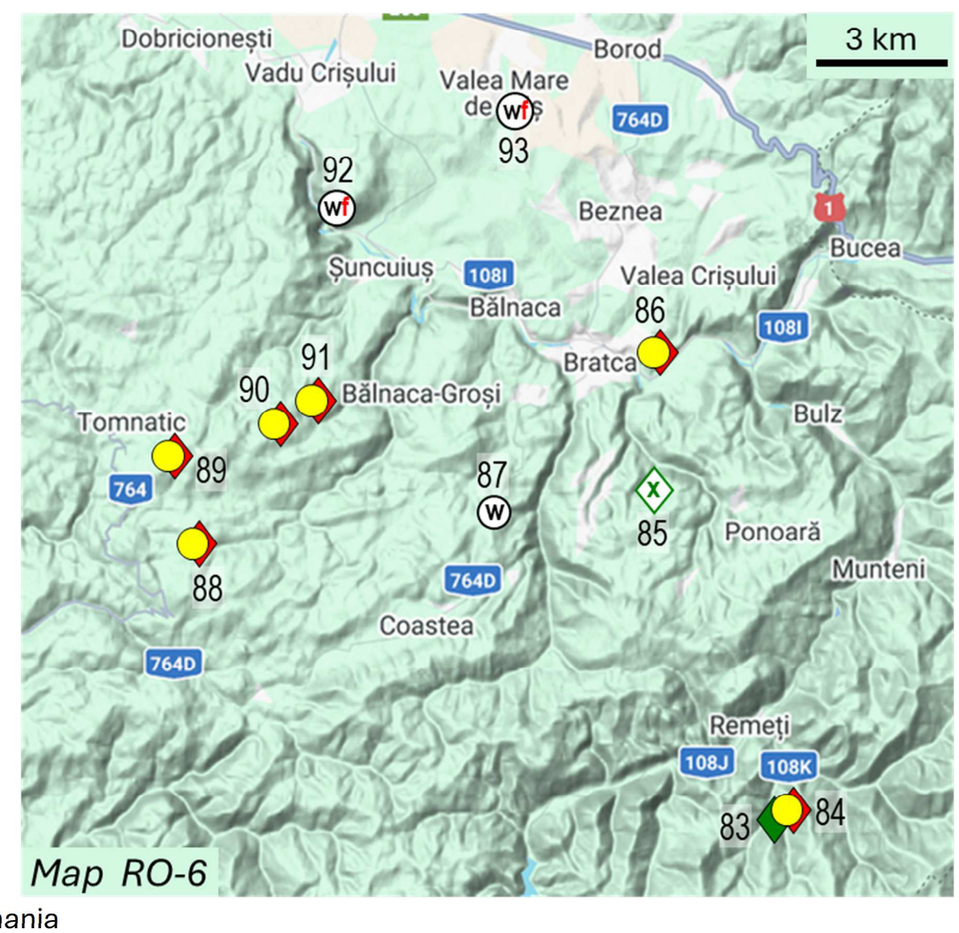


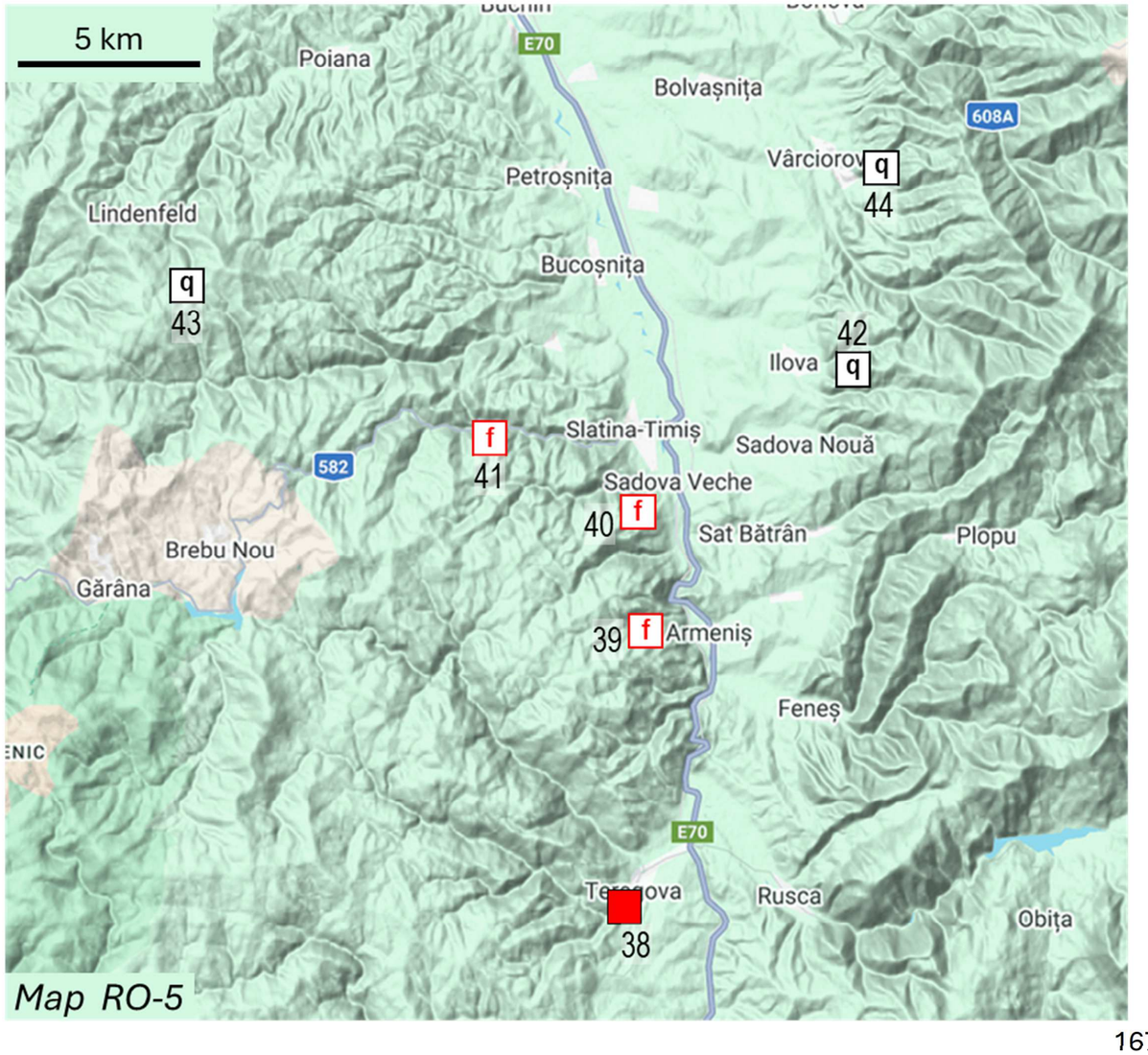




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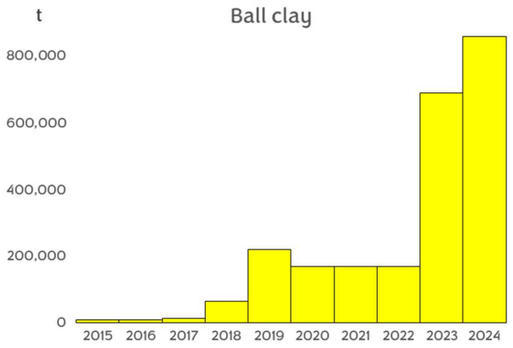


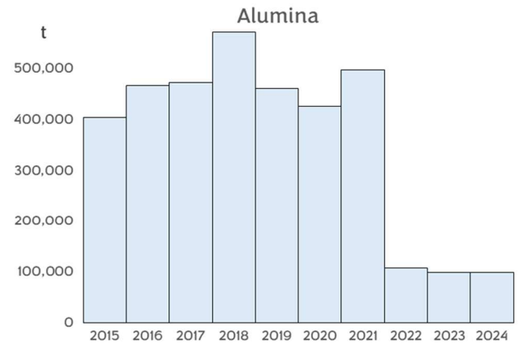
Raw material

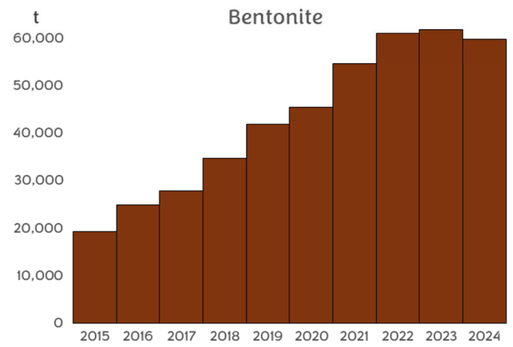
al	alumina (artificial)
ba	barite
be	bentonite
bx	bauxite
cr	chromite
fc	fireclay, refractory clays
fd	feldspar
ka	kaolin
li	lithium minerals
mg	magnesite
na	soda ash
ns	nepheline phonolite
qs	silica sand
qz	quartz
rc	red clays
sr	celestine
tc	talc
wc	white clays
wo	wollastonite

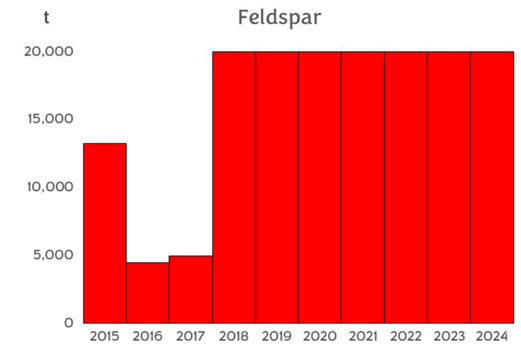
Status of deposit

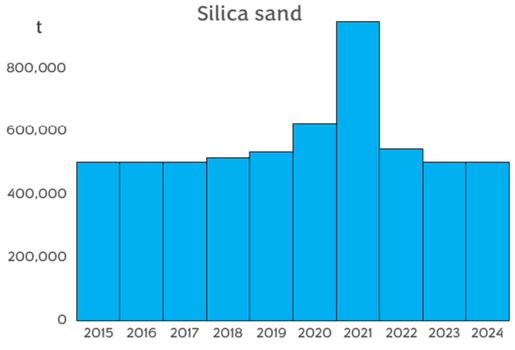
A	active mine
I	inactive mine
O	occurrence

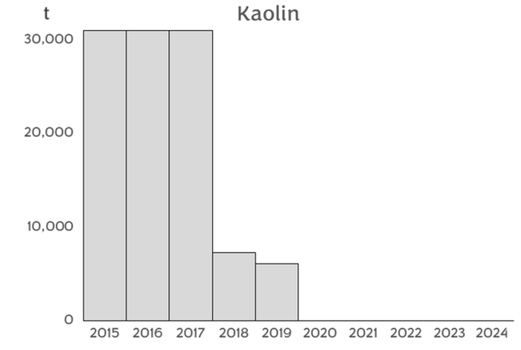














Medgidia, ball clay mine





Aghireș, kaolin mine

Courtesy Valentina Cetean

Russia (European)

Russia is a major producer of glass and ceramic raw materials, even though not always can be reliably identified the fraction coming from the European part of the country. Russian industry is likely the leading supplier of soda ash and alumina-bauxite, as well as the second larger producer of magnesite and zirconium minerals in the Euro-Mediterranean area. In addition, Russia is among the top five dealers of bentonite, chromite, kaolin, silica sand, zeolites, and feldspar. Moreover, various clay materials are extracted, but their amounts are not disclosed. Deposits of lithium minerals, barite, kyanite, olivine and pyrophyllite are also reported, although still under exploration or development, while talc mining has recently ceased [1-7].

Magnesite: giant deposits (reserves around 2 billion tonnes) occur in Late Proterozoic strata of the Southern Urals, mostly bound to the Satka Formation, represented mainly by shallow-marine limestones and dolostones [8,9]. Such stratabound deposits pertain to "Veitsch-type" magnesites of metasomatic origin [10]. Russian production is 1,265,000 tpa, mean 2015-2024 [2].

Zirconium minerals are recovered from the Kovdor massif, a Devonian igneous complex intruded into granites and gneisses of the Fennoscandian Shield of Archean age [3,11] Three economically extractable minerals (magnetite-apatite-baddeleyite) show a zonal distribution within a carbonatite-phoscorite pipe [11]. The baddeleyite production is on average 6,700 tpa [1].

Kaolin resources in the European Russia are concentrated in Southern Urals, where several occurrences of kaolinite-rich raw materials are claimed [6,7,12,13]. Eluvial deposits (mainly originated by weathering of granitoids) are being mined in Chelyabinsk [14,15] and Orenburg oblasts [16-18] with an average output of 2,128,000 tpa of raw kaolin [2]. Further deposits in the Sverdlovsk oblast attracted attention but are not currently exploited [19-21]. **Refractory clays**, often with rather high iron amount, are quarried along the Central Russian Uplands, particularly in the Novgorod and Tula-Ryazan-Voronezh poles [7,22-26] as well as in Southern Urals [7,22]. **Ball clays** are mainly extracted from three mining districts in the Sverdlovsk-Orenburg-Chelyabinsk area [7,27,28]. These sedimentary deposits of "white" clays occur within Cretaceous continental sequences (from lacustrine-palustrine to deltaic-lagoonal facies) inherited from primary Devonian kaolinized sources [25,26]. **Pyrophyllite** deposits are reported in Bashkortostan, ranging from quartz-pyrophyllitic schists to pyrophyllite-diaspore-sericite assemblages [29].

Bentonite deposits are known within Jurassic to Pliocene sedimentary successions of the Volga-Ural anticline, the Central Russian Upland, and the South Ural Uplift [30]. Bentonite is currently extracted (305,000 tpa, mean 2015-2024) in Tatarstan [1] where most of Russian reserves (170 million tonnes) are concentrated [30].

Feldspar: the main source is given by granitic pegmatites, mostly found in the Proterozoic shield of Karelia, where the Lupikko and Blinkova Varaka deposits are active [3,31-34]. Further aplite-pegmatite deposits are reported in the Archean shield of the Kola Peninsula [3,35] and in the Southern Urals, where the Malyshev deposit is in operation [28,36,37]. Russian production of feldspar is 458,000 tpa on average [2]. Other sources of feldspathic materials are metarhyolites of the Kostomuksha terrain [38,39] and nepheline syenite in the Khibina pluton [40,41], both in the Kola Peninsula. Nepheline-bearing rocks are exploited also in the Il'meno-Vishnevogorsky miaskite-carbonatite complex in Southeastern Urals [42,43]. However, the entire production of nepheline syenite is addressed to the aluminium metallurgical sector (1,084,000 tpa of nepheline concentrates) and is not used for ceramics.

Alumina is produced by four plants in the Leningrad and Sverdlovsk oblasts, which provide most of the average Russian output of 3 million tonnes [1]. **Bauxite**: a good part of the 6.5 million tpa extracted in Russia comes from three mining districts in the European part of the country [44], located in the Middle Timan (Komi territory), Severouralsk (Sverdlovsk) and Severo-Onezh (Arkhangelsk), which exploit Paleozoic karst bauxites [45-47].

Soda ash is manufactured (3,382,000 tpa) in four plants in Saint-Petersburg, Perm and Bashkortostan territories [1]. **Quartzous materials** are obtained (around 7 million tpa) by a range of sources, including quartz and quartz-feldspathic sands [48-51] as well as hydrothermal quartz veins [3]. **Red clays** are quarried mainly in the Central Russian Upland and the Volga-Ural Basin. Little information is accessible on the origin of Russian brick clay deposits, which have been investigated mainly from a technological perspective [52-61].

Zeolites are mined (35,000 tpa, mean of the last decade) in the Central Russian Upland, from a Cretaceous volcano-sedimentary deposit containing around 30% clinoptilolite [62]. **Talc** has been excavated until 2022, at the rate of 28,000 tpa, in the Southern Urals [2]. Occurrences of talc are reported in the Proterozoic Karelian Shield [3]. **Chromite** ore bodies are localized in a gabbro-ultrabasic massif pertaining to the Saranovsky stratiform complex [63] where an active mine ensures part of the Russian production (approximately 550,000 tpa) of chromite ore [1]. Other chromitites are reported in Northern Urals [45]. **Olivine** deposits, not yet exploited, are known in the Fennoscandian shield, both in the Kola and Karelia regions [3].

Lithium minerals occur within the Kola rare-metal pegmatite belt, extending for more than 300 km in the northeastern part of the Fennoscandian shield. Six deposits of granitic pegmatite dikes with rare-metals (Li, Be, Ta, Nb, Cs) are being explored [3,64]. **Barite** occurrences are reported in Northern Russia [3,45,65].

Kyanite-sillimanite-andalusite deposits have been identified both in the Fennoscandian Shield [3,66,67] and in South Urals [68]. Giant kyanite deposits have been recognized in the Kola Peninsula, along a WNW-ESE oriented belt, which includes high-alumina schists of the Archean metamorphosed Keivy Group [66]. In Karelia, the Hizovaara kyanite field was originated from high-pressure metamorphism that affected volcanics and greywackes [67]. Deposits in southern Urals consist of kyanite quartzite lenses [68].

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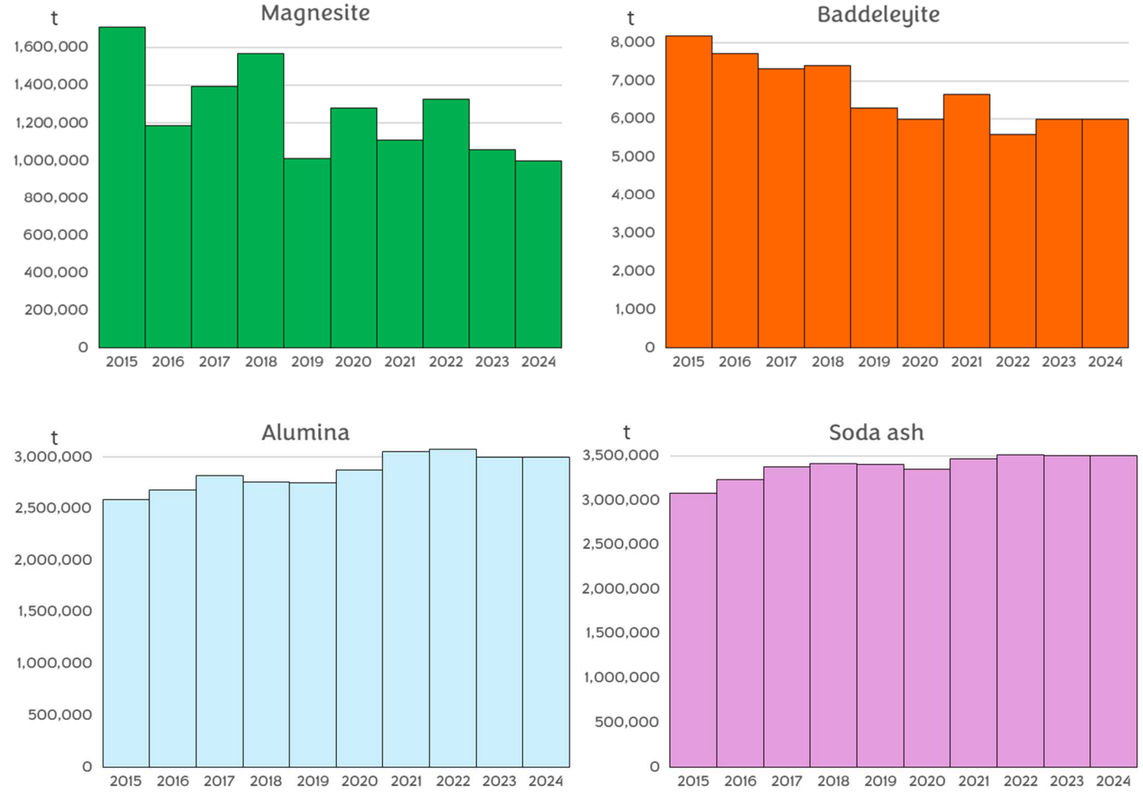
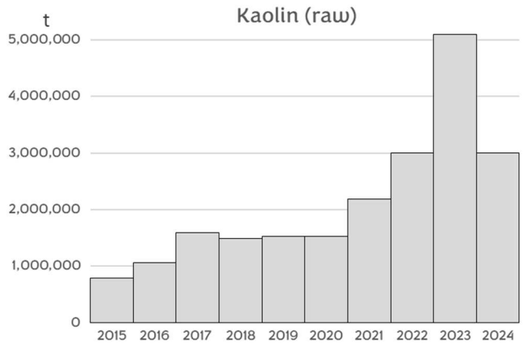
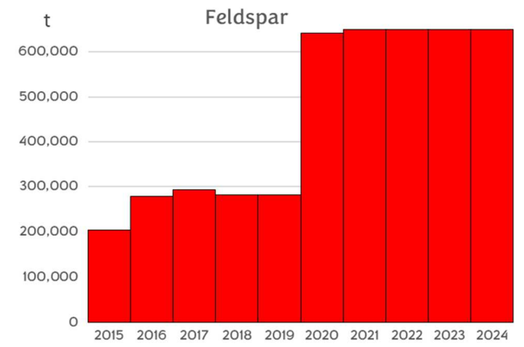
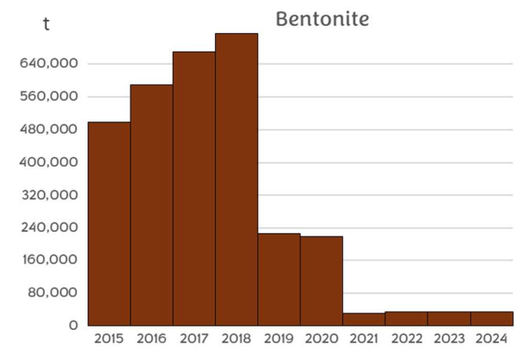


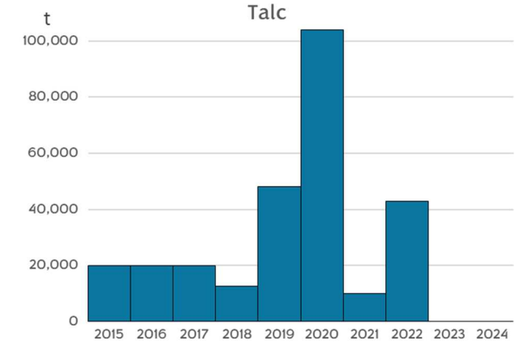
Table RU-a: deposits of raw materials for the ceramic and glass industries in Russia (European).

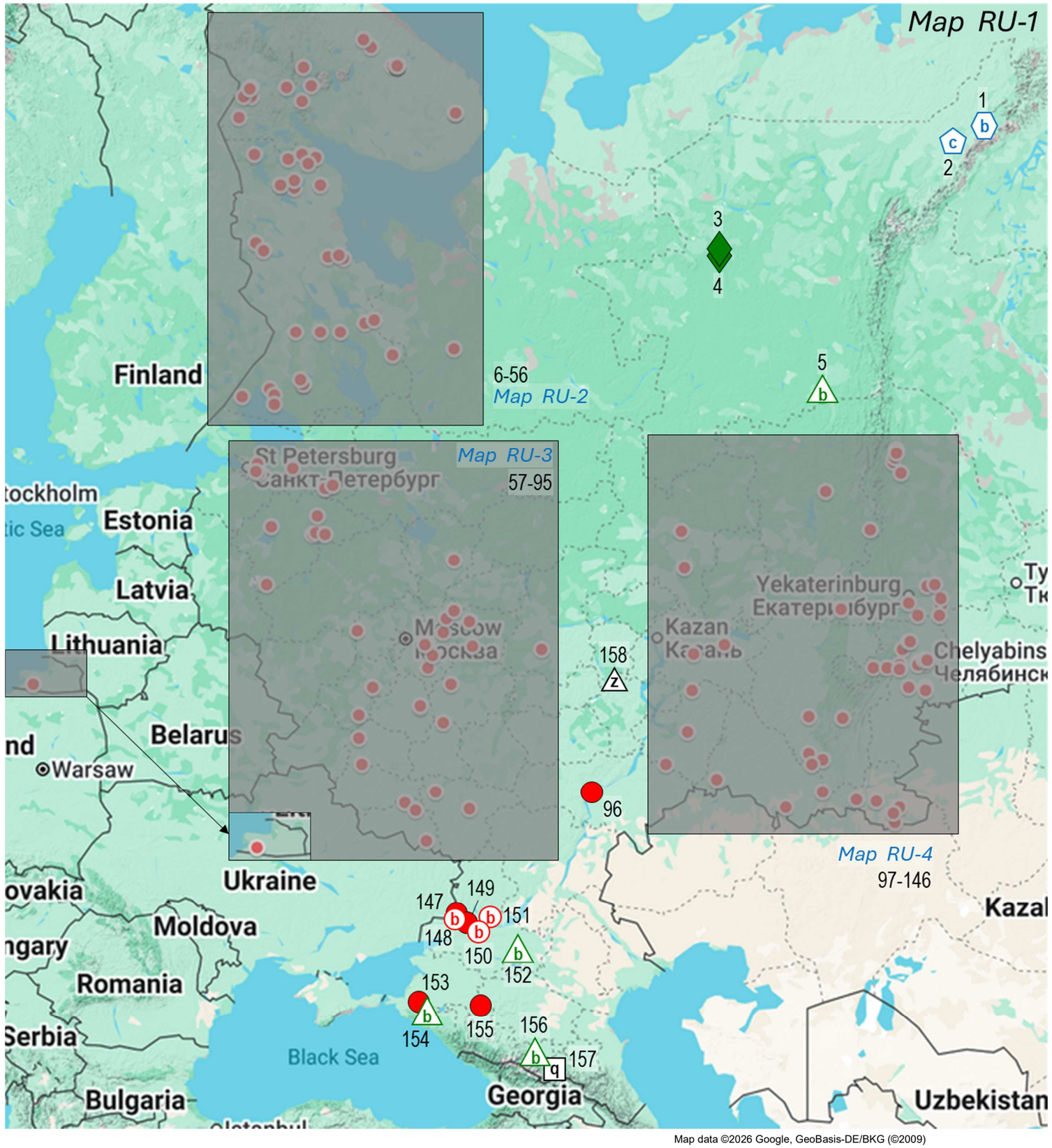
#	raw material	st	deposit	oblast
1	ba	O	Khoylinskoye	Komi
2	cr	O	Lekkhoyla	Komi
3	bx	A	Sredne-Timanskiy*	Komi
4	bx	A	Ščugor	Komi
5	be	O	Bad'inskoe	Komi
6	ky	O	Manyuk	Murmansk
7	ky	O	Nussa-Kaipurta	Murmansk
8	ky	O	Bezymyannoe-Kyrpurta-Shuururta	Murmansk
9	ky	O	Bolshoy Rov-Bol'shiye Keivy-Yagelurta	Murmansk
10	ky	O	Chervurta	Murmansk
11	ky-qz	O	Tyapysh-Manyuk	Murmansk
12	ky	O	Tavurta-Vorgelurta-Vostochnaya Shuururta	Murmansk
13	li	O	Kolmozero	Murmansk
14	li	O	Polmostundra	Murmansk
15	li	O	Okhmyl'k	Murmansk
16	li	O	Shongui	Murmansk
17	ns	A	Khibina	Murmansk
18	ol	O	Lesnaya Varaka	Murmansk
19	fd	O	Kuru-Vaara	Murmansk
20	ol	O	Kovdor N	Murmansk
21	zr	A	Kovdor	Murmansk
22	li	A	Sljudnyanaya	Murmansk
23	qz	O	Perchatka	Murmansk
24	ba	O	Sallanlatva	Murmansk
25	qz	O	Mayskoe	Karelia
26	qz	O	Stepanovo ozero	Karelia
27	fd	O	Nizhnee Kotozero	Karelia
28	fd	A	Blinkova Varaka	Karelia
29	fd	I	Hetolambina	Karelia
30	fd	O	Urakka	Karelia
31	fd	I	Lake Dolgoe	Karelia
32	fd	I	Chkalovskoe	Karelia
33	ns	O	Yeletozero	Karelia
34	ol	O	Shapkozero	Karelia
35	ky	O	Hizovaara	Karelia
36	fd	I	Pirtyma	Karelia
37	qz	I	Nikonova Varakka	Karelia
38	fd	O	Kostomuksha	Karelia
39	qz	O	Melomais	Karelia
40	fd	O	Roza Lampi	Karelia
41	fd	O	Torlov Stream	Karelia
42	fd	O	Sludyanoy Bor	Karelia
43	qz	O	Metchangyarvi	Karelia
44	qz	O	Fenkina Lampi	Karelia
45	tc	O	Pindushy	Karelia
46	tc	O	Povenchanka	Karelia
47	tc	O	Svetlozero	Karelia
48	ol	O	Aganozerskoe	Karelia
49	bx	A	Severo-Onezhskiy Boksitovyy	Arkhangelsk
50	tc	O	Ignoila	Karelia
51	fd	I	Kuryala	Karelia
52	fd	O	Bolshoe-Brusnichnoe	Karelia
53	fd	I	Linnavaara	Karelia
54	fd	A	Lupikko	Karelia
55	fd	O	Yuka-Koski	Karelia
56	fd	O	Yakkima	Karelia
57	rc	I	Shcheglovo	Leningrad
58	rc	A	Vsevolozhsky	Leningrad
59	rc	A	Petrushino	Leningrad
60	sa	A	Volkhovskiy	Leningrad
61	bx	I	Boksitogorsk	Leningrad
62	al	A	Boksitogorsk	Leningrad
63	al	A	Pikalevo	Leningrad
64	sa	A	Pikalevo	Leningrad
65	fc	I	Balakovskoe	Novgorod
66	fc	A	Brynkino Ust'e	Novgorod
67	fc	A	Okladnevskoe	Novgorod
68	fc	A	Malinovetskoe	Novgorod
69	rc	I	Sholokovo	Novgorod
70	rc	I	Kholm	Novgorod
71	rc	A	Pereulok Krasnopereval'skiy	Yaroslavl
72	be	O	Kunilovo-Dashkovo	Moscow
73	rc	A	Yuryev-Polsky	Vladimir
74	rc	I	Suvorotskoe	Vladimir
75	rc	I	Kolyugino	Vladimir
76	qf	A	Pokrov	Vladimir
77	rc	A	Gus-Khrustalny	Vladimir
78	rc	A	Arzamas	Nizhny Novgorod
79	rc	A	G'zhel	Moscow
80	rc	A	Voskresensky	Moscow













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Table RU-b: deposits of raw materials for the ceramic and glass industries in Russia (European).

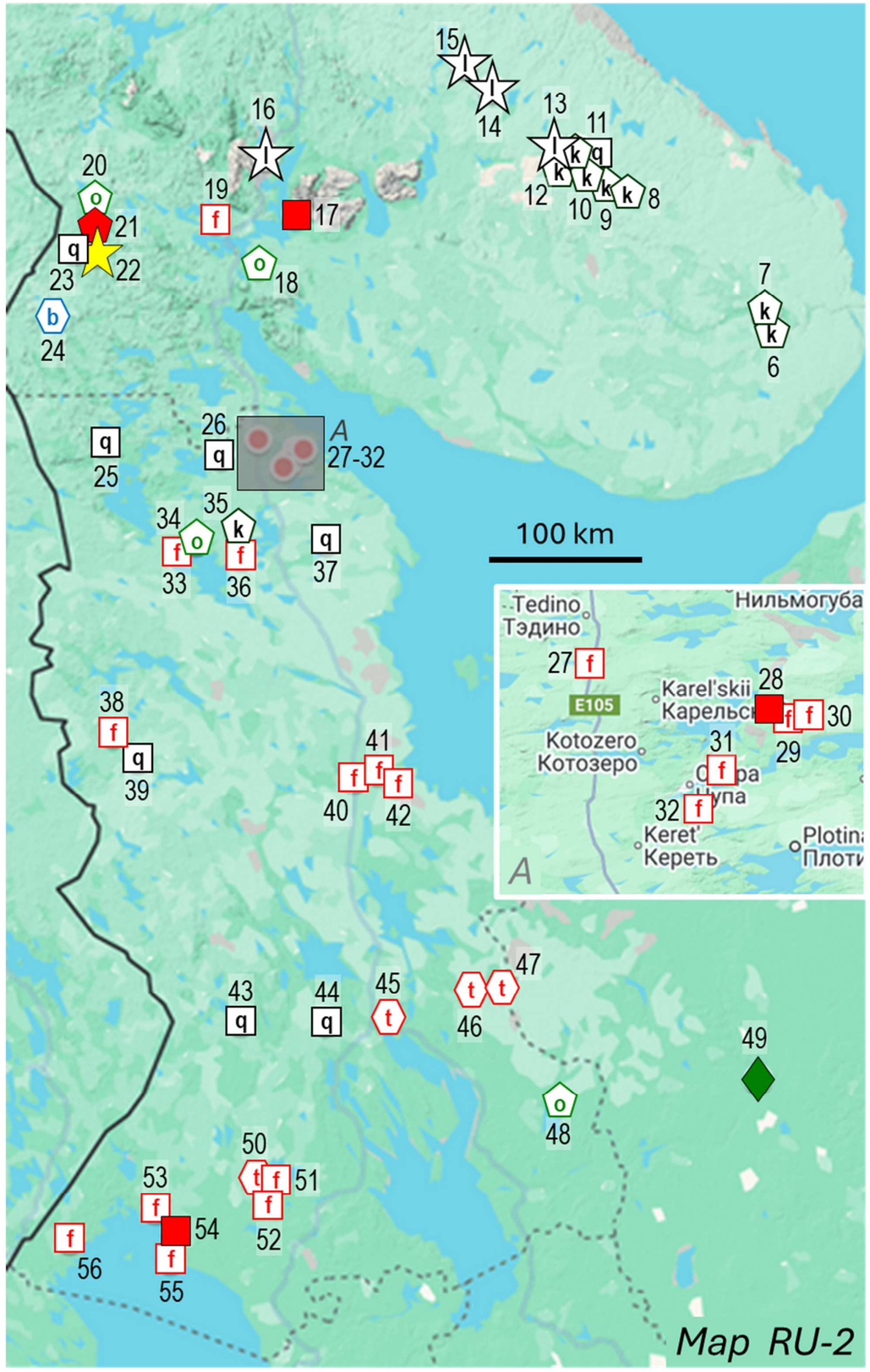
#	r.m.	st	deposit	oblast
81	rc	A	Gololobovskiy	Moscow
82	rc	A	Ryazan	Ryazan
83	rc	A	Vorotynsky	Kaluga
84	rc	A	Novomoskovsk	Tula
85	fc	A	Novomoskovsk	Tula
86	fc-wc	A	Shulepovskoe	Ryazan
87	fc	I	Ul'yanovo	Kaluga
88	ze	A	Khotynets	Oryol
89	rc	A	Zheleznogorsk	Kursk
90	fc-wc	A	Latnaya	Voronezh
91	be	I	Nikolskoe	Voronezh
92	qs	A	Gubkinskoe	Belgorod
93	rc	A	Gorodishche	Belgorod
94	qs	I	Vejdelevka	Belgorod
95	rc	A	Yablonenka	Kaliningrad
96	rc	A	Saratov	Saratov
97	be	O	Sobolevo	Orenburg
98	sc	I	Maloarkhangel'skoe	Samara
99	rc	A	Smyshlyayevka	Samara
100	be	I	Berezovka	Kazan
101	rc	A	Yuzhno-Chistopol	Kazan
102	be	A	Biklyan	Kazan
103	be	O	Vasil'evskoe	Kirov
104	rc	A	Kirovo-Chepetsk	Kirov
105	sa	A	Bereznikovskiy	Perm
106	bx	I	Cheremukhovo	Sverdlovsk
107	bx	I	Kal'ya	Sverdlovsk
108	bx	A	Severouralsk	Sverdlovsk
109	bx	A	Boksity	Sverdlovsk
110	al	A	Krasnotur'insk	Sverdlovsk
111	cr	A	Saranovski	Perm
112	ka	O	Zhuravlinyi Log	Sverdlovsk
113	wc	A	Reft-Zolotoruda	Sverdlovsk
114	fd	A	Malyshev	Sverdlovsk
115	fc	A	Bogdanovič	Sverdlovsk
116	tc	I	Shabrovski	Sverdlovsk
117	fc	I	Trinity-baynovskie	Sverdlovsk
118	al	A	Kamensk-Uralsky	Sverdlovsk
119	ky	O	Abramovskoe	Sverdlovsk
120	ka	A	Kyštym 1	Čeljabinsk
121	ka	A	Kyštym 2	Čeljabinsk
122	ky	O	Karabaš	Čeljabinsk
123	mg	A	Satka	Ufa
124	mg	O	Zlatoust	Ufa
125	rc	A	Miass	Čeljabinsk
126	tc	I	Miass	Čeljabinsk
127	ka	A	Poletaevo	Čeljabinsk
128	fd	I	Kremenkul'	Čeljabinsk
129	ka	I	Krasnoe Pole	Čeljabinsk
130	fc	A	Varlamovo-Kremenkul	Čeljabinsk
131	fd	I	Shershnevsk	Čeljabinsk
132	qs	A	Uvel	Čeljabinsk
133	wc	A	Nizhneuvelsk	Čeljabinsk
134	ka	I	Kotlik	Čeljabinsk
135	mg	A	Ismakaevo	Bashkortostan
136	sa	A	Sterlitamak	Bashkortostan
137	py	I	Kul'-Yurt-Tau	Bashkortostan
138	be	O	Izhberdino	Bashkortostan
139	rc	A	Tulgan	Orenburg
140	rc	A	Saratovka	Orenburg
141	be	I	Zheltoe	Orenburg
142	rc	A	Khalilovo	Orenburg
143	wc	A	Novoorsk	Orenburg
144	wc	I	Kumak	Orenburg
145	ka	A	Kiembaevsk	Orenburg
146	ka	O	South Ushkoty	Orenburg
147	rc	A	Gukovo	Rostov
148	rc	I	Kiselevo	Rostov
149	rc	A	Markin	Rostov
150	rc	I	Semikarakorsk	Rostov
151	rc	I	Chumakov	Rostov
152	be	O	Tarasov	Rostov
153	rc	A	Slavyansk-on-Kuban	Krasnodar
154	be	O	Černomorskij	Krasnodar
155	rc	A	Novokubansk	Krasnodar
156	be	I	Nal'čik	Kabardino-Balkaria
157	qs	O	Fiagdon	Northern Ossetia
158	ze	O	Tatarsko-Shatrashanskoe	Tatarstan
159	ns	A	Vishnevogorsk	Čeljabinsk

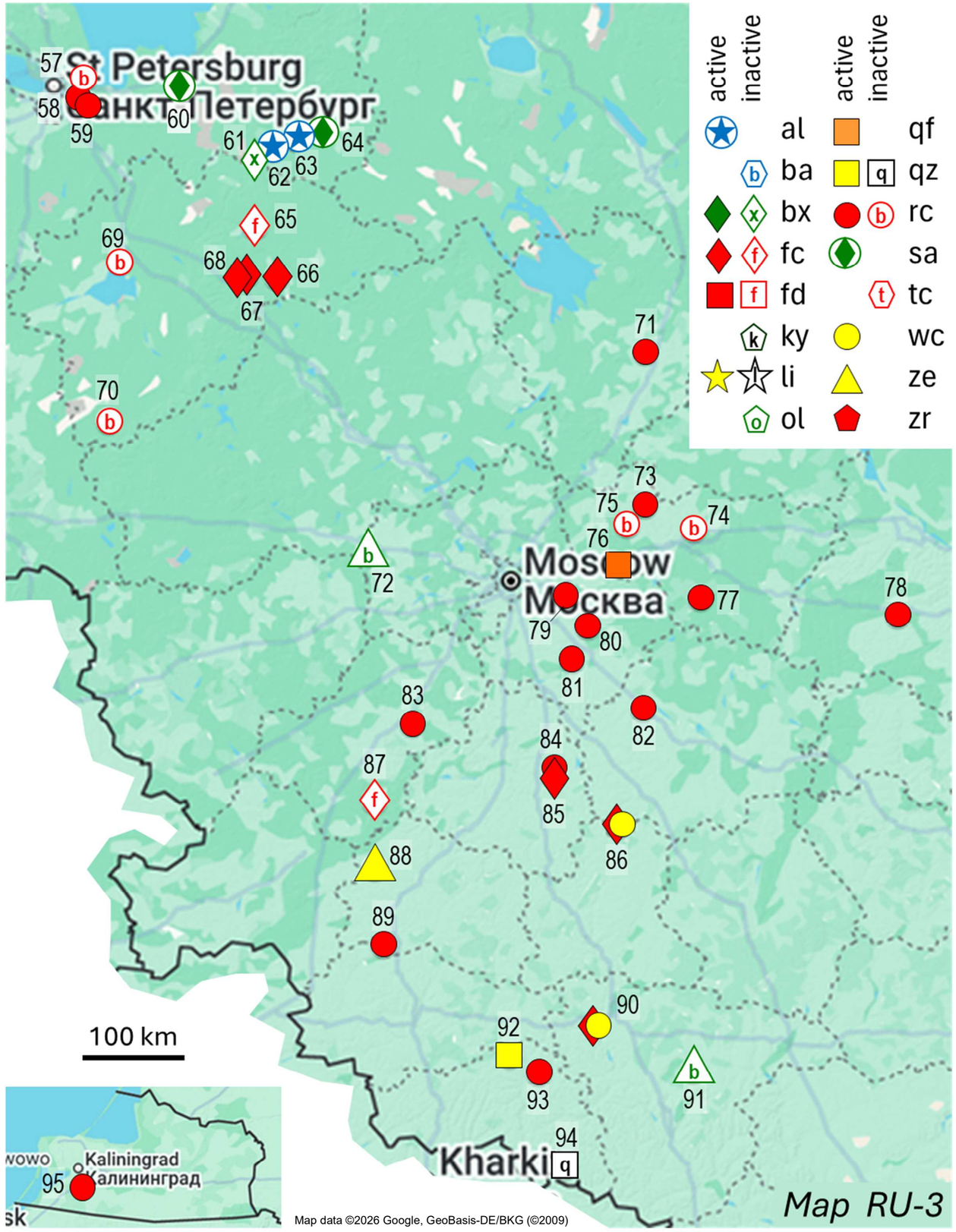
Raw material

al	alumina (artificial)
ba	barite
be	bentonite
bx	bauxite
cr	chromite
fc	fireclay, refractory clays
fd	feldspar
ka	kaolin
ky	kyanite
li	lithium minerals
mg	magnesite
ol	olivine
ns	nepheline phonolite
py	pyrophyllite
qf	quartz-feldspathic sand
qs	silica sand
qz	quartz
rc	red clays
sa	soda ash
sc	red stoneware clays
tc	talc
wc	white clays
ze	zeolites
zr	baddeleyite

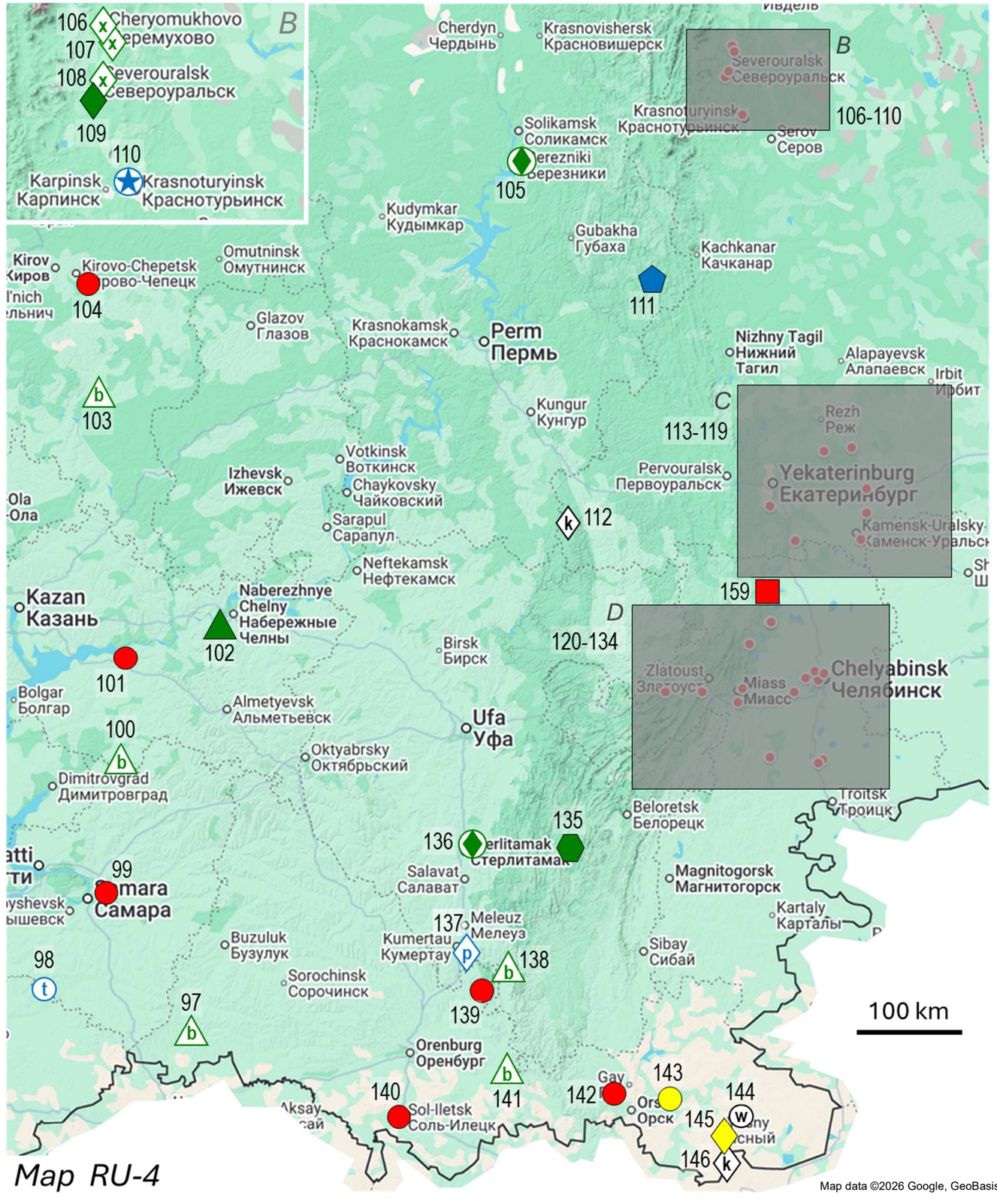
Status of deposit

A	active mine
I	inactive mine
O	occurrence

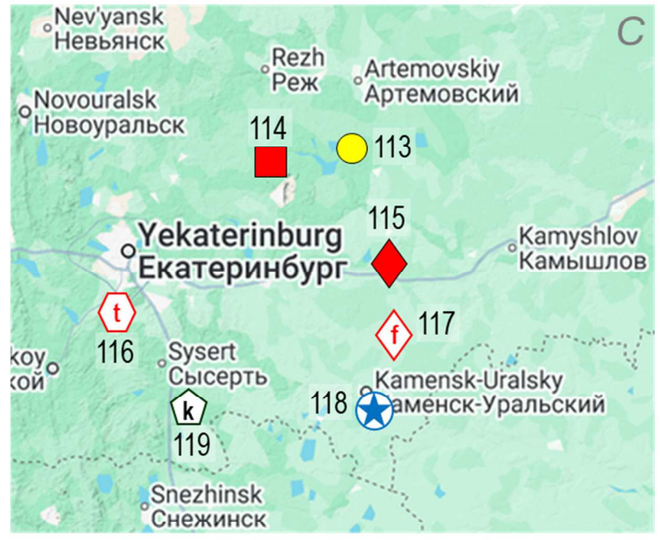


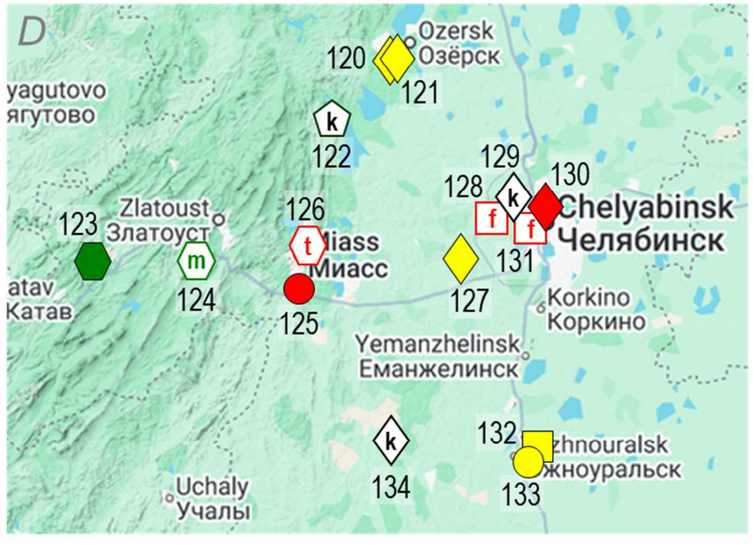


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active	inactive		active	inactive		active	inactive	
★		al	■	f	fd	■		qz
▲	b	be	◆	k	ka	●		rc
◆	x	bx		k	ky	◆		sa
⬟		cr	⬢	m	mg		t	tc
◆	f	fc		p	py	●	w	wc





Serbia

The Serbian territory is characterized by three distinct minerogenic provinces (Carpatho-Balkanian, Serbian-Macedonian, and Dinaric) which have given rise to a wide variety of raw materials for glass and ceramics (including lithium and borates) which have long been exploited, essentially to fuel local industry. Production includes ball clay and fireclay, kaolin, red clays, and silica sands. Instead, barite, bentonite, feldspar, magnesite, wollastonite, zeolites, and chromite appear to have been explored, but are not officially being mined [1-5].

Kaolin is mined in deposits originating from granite weathering (Jadranska Lešnica) and kaolinization of arkosic sands (Bor and South Banat districts). The deposits in Šumadija, linked to the kaolinization of granites, and those in Pcinja (where the transformation of volcanics into halloysite has taken place) are no longer exploited [6-8]. **Ball clays** are produced by a dozen mines exploiting Miocene deposits in central Serbia [8-10]. Going from west to east, the following basins are encountered, with the source rocks from which the clay sediments derive [11-19]: Jadarska Lešnica (granites and metasediments); Tamnava (metasediments); Ub (metasediments); Kolubara (shales and volcanics); Aranđelovac (granites). Reserves are estimated to be around 40 million tonnes [2]. The Serbian production of kaolin and ball clay is on the whole 257,000 tpa, on average [1]. **Fireclays** are exploited in Miocene sediments along the southern border of the Pannonian basin and in Jurassic continental sediments in southeastern Serbia [12,20]. The total reserves are around 23 million tonnes [2].

Red clays have been extensively quarrying (estimated production around 700,000 tpa) especially in Vojvodina and along the Morava valley, where mainly Quaternary deposits (alluvial, lacustrine, palustrine, with loess contribution) and shallow marine Miocene sediments are exploited [12,21-30].

Industrial silica is obtained (285,000 tpa, on average) mainly from quartz sands in the Kolubara and Bor districts, as well as from quartzite near Toplica [31]; overall reserves are around 66 million tonnes [2].

Barite is extracted from a polymetallic ore deposit (Bobija), where it is associated with sulphide mineralizations. The deposit is stratabound and hosted by a Triassic sedimentary sequence [32]. Reserves were given around one million tonnes [2].

Bentonite: Serbian resources have been calculated in tens of million tonnes from a dozen deposits [12], but exploitation of bentonite was very limited, and only one mine seems active (Bogovina) even though not productive.

Wollastonite mineralization in the Jaram and Duboka skarn has long been known [33]. Outwardly, they are active deposits, but their production is unknown; reserves amount to 1.5 million tonnes [2].

Zeolites deposits (mostly clinoptilolite) are related to subaqueous alteration of ash-fall tuffs intercalated within Miocene (Beočin, Jablanica, Zlatokop) or Eocene (Katalenac) marls [34,35]. Reserves are indicated in total 1.34 million tonnes [34].

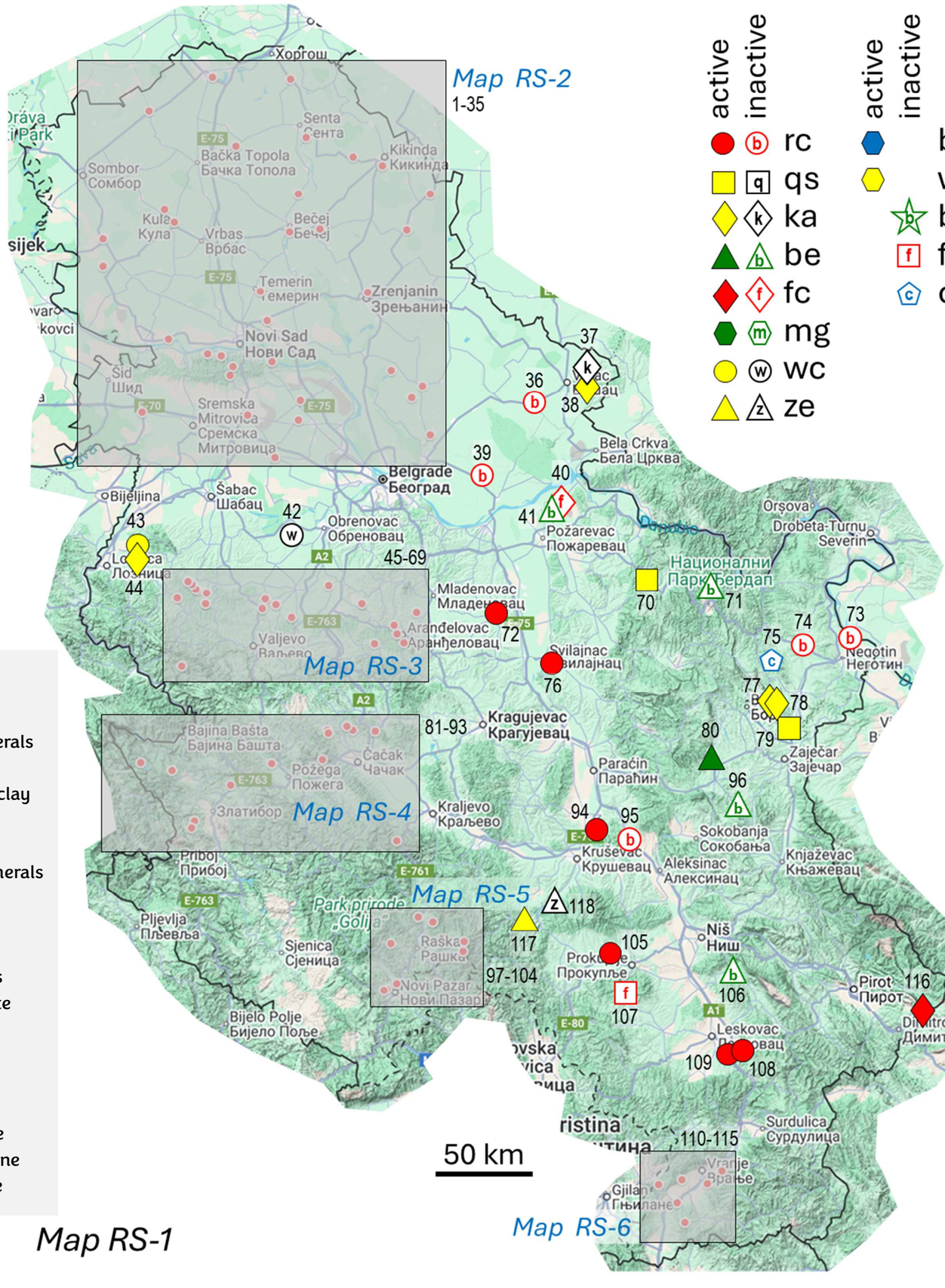
Feldspar was extracted either from pegmatite-aplite or granite [36,37] with a peak in 2013 (24,000 tpa) [5] but the Serbian production officially ceased in 2013. Total reserves are around 15 million tonnes [2].

Magnesite deposits are present in the Dinaric ophiolitic belt, differing for origin and structure [38-42]. Some mining activities are apparently ongoing, although Serbian production (peaking at 73,000 tpa in 2003) was officially ceased in 2007 [5]. Reserves are indicated at around 1.7 million tonnes [1]. **Chromite** deposits occur in ultrabasic rocks of the ophiolitic belt [3,4].

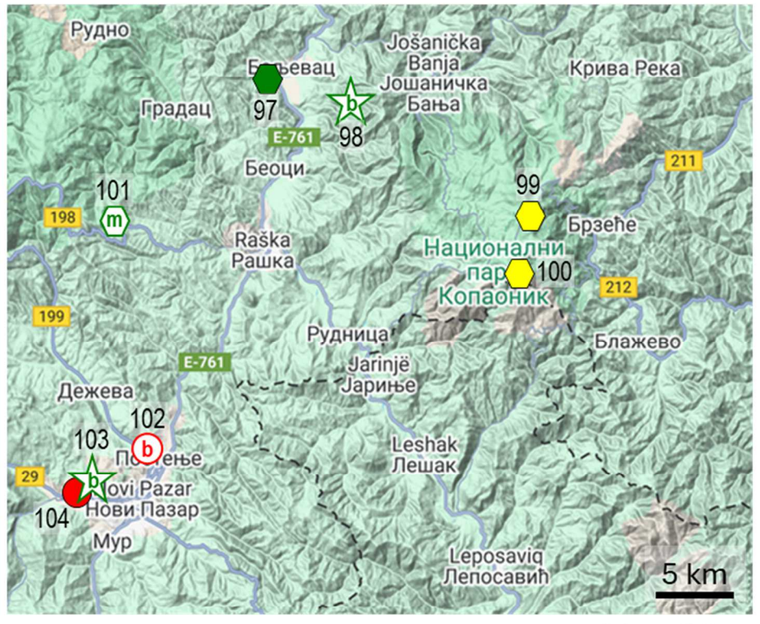
Boron-lithium minerals: the Jadar basin is the archetype of the volcano-sedimentary Li-B deposits [43]. They formed in Miocene lake sediments with intercalations of tuffs and evaporite episodes, which gave rise to the formation of jadarite, $LiNaB_3SiO_7(OH)$, and borates; the reserves amount to 2.6 million tonnes of Li_2O and 20.7 million tonnes of B_2O_3 [44]. Similar conditions occur in the Piškanja-Jarandol lake basin, as well as in other basins in western Serbia, which are therefore the subject of mineral exploration [43-46].

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active	inactive		
●	ⓑ	rc	
■	ⓠ	qs	
◆	ⓚ	ka	
▲	ⓑ	be	
◆	ⓕ	fc	
⬢	ⓜ	mg	
●	ⓦ	wc	
▲	ⓩ	ze	
⬢		ba	
⬡		wo	
★	ⓑ	bo	
■	ⓕ	fd	
⬠	ⓒ	cr	



Map RS-5



Map RS-6

Raw material

ba	barite
be	bentonite
bo	boron minerals
cr	chromite
fc	refractory clay
fd	feldspar
ka	kaolin
li	lithium minerals
mg	magnesite
qs	silica sand
rc	red clays
wc	white clays
wo	wollastonite
ze	zeolites

Status of deposit

A	active mine
I	inactive mine
O	occurrence

Table RS-a: deposits of raw materials for the ceramic and glass industries in Serbia.

#	r.m.	st	deposit	district
1	rc	I	Subotica	North Bačka
2	rc	A	Kanjiža	North Bačka
3	rc	A	Bajmok	North Bačka
4	rc	I	Senta	North Bačka
5	rc	A	Novo Orahovo	North Bačka
6	rc	I	Iđoš	North Banat
7	rc	A	Kikinda	North Banat
8	rc	I	Srpska Crnja	Central Banat
9	rc	I	Bačko Petrovo Selo	South Bačka
10	rc	I	Crvenka	West Bačka
11	rc	I	Kula	West Bačka
12	rc	I	Srpski Miletić	West Bačka
13	rc	I	Bečej (Rit)	South Bačka
14	wc	A	Novi Bečej (Garajevac)	Central Banat
15	rc	I	Banatsko Karađorđevo-Žitište	Central Banat
16	rc	I	Karavukovo	West Bačka
17	rc	I	Temerin	South Bačka
18	rc	A	Zrenjanin	Central Banat
19	rc	A	Kać	South Bačka
20	rc	I	Čelarevo	South Bačka
21	rc	A	Čerević	South Bačka
22	ze	A	Manastirac	South Bačka
23	fd	O	Rakovac	South Bačka
24	be	I	Vrdnik	Srem
25	rc	A	Karlovacki vinogradi	South Bačka
26	rc	A	Sremski Karlovci	South Bačka
27	rc	A	Sakule	South Banat
28	rc	I	Kovačica	South Banat
29	rc	I	Debeljača	South Banat
30	rc	A	Kuzmin	Srem
31	rc	I	Ruma	Srem
32	rc	A	Inđija	Srem
33	rc	I	Golubinci	Srem
34	rc	A	Pećinci	Srem
35	rc	A	Pančevo	South Banat
36	rc	I	Uljma	South Banat
37	ka	O	Pojana Mare-Strijare	South Banat
38	ka	A	Mešić	South Banat
39	rc	I	Bavanište	South Banat
40	wc	O	Kostolac basin	Braničevo
41	be	I	Drmno	Braničevo
42	wc	I	Dren	Beograd
43	wc	A	Savića Mala	Mačva
44	ka	A	Beli Majdan	Mačva
45	bo+li	I	Jadar	Mačva
46	wc	I	Burovica	Kolubara
47	wc	A	Stare Kuće	Kolubara
48	wc	A	Bele Vode	Kolubara
49	wc	A	Jovanovića Brdo	Kolubara
50	rc	A	Zbegovi-Zorka	Kolubara
51	rc	A	Miličinica	Kolubara
52	wc	O	Ramnava	Kolubara
53	wc	O	Brezaci	Kolubara
54	wc	O	Kisela Voda	Kolubara
55	wc	A	Slatina	Kolubara
56	wc	A	Pambukovica	Kolubara
57	wc	A	Čučuge	Kolubara
58	wc	A	Dokmir	Kolubara
59	qs	A	Vrhovine	Kolubara
60	qs	O	Kolubara	Kolubara
61	wc	O	Barošević	Beograd
62	wc	I	Rudovci	Beograd
63	ka	I	Zivkovci-Garaši	Šumadija
64	rc	A	Bukovik	Šumadija
65	fc	A	Lazine	Šumadija
66	fd	O	Bukulja	Šumadija
67	wc	O	Vrbica	Šumadija
68	wc	I	Košarno	Šumadija
69	ba	A	Bobija	Mačva
70	qs	A	Kornjica	Toplica
71	be	O	Valja Saka	Bor
72	rc	A	Smederevska Palanka	Podunavlje
73	rc	I	Dušanovac	Bor
74	rc	O	Metiš-Štubik	Bor
75	cr	O	Deli Jovan	Bor
76	rc	A	Dublje-Svilajnac	Pomoravlje
77	ka	A	Donja Bela Reka	Bor
78	ka	A	Belorečki peščar	Bor
79	qs	A	Rgotina	Bor
80	be	A	Bogovina	Zaječar
81	mg	I	Koviljača	Moravica
82	mg	A	Milićevci	Moravica
83	mg	A	Razhana-Srezojevci	Moravica
84	mg	A	Brezak	Moravica
85	mg	A	Pranjani	Moravica
86	qz	O	Ovcar Banja	Moravica
87	rc	O	Dobrodo	Zlatibor
88	mg	O	Krive strane	Zlatibor
89	mg	O	Kremna	Zlatibor
90	mg	I	Kačer	Zlatibor
91	mg	I	Čavlovac	Zlatibor
92	mg	I	Ribnica-Liska	Zlatibor
93	mg	O	Bogutovac	Raška
94	rc	A	Stalać	Rasina
95	rc	O	Rujište	Nišava
96	be	O	Mečji	Nišava
97	mg	A	Bela Stena	Raška
98	bo	I	Piškanja-Jarandol	Raška
99	wo	A	Jaram	Rasina
100	wo	A	Duboka	Rasina
101	mg	I	Trnava	Raška
102	rc	I	Postenje	Raška
103	bo	I	Poberđe	Raška
104	rc	A	Novi Pazar	Raška
105	rc	A	Donja Rečica	Toplica
106	be	O	Jelenkovac-Zaplanje	Nišava
107	fd	O	Vidojevica	Toplica
108	rc	A	Vlasotince	Jablanica
109	rc	A	Guberevac	Jablanica
110	ze	I	Katalenac	Pčinja
111	ka	O	Gornji Vrtogos	Pčinja
112	ka	I	Trnovac	Pčinja
113	ze	A	Zlatokop	Pčinja
114	fd	I	Bujanovac	Pčinja
115	mg	O	Beli Kamen	Pčinja
116	fc	A	Crne Rovine	Dimitovgrad
117	ze	A	Igroš	Rasina
118	ze	O	Jablanica	Rasina

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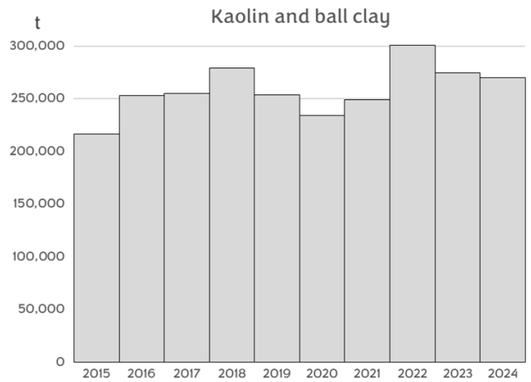
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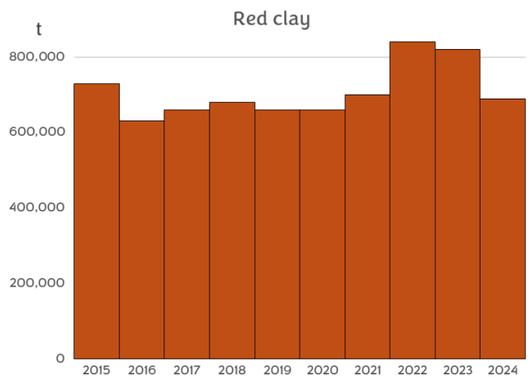
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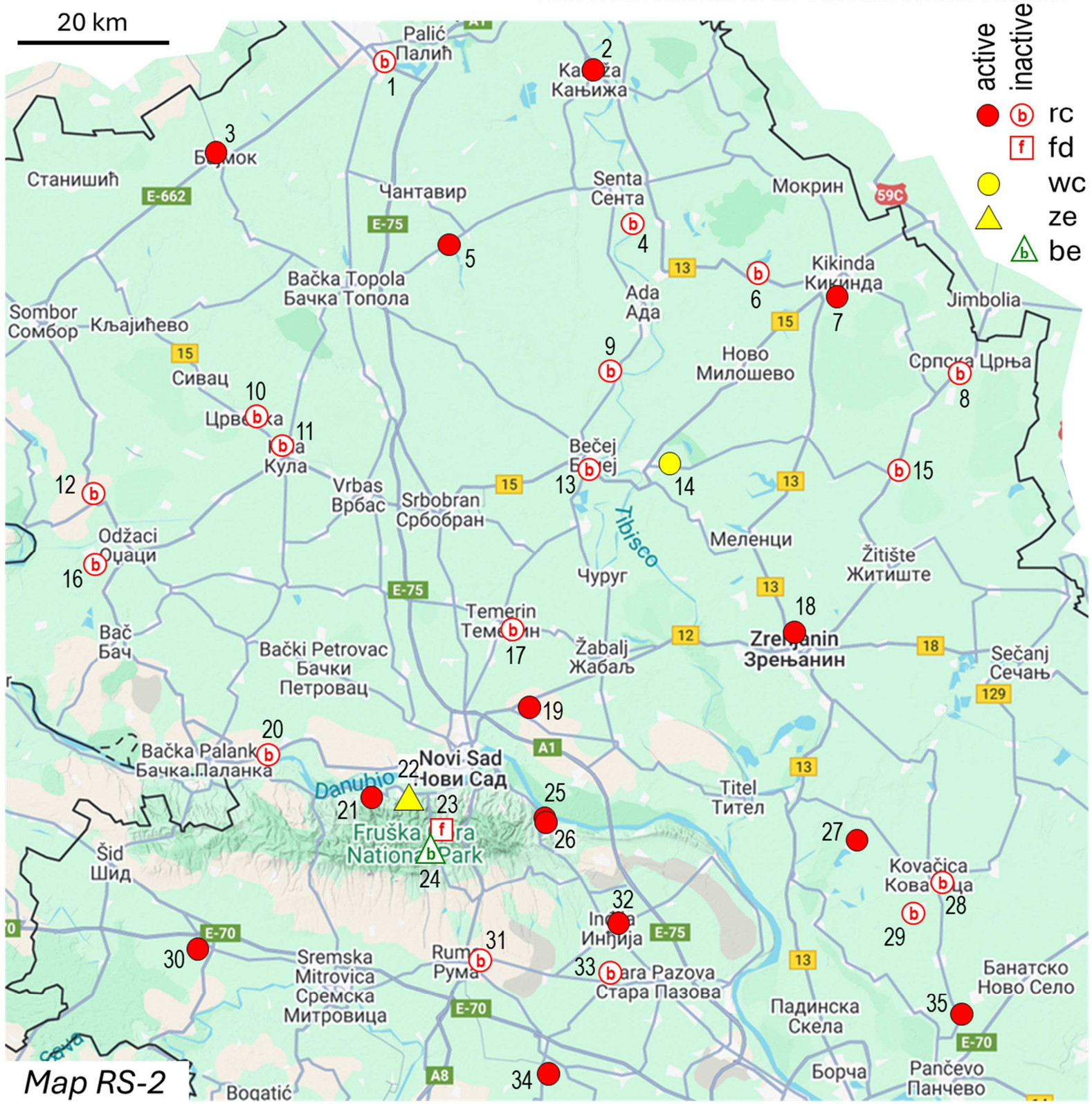
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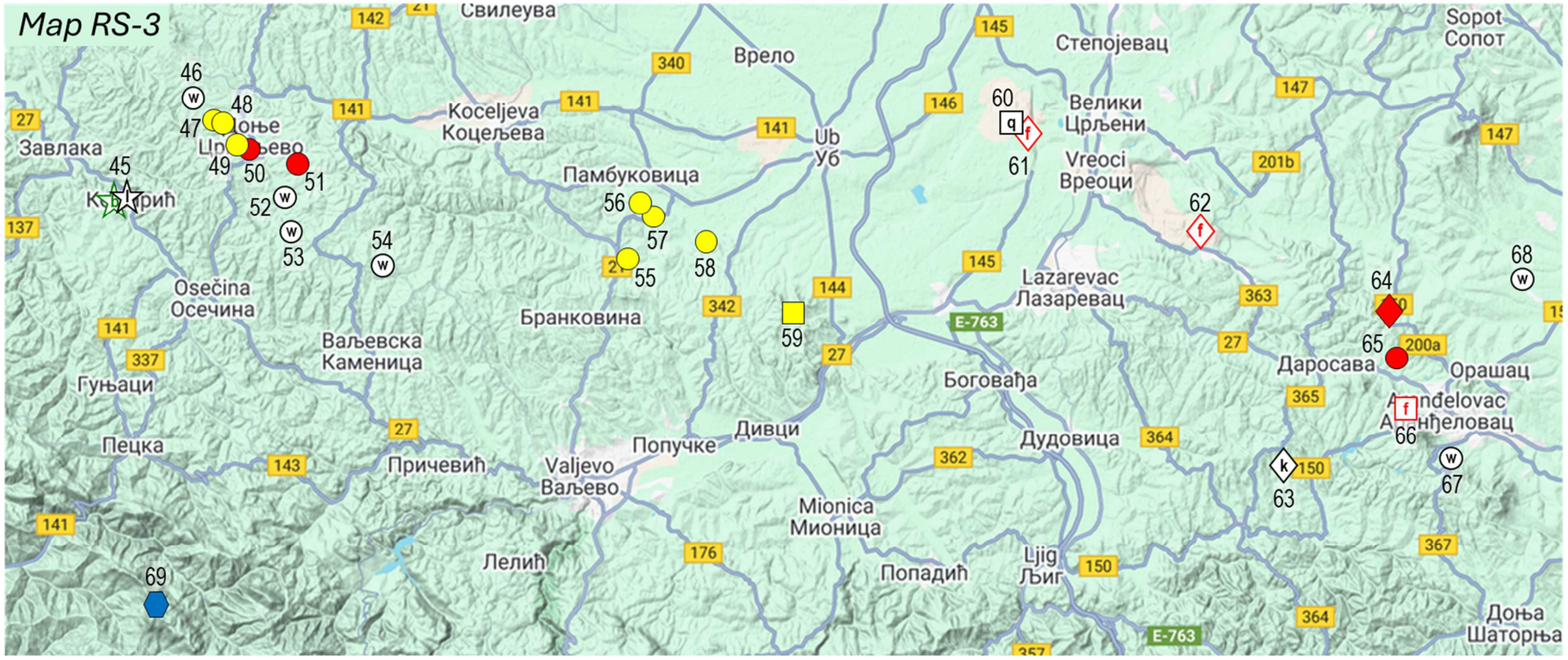




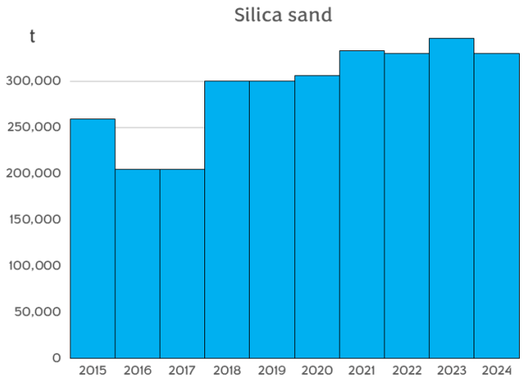


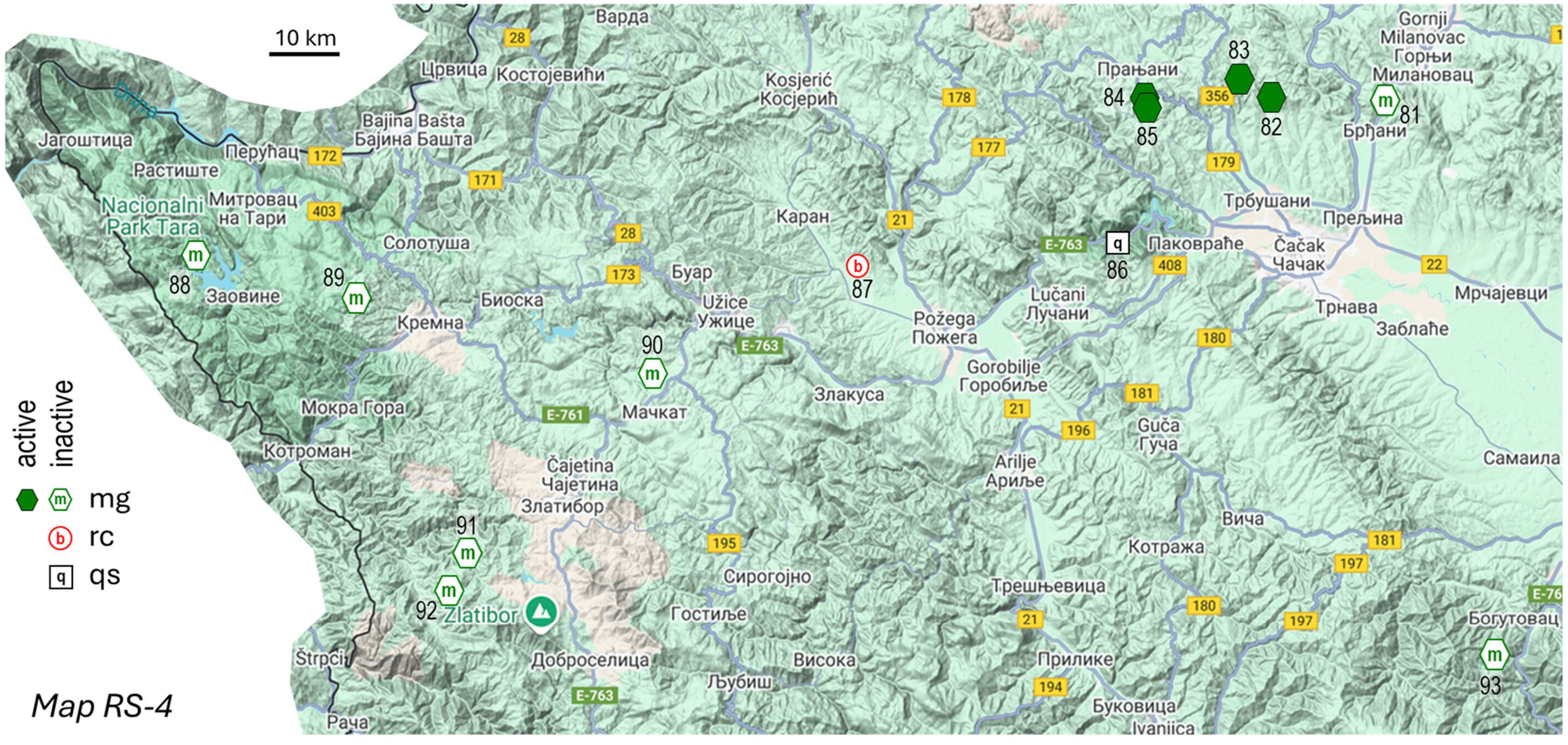
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Map RS-3

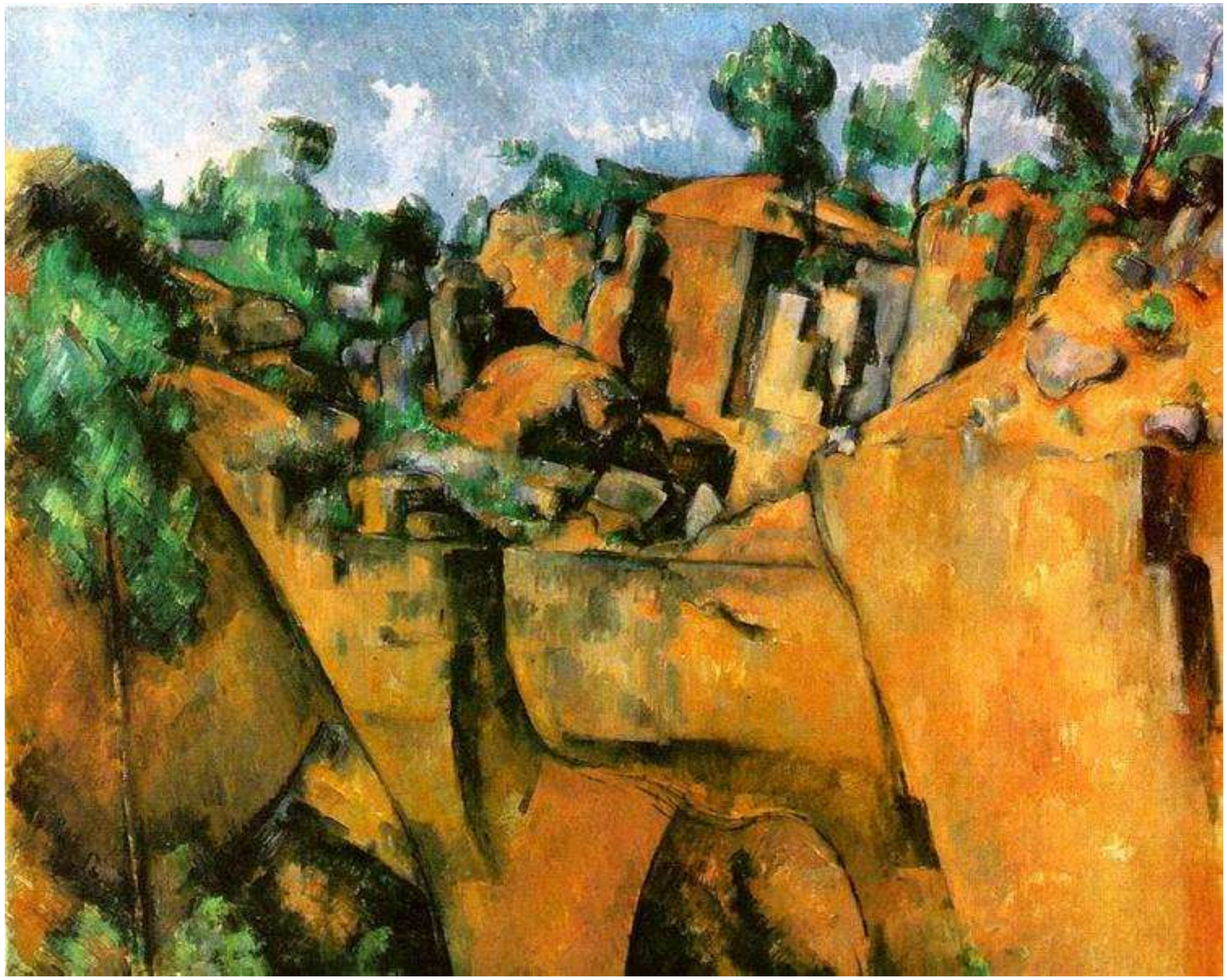


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Map RS-4



Bibémus Quarry

Paul Cézanne (1839-1906)

Slovakia

Slovakia is Europe's leading producer of zeolites, the third major supplier of magnesite, the fifth of talc, and the seventh of bentonite and perlite. Furthermore, silica sands, red clays, basalt for stone wool, and white clays (both ball clay and fireclay) are extracted, as well as modest quantities of barite, kaolin and feldspar [1-5].

Magnesite: numerous deposits are hosted in early Carboniferous schists of the Gemeric tectonic unit in western Carpathians, the origin of which is debated, although hydrothermal-metasomatic genesis is favored [6-8]. Currently, three are exploited in the Revúca region (Jelševa and Lubeník), as well as the Hnúšťa-Mútnik deposit (*Map SK-6*) where magnesite is mined together with talc [1,9,10]. Slovak production averages around 797,000 tpa (2015-2024) with reserves amounting to 1,147 million tonnes [1].

Talc-magnesite mixtures are extracted both from the above-mentioned Hnúšťa-Mútnik mine near Rimavská Sobota [10] and from the Gemerskà Poloma deposit (Košice). This latter has syn-sedimentary origin: Carboniferous carbonate rocks (Gemeric unit) were converted into talc and magnesite during Variscan regional metamorphism [11,12]. There are further occurrences of talc in the western Carpathians, although not currently exploited [13,14]. Production is 60,000 tpa on average, while reserves are 242 million tonnes [4].

Perlite: among the many occurrences reported in the Slovakian part of the Western Carpathians, only two are currently exploited, with an average of 35,000 tpa and about 30 million tonnes of reserves [1]. These are the Lehôtka pod Brehmi and Jastrabá deposits (*Map SK-4*) [15,16], where perlite occurs in hyaloclastite breccia and glassy rhyolite breccia, respectively [17].

Zeolites: the most important Slovak deposits are found in rhyodacite volcaniclastics of Miocene age [1,15]. The Hrabovec tuff (mostly clinoptilolite) is being quarried by two deposits near Prešov (*Map SK-9*) with average production of 184,000 tpa and reserves for 117 million tonnes [1,15,18]. Further occurrences of zeolites are reported in the Žiar nad Hronom region [15,19].

Bentonite is mined mainly at a dozen sites in the southwestern part of the Kremnické vrchy Mountains (Žiar nad Hronom, *Map SK-4*) and also from a couple of deposits near Trebišov [1,15]. Slovak production is 252,000 tpa (average 2015-2024) with reserves of 56 million tonnes [1]. The Kremnické vrchy district exploits the Miocene Jastrabá Formation, which consists of rhyolitic volcanism products altered into bentonites, K-bentonites and zeolites [20-22]. Further known deposits in central Slovakia are no longer mined [23].

Red clay is quarried in a dozen sites, distributed throughout the country, for the production of bricks and roof tiles (about 614,000 tpa, average of the last decade); reserves are equal to 192 million tonnes [1]. The main sources are Quaternary loess and loams of glacial origin [1,24].

Silica sands are excavated in two areas in the Vienna Basin (Senica and Malacky, *Map SK-2*) in western Slovakia [25,26]. Production is ~455,000 tpa on average of glass sands, with reserves of 883 million tonnes [1]. Many occurrences of quartzous materials, currently not exploited, are in eastern Slovakia (*Maps SK-7 and SK-10*) .

Kaolin is produced in the regions of Poltár and Košice (23,000 tpa, average 2015-2024) with reserves of 62 million tonnes [1]. Kaolin is obtained from altered Paleozoic metarhyolites (Kalinovo, *Map SK-5*) or from washing kaolinized sands at Vyšný Petrovec and Rudník [27-30].

White clays are exploited with an average production of approximately 27,000 tpa of ball clays and fireclay; reserves amount to 198 million tonnes [1]. The extraction of refractory clays stopped in 2021 [1]. Ball clays are found in Pliocene-Miocene fluvio-lacustrine sediments near Lučenec (Gregorova Vieska and other deposits related to the degradation of volcanic rocks, *Map SK-5*) and Košice. Refractory clays have been extracted from kaolinitic deposits resulting from the alteration of Kalinovo-Močiar metamorphic rocks [31].

Feldspar: potassic-sodic types are obtained as a by-product of kaolin processing in Rudník (*Map SK-8*) where weathered arkoses are exploited [32]. Slovak production is 15,000 tpa; reserves are estimated at around 22 million tonnes [1]. Other sources of feldspathic fluxes, such as rhyolites and pegmatites, are no longer exploited [32,33].

Basalt for stone wool manufacturing is extracted from the Pliocene-Quaternary alkaline basalt field in southern Slovakia [34]. Average production is around 86,000 tpa (2015-2024) and the reserves indicated are 39 million tonnes [1]. **Barite** was mined until 2019 from a polymetallic mineralization in eastern Slovakia [1,35]. Production was up to 23,000 tpa in 2016 and reserves are valued at 12.5 million tonnes [1,36].

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Map SK-1

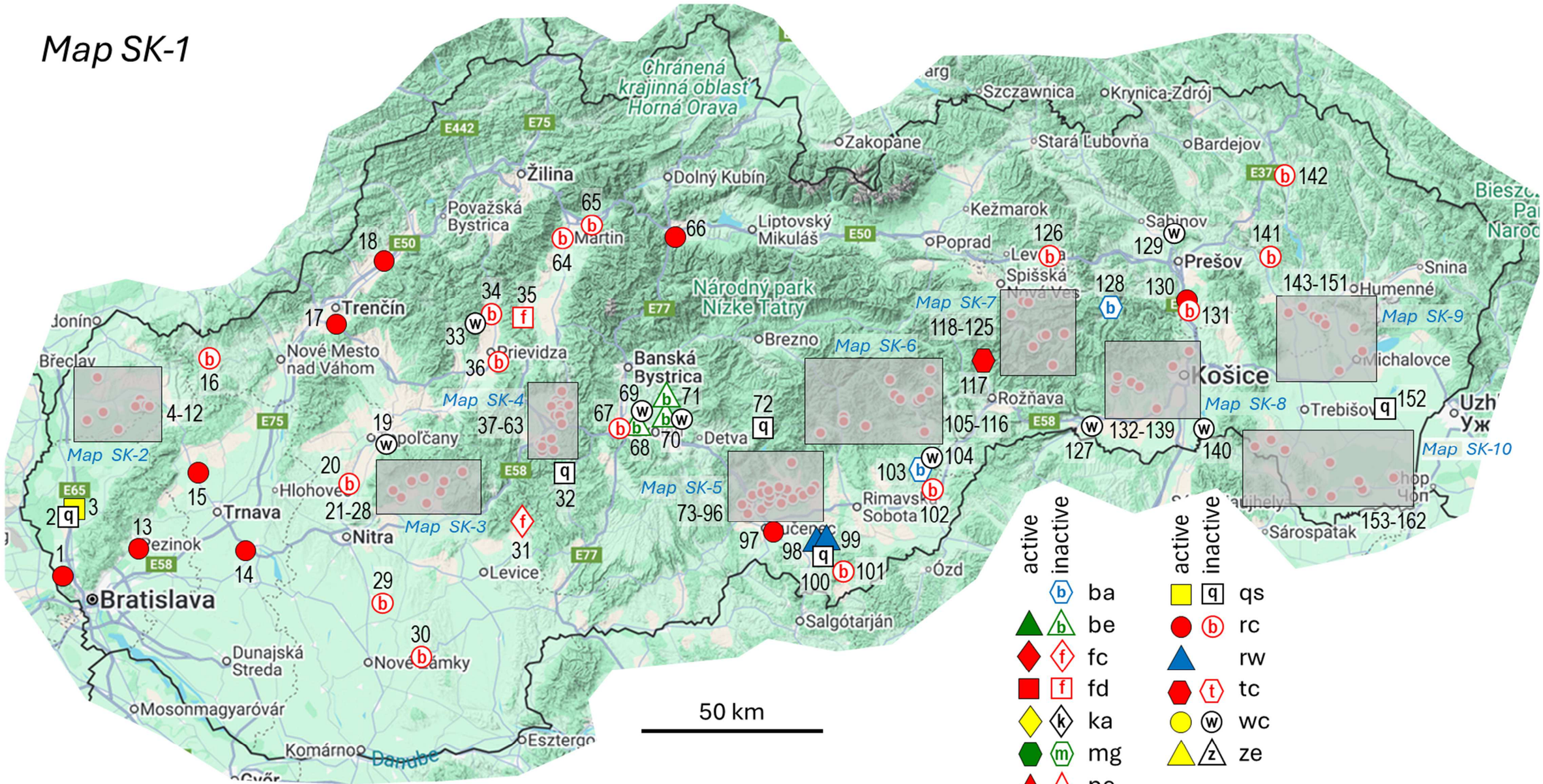
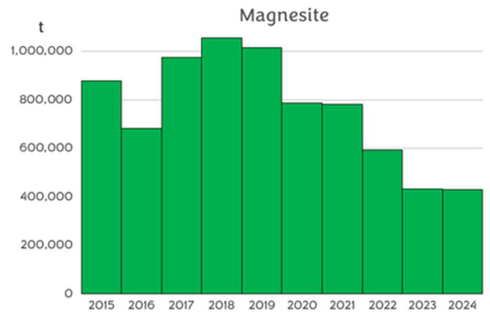
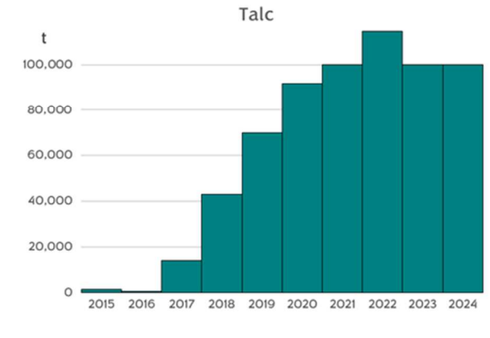
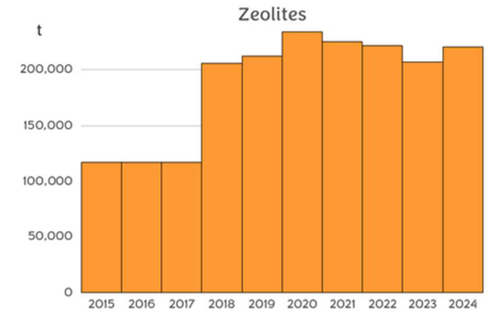


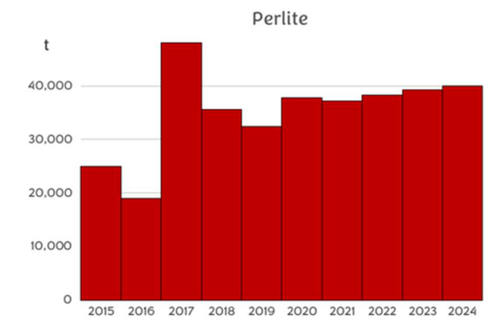
Table SK-a: deposits of raw materials for the ceramic and glass industries in Slovakia.

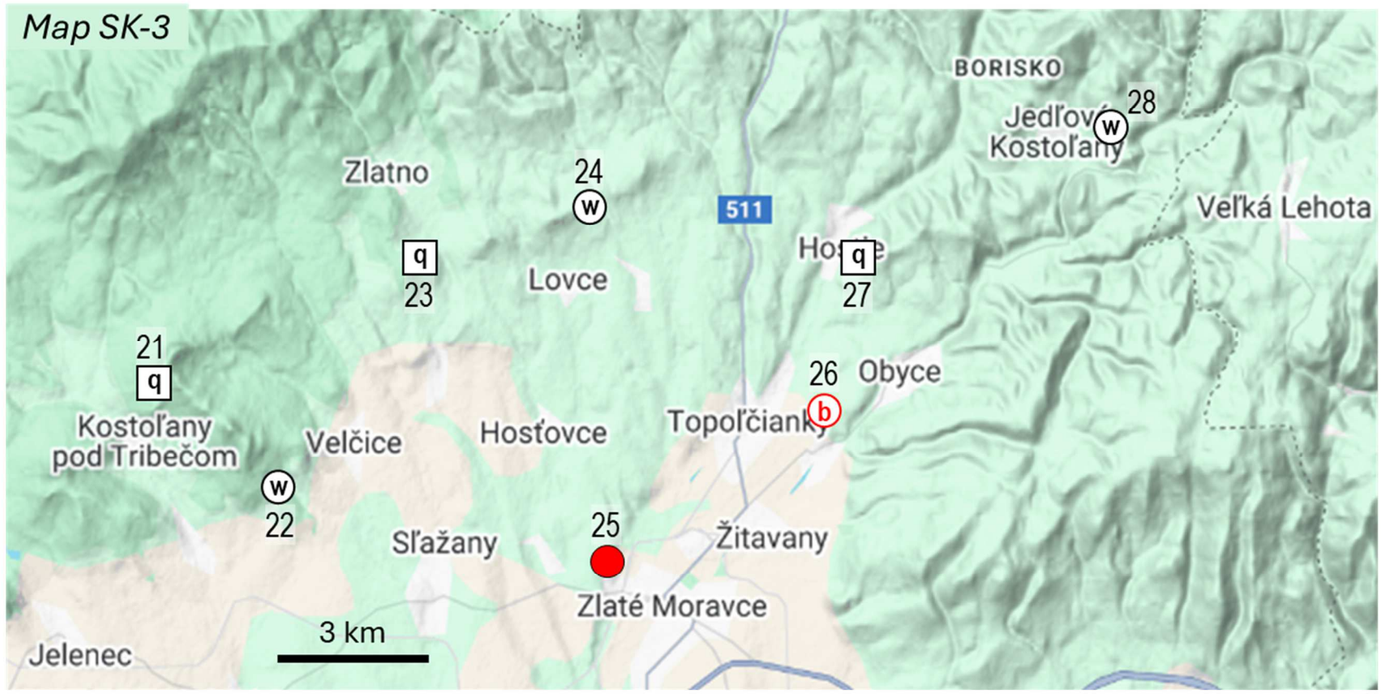
#	r.m.	st	deposit	region
1	rc	A	Devínska Nová Ves	Bratislava
2	qs	I	Bažantnica I	Malacky
3	qs	A	Bažantnica II	Malacky
4	rc	I	Borský Svätý Jur	Senica
5	qs	A	Šaštín - Stráže	Senica
6	qs	I	Lakšárska Nová Ves	Senica
7	qs	A	Šajdíkove Humence-Borský I	Senica
8	qs	A	Šajdíkove Humence II	Senica
9	qs	A	Šajdíkove Humence-Borský II	Senica
10	qs	I	Záhorie	Bratislava
11	qs	I	Šajdíkove Humence I	Senica
12	rc	I	Gbely	Skalica
13	rc	A	Pezinok	Pezinok
14	rc	A	Sered'	Galanta
15	rc	A	Boleráz	Trnava
16	rc	I	Myjava	Trenčín
17	rc	A	Trenčianska Turná	Trenčín
18	rc	A	Ilava	Ilava
19	wc	I	Solčany	Topoľčany
20	rc	I	Preseľany	Topoľčany
21	qz	I	Jelenec	Zlaté Moravce
22	wc	I	Ladice	Zlaté Moravce
23	qz	I	Zlatno	Zlaté Moravce
24	wc	I	Žikava	Topoľčany
25	rc	A	Zlaté Moravce	Zlaté Moravce
26	rc	I	Machulince	Zlaté Moravce
27	qz	I	Hostie	Zlaté Moravce
28	wc	I	Jedľové Kostoľany	Zlaté Moravce
29	rc	I	Mojzesovo	Nové Zámky
30	rc	I	Semerovo	Nové Zámky
31	fc	I	Pukanec	Levice
32	qz	I	Šobov	Banská Štiavnica
33	wc	I	Poruba	Trenčín
34	rc	I	Nitrianske Pravno	Trenčín
35	fd	O	Budiš	Turčianske Teplice
36	rc	I	Prievidza	Trenčín
37	qz	O	Kopernica	Žiar nad Hronom
38	be-wc	A	Dolná Ves	Žiar nad Hronom
39	be	I	Kopernica - Slobodné	Žiar nad Hronom
40	be-wc	A	Kopernica	Žiar nad Hronom
41	be	A	Kopernica III	Žiar nad Hronom
42	be	A	Stará Kremnička - Lutila	Žiar nad Hronom
43	be-wc	A	Bartošova Lehôtka - Veľký Háj	Žiar nad Hronom
44	be	A	Bartošova Lehôtka - Okolo salaša	Žiar nad Hronom
45	pe	A	Jastrabá	Žiar nad Hronom
46	be	A	Stará Kremnička I	Žiar nad Hronom
47	qz	O	Kypec	Žiar nad Hronom
48	be	A	Stará Kremnička - Jelšový potok N-II	Žiar nad Hronom
49	ze	I	Bartošová Lehôtka - Paseka	Žiar nad Hronom
50	be-wc	A	Lutila	Žiar nad Hronom
51	be	A	Stará Kremnička - Jelšový potok I	Žiar nad Hronom
52	qz	O	Stará Kremnička-Jelšový Potok	Žiar nad Hronom
53	qz	O	Lutila	Žiar nad Hronom
54	qz	O	Stará Kremnička-Kotlište	Žiar nad Hronom
55	qz	O	Stará Kremnička	Žiar nad Hronom
56	qz	O	Žiar nad Hronom E	Žiar nad Hronom
57	ka	I	Žiar nad Hronom S	Žiar nad Hronom
58	pe	I	Lehôtka pod Brehmi - Bralo	Žiar nad Hronom
59	pe	A	Lehôtka pod Brehmi	Žiar nad Hronom
60	be	A	Hliník nad Hronom	Žiar nad Hronom
61	pe	A	Lesná	Žiar nad Hronom
62	be	A	Hliník nad Hronom I	Žiar nad Hronom
63	ze	O	Sklené Teplice	Žiar nad Hronom
64	rc	I	Martin	Martin
65	rc	I	Turčianska Štiavnička	Martin
66	rc	A	Ružomberok	Ružomberok
67	rc	I	Zvolen	Zvolen
68	be	O	Lieskovec	Zvolen
69	wc	I	Sampor	Zvolen
70	be-wc	O	Očová	Zvolen
71	be	O	Hrochoť	Zvolen
72	qz	O	Látky	Detva
73	ka	I	Uhorské	Poltár
74	rc	I	Pondelok-Suchá	Poltár
75	ka-wc	I	Pondelok	Poltár
76	rc	I	Poltár-Dráhy	Poltár
77	ka	I	Horná Prievrana	Poltár
78	ka	A	Vyšný Petrovec	Poltár
79	ka	I	Breznička	Poltár
80	rc	A	Zelené	Poltár
81	rc	I	Breznička-Červeň	Poltár
82	qs	I	Hrabovo	Poltár

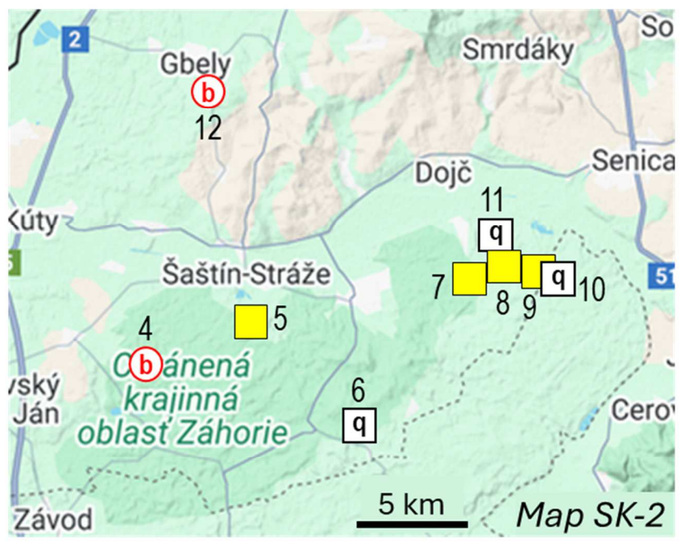


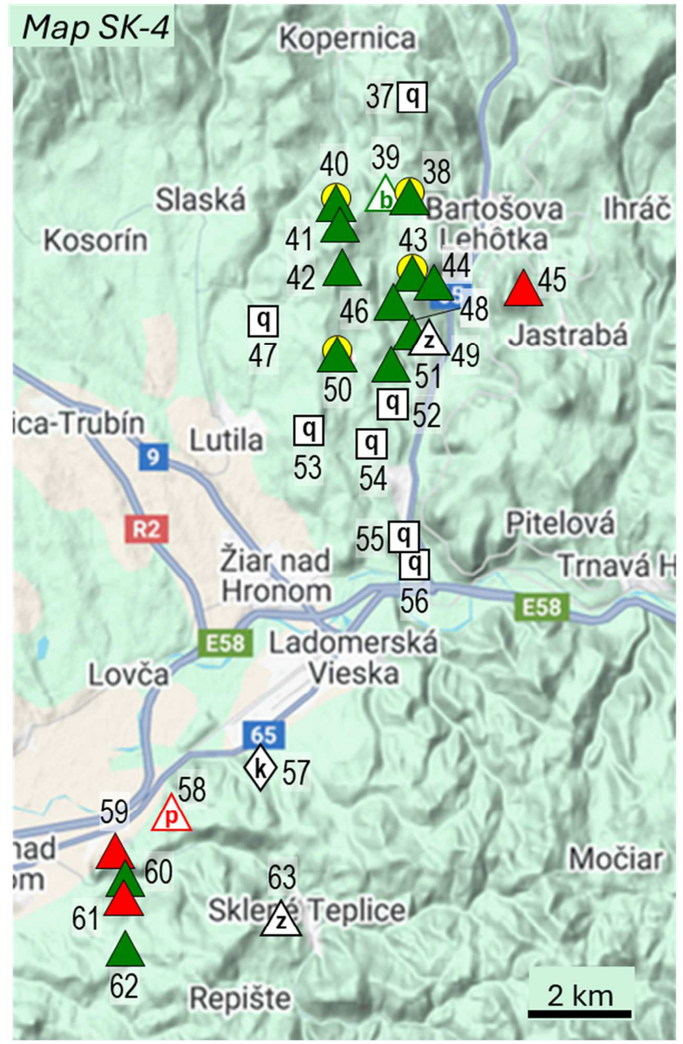


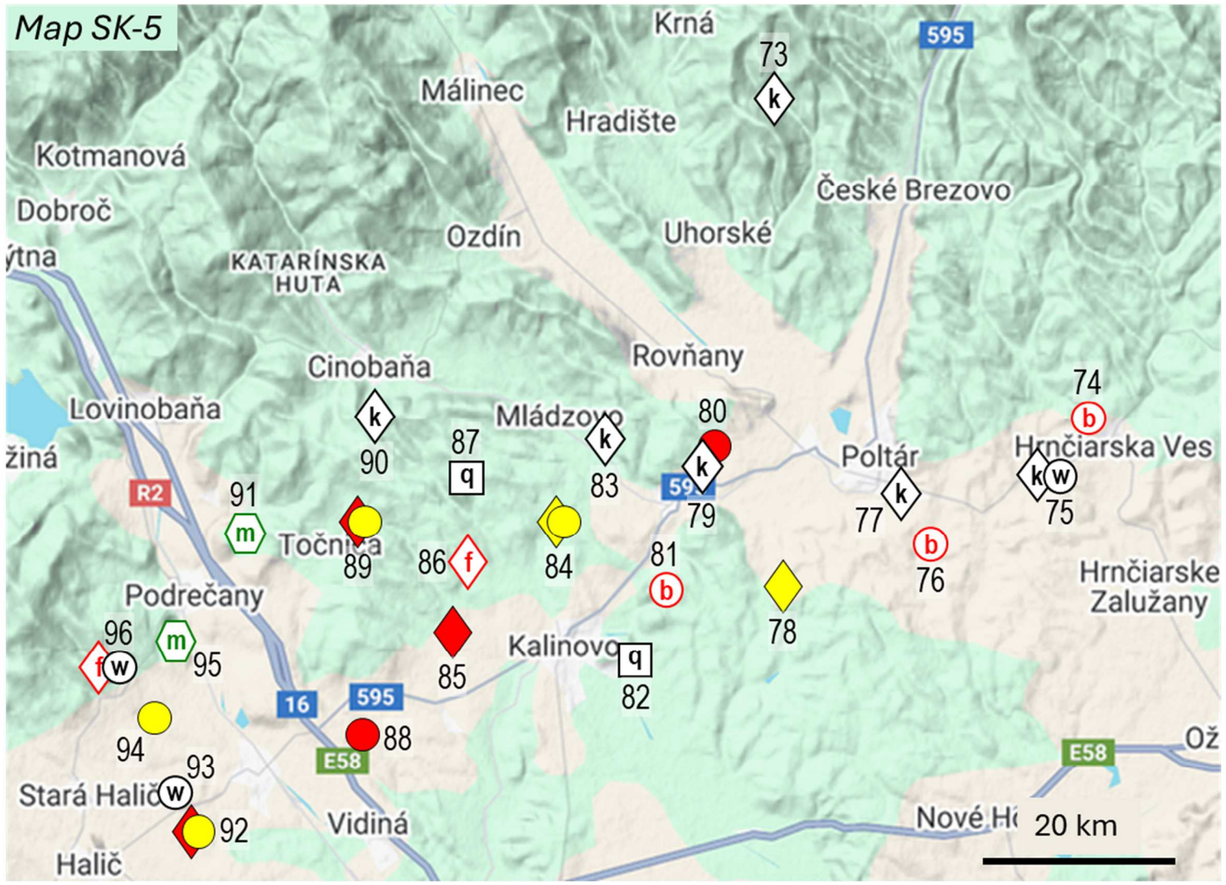












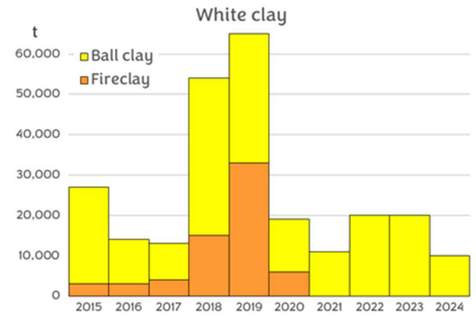
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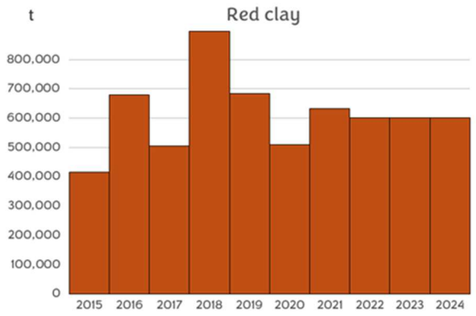
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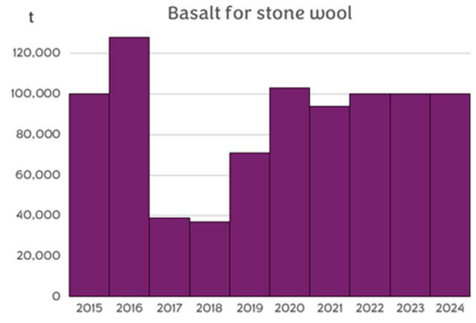
Table SK-b: deposits of raw materials for the ceramic and glass industries in Slovakia.

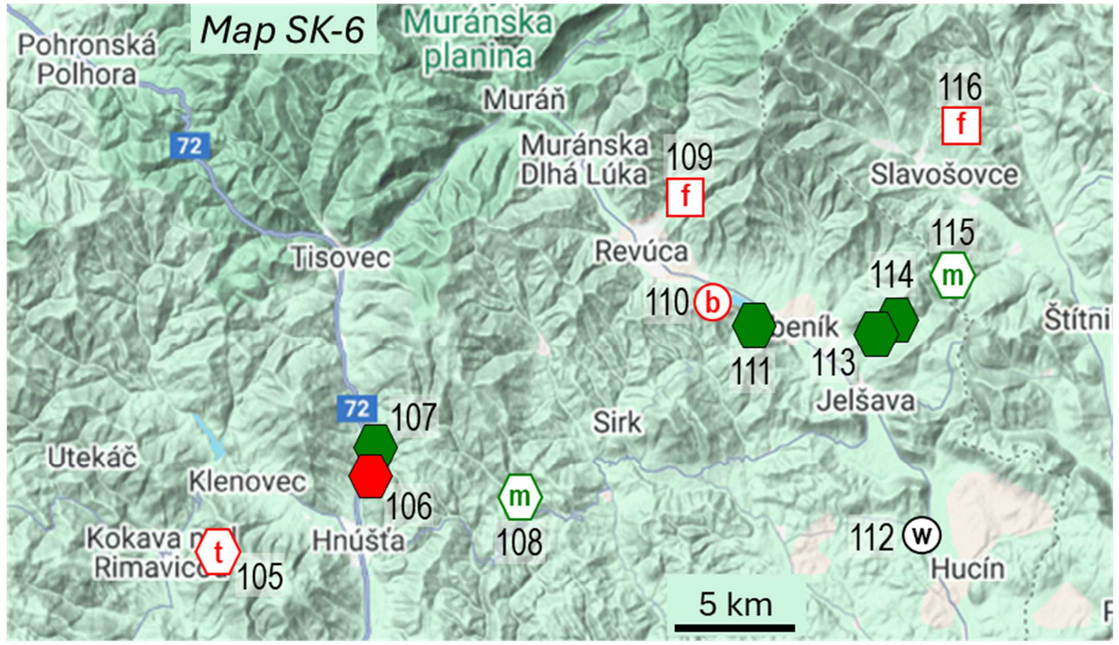
#	r.m.	st	deposit	region
83	ka	I	Mládzovo	Poltár
84	ka-wc	A	Kalinovo	Poltár
85	fc	A	Kalinovo - Močiar	Poltár
86	fc	I	Kalinovo - Briežky	Poltár
87	qz	I	Kalinovo - Zlámanec	Poltár
88	rc	A	Vidiná - Halier	Lučenec
89	ka	O	Cinobaňa	Poltár
90	wc-fc	A	Točnica	Lučenec
91	mg	O	Uderiná	Lučenec
92	wc-fc	A	Halič - Kopáň	Lučenec
93	wc	I	Stará Halič	Lučenec
94	wc	A	Gregorova Vieska	Lučenec
95	mg	I	Podrečany	Lučenec
96	fc-wc	I	Podrečany	Lučenec
97	rc	A	Fabianka	Lučenec
98	bf	A	Bulhary	Lučenec
99	bf	A	Konrádovce	Rimavská Sobota
100	qs	O	Šíd	Lučenec
101	rc	I	Hajnáčka	Rimavská Sobota
102	rc	I	Behynce	Revúca
103	ba	O	Gemerská Ves	Revúca
104	wc	I	Meliata	Rožňava
105	tc	O	Kokava nad Rimavicou	Poltár
106	mg	A	Hnúšťa - Mútnik	Rimavská Sobota
107	tc	A	Hnúšťa - Mútnik	Rimavská Sobota
108	mg	I	Rovné	Rimavská Sobota
109	fd	O	Revúčka	Revúca
110	rc	I	Mokrá Lúka	Revúca
111	mg	A	Lubenik	Revúca
112	wc	I	Šivetice	Revúca
113	mg	A	Jelšava	Revúca
114	mg	A	Jelšava - Dúbravský	Revúca
115	mg	O	Ochtiná	Rožňava
116	fd	O	Slavošovce	Rožňava
117	tc	A	Gemerská Poloma	Košice
118	qz	I	Smolník	Gelnica
119	qz	I	Mníšek nad Hnilcom	Gelnica
120	qz	I	Švedlár - Štofova dolina	Gelnica
121	qz	I	Švedlár	Gelnica
122	qz	I	Stará Voda	Gelnica
123	qz	I	Závadka	Gelnica

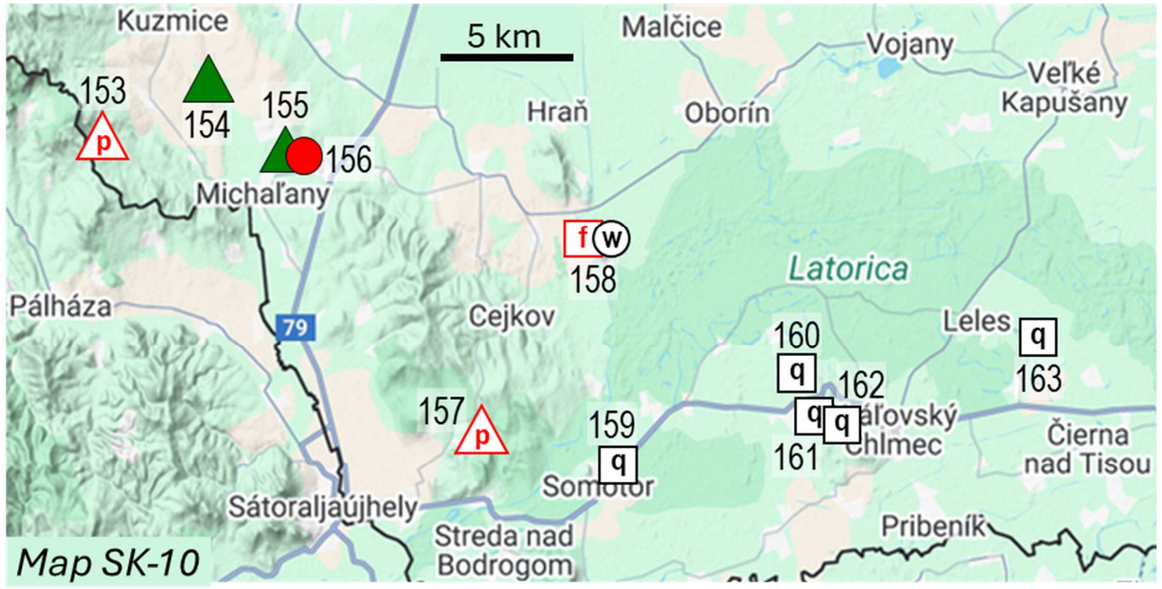
#	r.m.	st	deposit	region
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125	ba	I	Rudňany	Spišská Nová Ves
126	rc	I	Spišské Podhradie	Levoča
127	wc	I	Žarnov	Košice-okolje
128	ba	O	Jaklovce	Gelnica
129	wc	O	Gregorovce	Prešov
130	rc	A	Močarmany	Prešov
131	rc	I	Drienov	Prešov
132	wc	A	Tepličany	Košice
133	mg	I	Košice	Košice
134	wc	I	Hodkovce	Lučenec
135	fd-ka	O	Nováčany	Košice-okolje
136	fd-ka	A	Rudník II	Košice-okolje
137	fd-ka	A	Rudník	Košice-okolje
138	rc	I	Jasov	Košice-okolje
139	wc	I	Šaca	Košice
140	wc	I	Trstené pri Hornáde	Košice-okolje
141	rc	I	Bystré	Vranov nad Topľou
142	rc	I	Tisinec	Stropkov
143	rc	I	Čemerné	Vranov nad Topľou
144	ze	I	Majerovce	Prešov
145	ze	A	Kučín	Prešov
146	ze	A	Nižný Hrabovec	Prešov
147	ze	O	Kučín-Pusté Čemerné	Prešov-Košice
148	ze	O	Pusté Čemerné	Košice
149	fd-wc	I	Oreské	Michalovce
150	ka	I	Biela Hora	Michalovce
151	wc	I	Pozdišovce	Michalovce
152	qs	O	Pavlovce nad Uhom	Michalovce
153	pe	O	Byšta	Trebišov
154	be	A	Brezina - Kuzmice	Trebišov
155	be	A	Michaľany - Lastovce	Trebišov
156	rc	A	Lastovce	Trebišov
157	pe	I	Malá Bara	Trebišov
158	fd-wc	O	Brehov	Trebišov
159	qs	O	Somotor	Trebišov
160	qs	O	Vojka	Trebišov
161	qs	I	Svätuše	Trebišov
162	qs	O	Kráľovský Chlmec	Trebišov
163	qs	O	Kapoňa	Trebišov

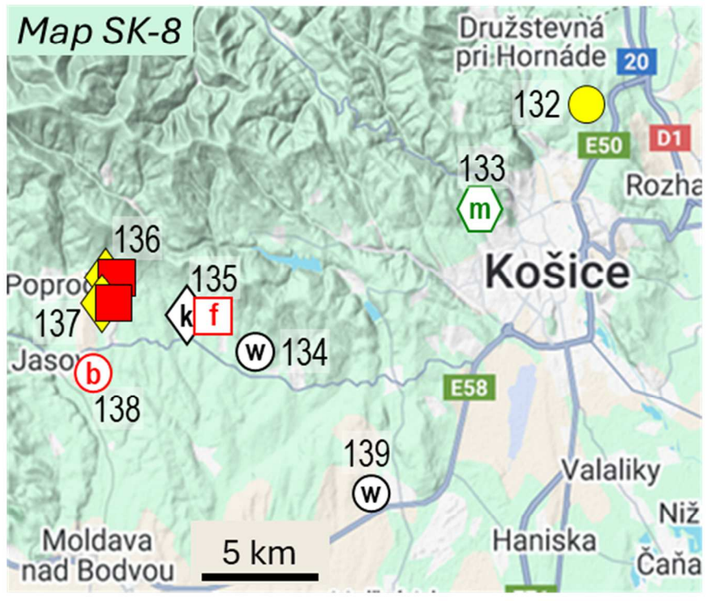


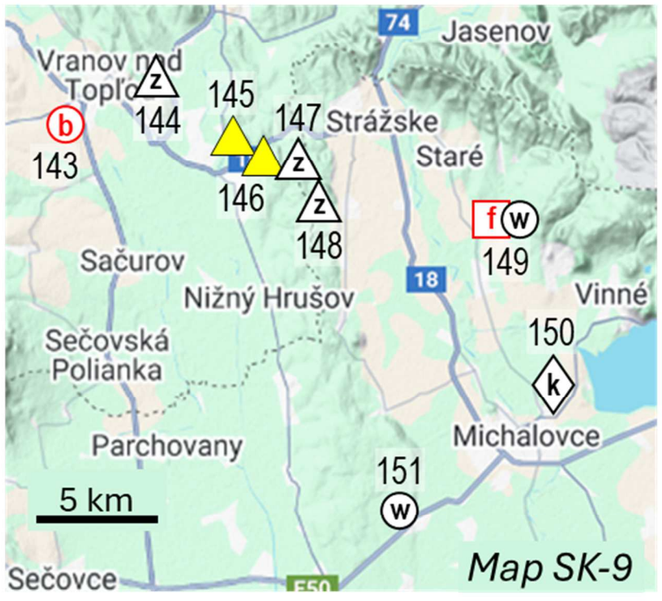








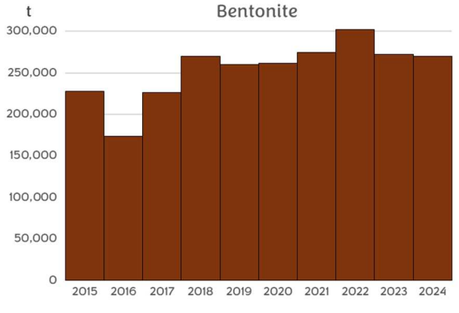


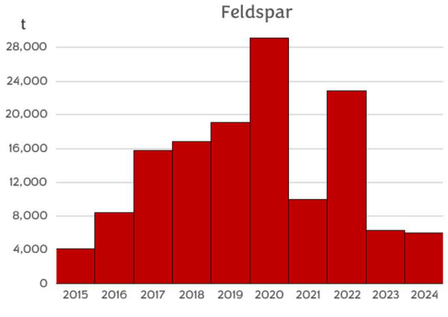


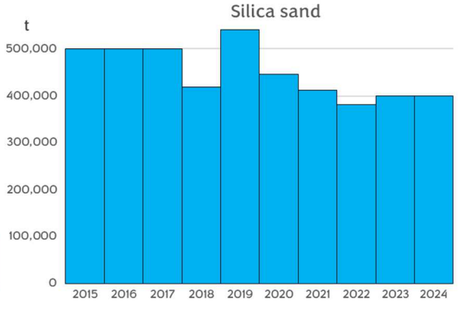
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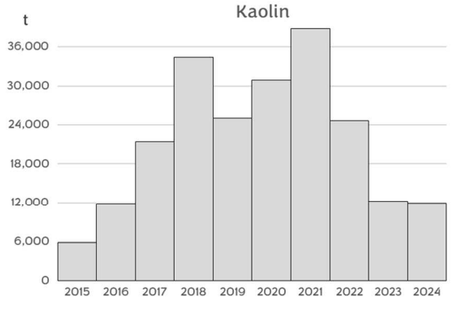
ba	ba
be	be
fd	fd
ka	ka
mg	mg
pe	pe
qs	qs
rc	rc
tc	tc
wc	wc
ze	ze

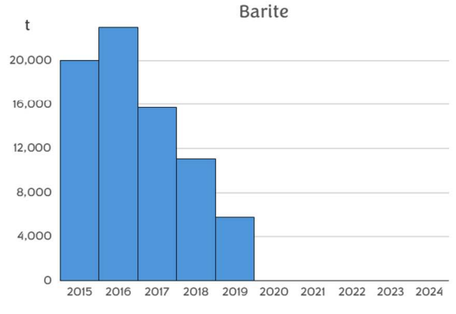












Slovenia

The production of raw materials for ceramics and glass includes red clay (second most intensive use, per capita, in the Euro-Mediterranean area), silica sand, white-firing clay materials (both ball clay and fireclay) as well as modest amounts of bentonite and volcanic tuff for stone wool. Occurrences of kaolin, feldspar and clays for lightweight aggregates, currently unexploited, are also reported [1,2].

Red clays are currently mined for bricks and roof tiles in four quarries with a production of 260,000 tpa (mean 2015-2024) clearly increasing in recent years [1,2]. The main deposits belong to two different contexts: Eocene distal turbidite sequences of the Julian Alps and Carniola [2-4] and Miocene to Quaternary sediments in the Celje and Drava-Ptuj Basins [3-4,6-8]. Reserves ensure at least 30 years at the current rate of consumption.

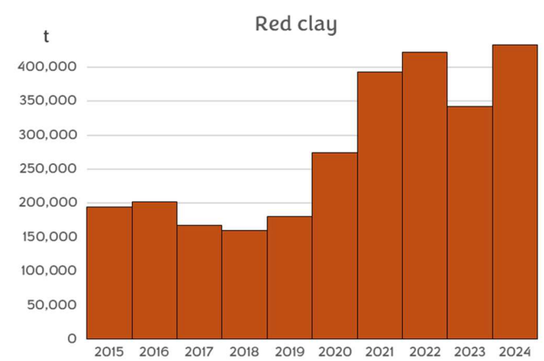
White clays are produced (average 20,000 tpa over the last decade) in two sites: refractory clays come from Globoko, where they occur within Neogene sediments, while ball clays are obtained from an Oligocene deposit at Hom [3-5]. The extent of the reserves is not known.

Silica sands are excavated (348,000 tpa, on average) from Pliocene-Pleistocene sediments, mainly in the Sava Basin [1,2,9].

Bentonite is occasionally produced in an Oligocene-Miocene deposit in the Zagorje Basin, currently mined together with raw materials for stone wool, i.e., Oligocene andesitic tuff of Zaloška Gorica [1-4,10]. **Kaolin** of hydrothermal origin was extracted in the Črna valley, but mining activities have long since been abandoned [9]. Further resources are reported: **feldspar**, as granite and syenite occurrences in the Karavanken [11], and **red clay** for lightweight aggregates, from a Pliocene sequence in the easternmost Slovenia [8].

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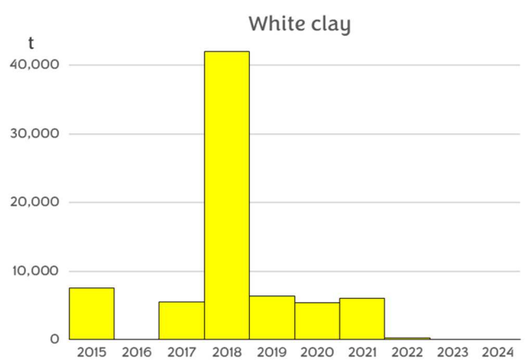
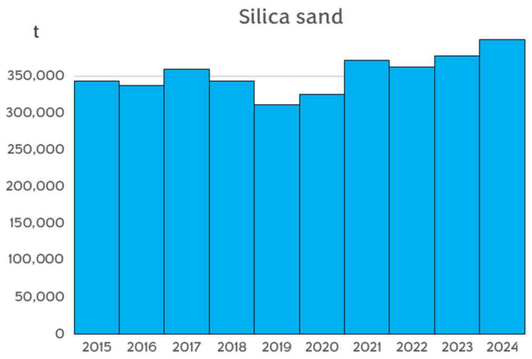


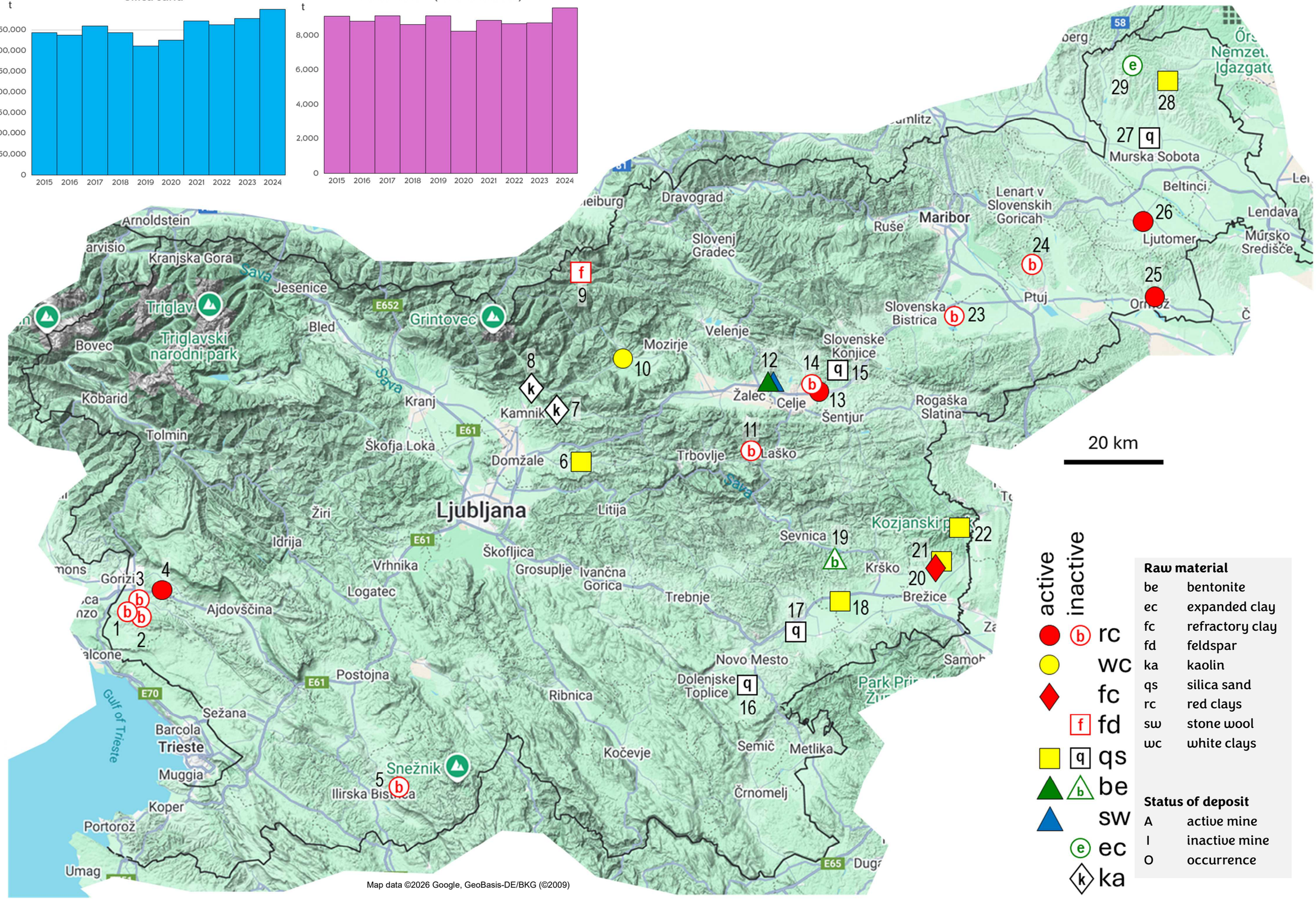
Table SI-a: deposits of raw materials for the ceramic and glass industries in Slovenia.

#	raw material	st	deposit	region
1	rc	I	Dolgi hrib	Renče-Vogrsko
2	rc	I	Tomaški hrib	Renče-Vogrsko
3	rc	I	Biljenski griči	Šempeter-Vrtojba
4	rc	A	Okroglica	Renče-Vogrsko
5	rc	O	Ilirska Bistrica	Ilirska Bistrica
6	qs	A	Moravče	Moravče
7	ka	I	Sela	Laze v Tuhinju
8	ka	I	Črna pri Kamniku	Stahovica
9	fd	O	Črna na Koroškem	Mežica
10	wc	A	Hom	Ljubno
11	rc	O	Huda jama	Laško
12	be-sw	A	Zaloška Gorica	Žalec
13	rc	A	Šmiklavž	Celje
14	rc	I	Zadobrova	Celje
15	qs	O	Vrhe pri Štorah	Šmarje pri Jelšah
16	qs	O	Štebih	Novo Mesto
17	qs	I	Polhovica-Prapreče	Šentjernej
18	qs	A	Ravno	Krško
19	be	O	Lomno	Krško
20	fc	A	Globoko	Brežice
21	qs	A	Globoko	Brežice
22	qs	A	Bizeljsko	Brežice
23	rc	I	Pragersko	Slovenska Bistrica
24	rc	I	Janežovci	Destrnik
25	rc	A	Hardeška šuma	Ormož
26	rc	A	Logarovci	Križevci
27	qs	O	Gorica	Puconci
28	qs	A	Kuštanovci	Gornji Petrovci
29	ec	O	Bomčev Breg	Goričko

Silica sand



Volcanic tuff (for stone wool)



active / inactive

●	ⓑ	rc
●		wc
◆		fc
	f	fd
■	q	qs
▲	ⓑ	be
▲		sw
	e	ec
	◇k	ka

Raw material

be	bentonite
ec	expanded clay
fc	refractory clay
fd	feldspar
ka	kaolin
qs	silica sand
rc	red clays
sw	stone wool
wc	white clays

Status of deposit

A	active mine
I	inactive mine
O	occurrence

Spain

Spain is a major player on the chessboard of glass and ceramic raw materials, being the leading supplier of wollastonite and celestine, and the second largest producer in the Euro-Mediterranean area of red clays, alumina and natural sodium sulphate. In addition, the Spanish mining industry is the third producer of feldspar, the fourth of white clays, the fifth of magnesite and quartzous materials, and the sixth of kaolin. Moreover, bentonite, olivine and zeolites are also extracted, while the production of talc, pyrophyllite and lithium minerals ceased in the last decade [1-6].

Wollastonite is produced from the Aldea del Obispo deposit in Salamanca (*Map ES-5*) originating by metasomatic action on quartz-schists and calc-schists [1,2,7]. Production averages 16,300 tpa and proven reserves are 4.5 million tonnes [7]. Other deposits, formed by contact metamorphism on Cambrian/Precambrian limestones due to Variscan granitic intrusions, are under evaluation in Mérida [8] and Huelva [9].

Strontium minerals are obtained (137,000 tpa of celestine, mean 2015-2024) from two mines (Aurora-Montevive and Escúzar, *Map ES-8*) with reserves around one million tonnes and resources in the order of 12 million tonnes [1,2]. Celestine orebodies are present in the Miocene evaporite succession of the intramontane Granada Basin, where strontium sulphate replaced gypsified stromatolites and occurs in secondary karst deposits [10,11].

Alumina is made (about 1,500,000 tpa) at the San Cibrao plant in Galicia [12].

Natural soda ash is produced (mean 1,535,000 tpa, of which 1,268,000 tpa glauberite and 267,000 tpa thenardite) by two mining districts, which exploit Lower Miocene evaporitic deposits in the Ebro-Rioja (*Map ES-3*) and Madrid (*Map ES-5*) basins [1,2]. Sodium sulphates (glauberite predominant on thenardite/mirabilite) precipitated in association with anhydrite [13] or halite and magnesite [14,15] but subsequently suffered from diagenetic overprinting with leaching of Miocene gypsum cover (Burgos) or Cretaceous-Paleogene anhydrite units (Toledo). Further deposits with glauberite-halite association, currently unexploited, are known from the Miocene Zaragoza Gypsum Formation, Ebro Basin [16,17]. Overall resources of natural soda ash amount to 730 million tonnes [2].

Red clays: Europe's largest mining hub for *red stoneware clay* materials (3,127,000 tpa on average) from a dozen quarries (*Map ES-6*) feeds the production of porous and gresified tiles in the Castellón district [1,2]. The sedimentary sequences of the Iberian System, mainly of fluvial-deltaic environment, offer a broad spectrum of compositions [18-21]: non-carbonatic illitic-kaolinitic clays are extracted from Permo-Triassic sediments, e.g., Moró [22], Jurassic at Chulilla [19] and Cretaceous [23-25], both in Weald facies (Mora, Villár) and in Utrillas facies (Galve, Morella). Carbonatic clays of marine origin are from the Miocene (Mas Vell) and Pliocene-Quaternary [26]. In the rest of Spain, red clays are extracted from around ninety quarries distributed throughout the country (mean 4,607,000 tpa) which are essentially used for the production of bricks and roof tiles [1,2]. There is a wide range of sources of clay materials: Quaternary to Pliocene fluvial sediments [27-30]; Neogene marine sequences [27,31,32]; Oligocene-Miocene continental deposits [33-36]; fluvio-lacustrine formations of Cretaceous [32] and Triassic age [36,37].

Feldspar: there are numerous sources of felspathic materials for an average production of 728,000 tpa from seven mines [1,2]. The main source is represented by the aeolian arkoses in the Segovia area (Carrascal del Río and Río Pirón, *Map ES-5*) which provide both potassium feldspar and feldspathic sands [38,39]. The contribution of kaolin processing by-products (Poveda de la Sierra, Villár del Arzobispo, *Map ES-6*) is also important. Minor output is ensured by aplites and pegmatites [40-43], with active mines in Catalonia and Andalusia, albitite in Galicia [44] and granite in Extremadura [2]. Spanish resources of feldspathic materials are substantial, with potassium feldspar reserves of 37 million tonnes, while those of sodium feldspar are around 2 million tonnes [2].

White clays are extracted in around twenty mines in the Iberian Range: Oliete-Ariño, Utrillas-Aliaga and Castellote basins (*Map ES-6E*). Lower Cretaceous ball clays and fireclays, pertaining to Utrillas and Escucha formations, were deposited in mudflat environment with freshwater swamp plains, interbedded with subbituminous coals [45-51]. Outside the Iberian Range, ball clay is extracted at Basconcillo del Tozo (Burgos) and, together with bentonite, at Tamame de Sayago (Zamora) from a deposit formed by hydrothermal alteration and weathering of granite [52]. Refractory clays are also obtained as byproducts of kaolin processing (*Map ES-6*). The Spanish production of white clays is on average 1,207,000 tpa, plus 792,000 tonnes of fireclay and red clay byproducts [1]. Further deposits are known in weathered Ordovician phyllites [53] and Cretaceous-Paleocene kaolinized laterites [54] but not currently exploited.

Magnesite is extracted (653,000 tpa, average 2015-2024) from three mines in Navarra, Galicia and Castilla-León [1,2]. The Eugui magnesite deposit occurs in limestone series at the Carboniferous-Devonian boundary in the Aldudes-Quinto Real massif [55]. The Rubián deposit is hosted by a Cambrian carbonate-siliciclastic meta-sedimentary sequence in the West Asturian-Leonese Zone [56]. The Borobia stratiform magnesite deposit is sandwiched between Cambrian carbonates and shales of the Eastern Iberian Chain [57].

Quartzous materials are recovered from both silica sands (nearly 60 quarries supplying 4,152,000 tpa on average) and quartz veins by about twenty mines producing 1,061,000 tpa [1,2]. The main sources of silica sand are Cenozoic sandstones [58] and Triassic Bundsandstein [59], while hydrothermal quartz deposits are found essentially in the Central Iberian Zone [60] and West Asturian-Leonese Zone [61] (*Map ES-2*).

Kaolin: occurrences of kaolinized rocks are quite common and have different origins [62,63]. The most frequent is kaolinization by weathering of Variscan granitoids in Galicia – e.g. , Vimianzo and Montecastelo [64-66] – as well as Cretaceous arkosic sandstones [62] both in the Utrillas facies (Riodeva, *Map ES-6F*) and in the Weald facies in the provinces of Guadalajara (Poveda de la Sierra, *Map ES-6F*), Cuenca (Carboneras de Guadaozón, *Map ES-6H*) and Valencia (Alpuente, Higueruelas, Villár del Arzobispo, *Map ES-6I*). These mines also supply, as by-products, refractory clays, quartz and feldspar. Furthermore, kaolin derived from the alteration of the Paleozoic basement is exploited: weathering of Silurian slates in Almuradiel (Ciudad Real) and flint clay derived from volcanic ash in the Ordovician sequence of the Salas-Tineo district in Asturias [67]. In addition, there are deposits (e.g., Jove in Galicia) of hydrothermal origin [62]. The average production is 358,000 tpa of washed kaolin (from 25 mines) and reserves exceed 200 million tonnes of raw kaolin [1,2].

Bentonite is extracted by half a dozen mines (162,000 tpa on average) operating in Almería, Toledo and Zamora provinces, with reserves estimated to be 15 million tonnes [1,2,68]. Bentonites are found in Miocene fluvial-lacustrine deposits of the Tajo Basin [68] or are originated by hydrothermal alteration of Variscan granite in Tamame de Sayago [52] and Miocene pyroclastic rocks (rhyolite and dacite) in the Cabo de Gata district [68-71]. In the same area (*Map ES-8O*) important deposits of **zeolites** (mordenite) occur as epiclastic tuffs interbedded with volcanic bentonitised materials, which underwent hydromagmatic activity [71]; officially, there is no production, but resources appear to be substantial.

Talc: Spanish production, on average 13,000 tpa in the 2017-2019 period, ended in 2021, despite there still being 5.6 million tonnes of resources [1,2,6]. Two deposits exploited talc-chlorite lenses, hosted in hydrothermal dolostones replacing Carboniferous limestones in Puebla de Lillo [72,73] or formed by metasomatism of ultrabasic rocks in the Serrania de Ronda [74]. **Olivine** is extracted (~760,000 tpa on average) from the ultrabasic massif of Cabo Ortegal (*Map ES-2*) in the form of partially serpentinized dunite [75].

Lithium minerals: although the extraction of lithium-bearing pegmatite from La Fregeneda (Salamanca), carried out from 1992 to 2010, is now abandoned [6,76], there are considerable activities of mineral prospecting in the Central Iberian Zone (*Map ES-5*) that have as main target pegmatites containing spodumene, petalite, Li-mica, or Li-phosphates [77-80]. Furthermore, half a dozen deposits have been identified in Extremadura, which pertain to a new type, linked to the metasomatic enrichment of Ordovician sediments, e.g., Valdeflorez and El Trasquilón [81].

Pyrophyllite has been mined in Extremadura until 2012, with peak production of 5600 tonnes in 2011 [6,82].

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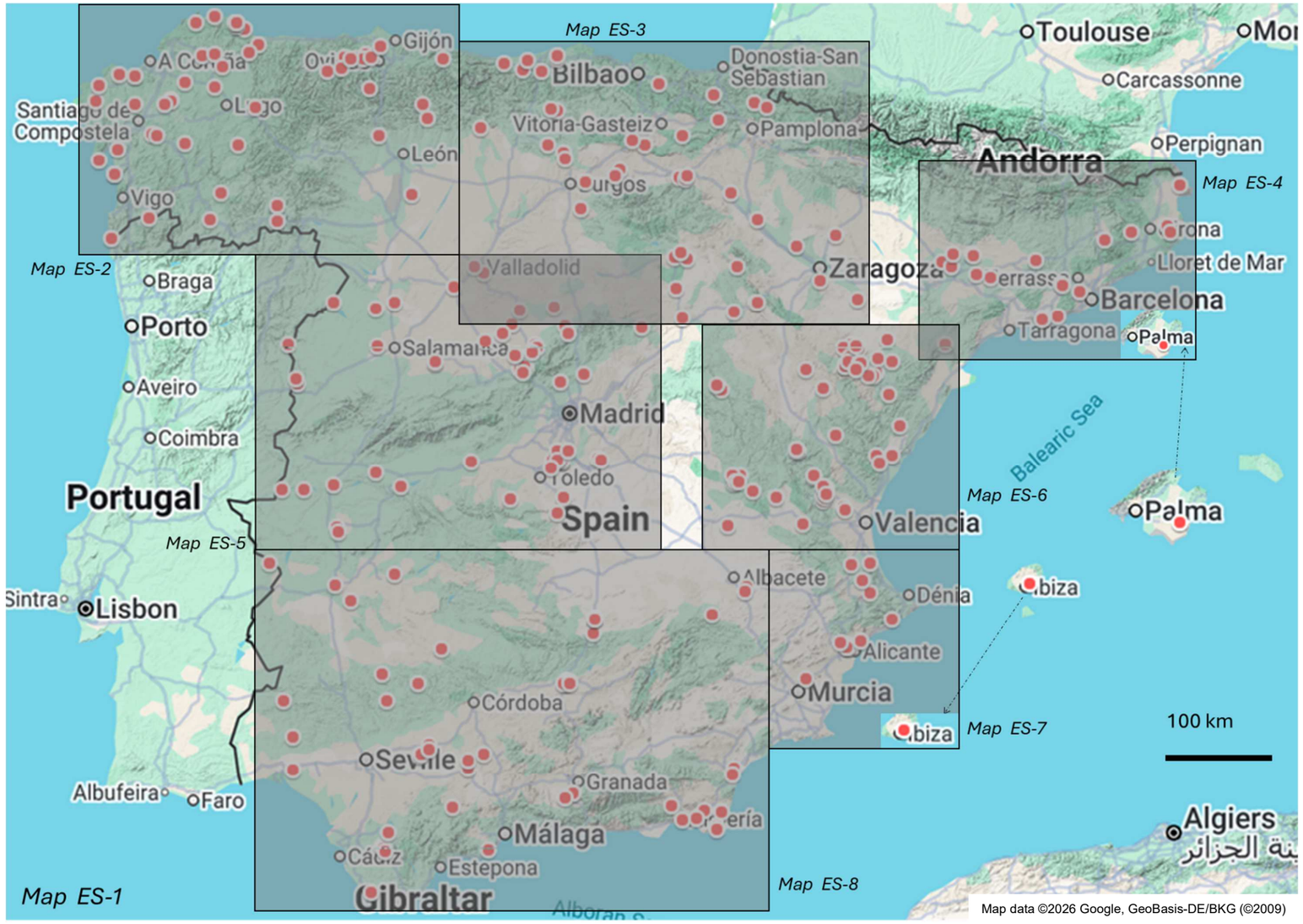
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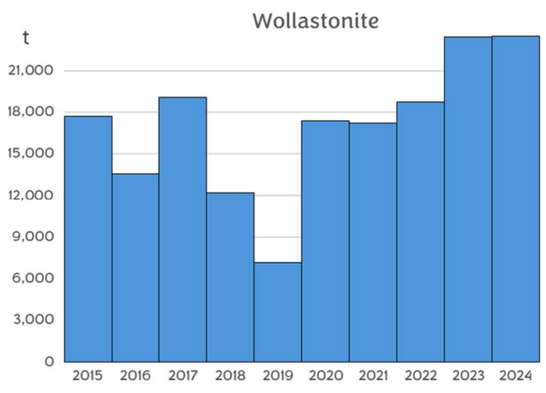
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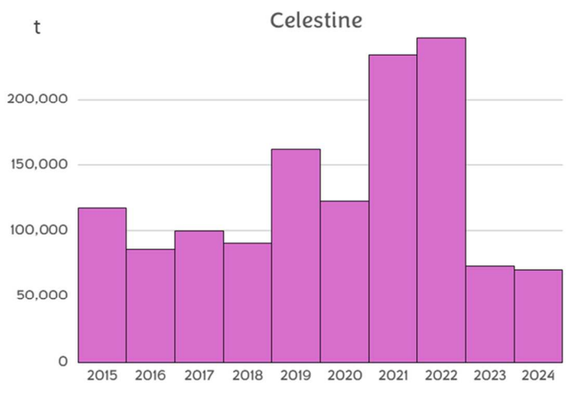
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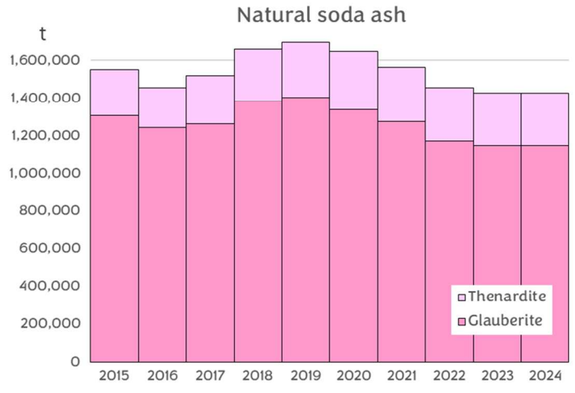
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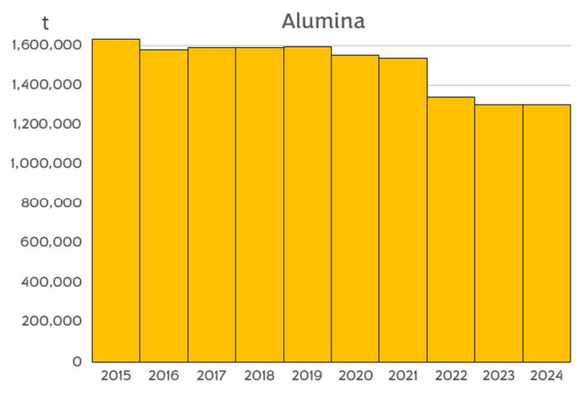
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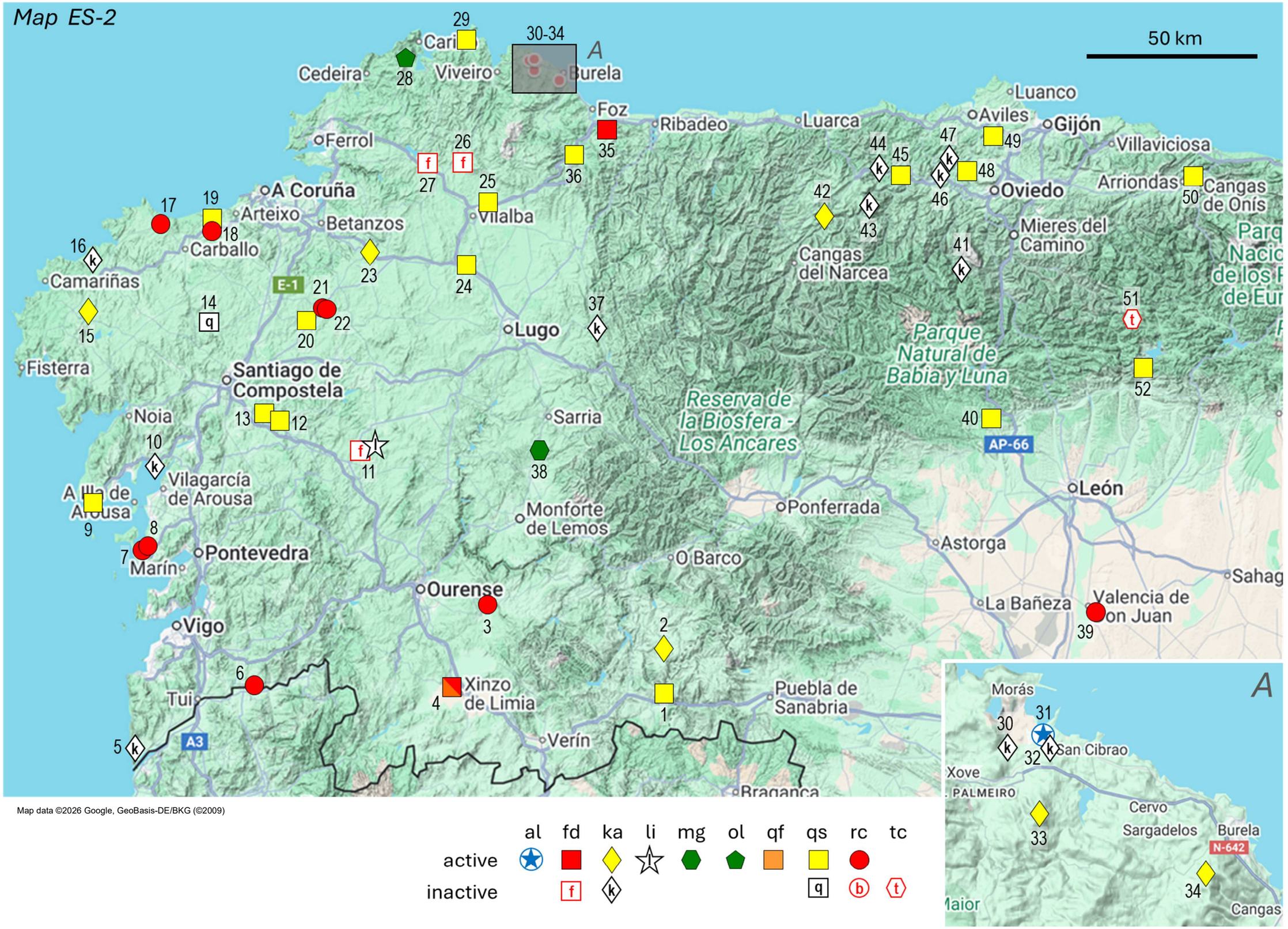
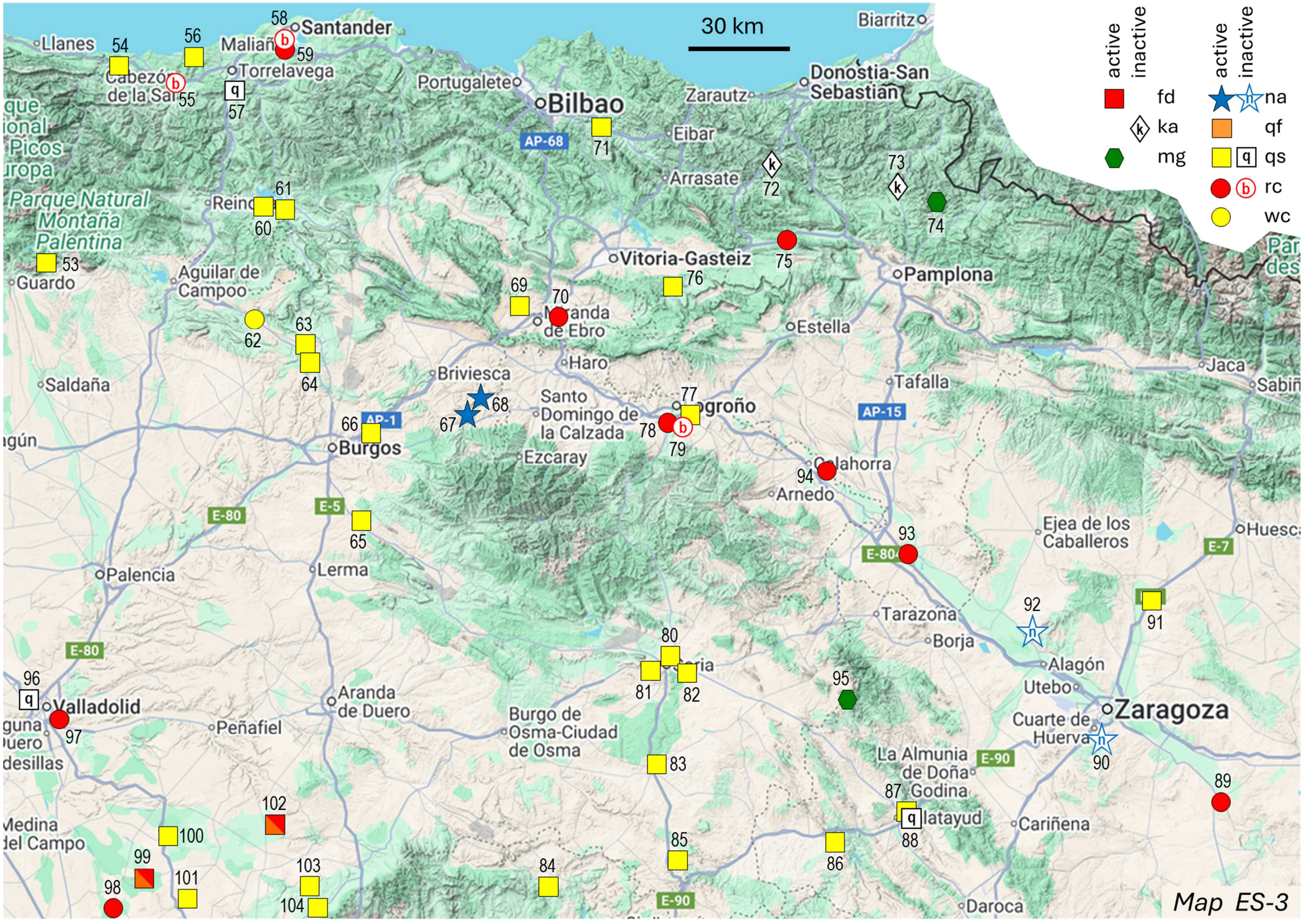

Map ES-2
50 km
A
Cedeira
Viveiro
Burela
Foz
Ribadeo
Luarca
Luanco
Aviles
Gijón
Villaviciosa
Ferrol
A Coruña
Arteixo
Carballo
Betanzos
Vilalba
Arriondas
Cangas de Onís
Oviedo
Mieres del Camino
Cangas del Narcea
Camariñas
Fisterra
Lugo
Santiago de Compostela
Noia
Sarria
Parque Natural de Babia y Luna
Reserva de la Biosfera - Los Ancares
AP-66
León
Vilagarcía de Arousa
Monforte de Lemos
Ponferrada
Astorga
Pontevedra
Marín
O Barco
Ourense
Vigo
La Bañeza
Valencia de Don Juan
Tui
Xinzo de Limia
Puebla de Sanabria
Verín
A3
E-1
Morás
San Cibrao
Xove
PALMEIRO
Cervo
Sargadelos
Burela
N-642
Cangas
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)
al fd ka li mg ol qf qs rc tc
active
inactive

Table ES-a: deposits of raw materials for the ceramic and glass industries in Spain.

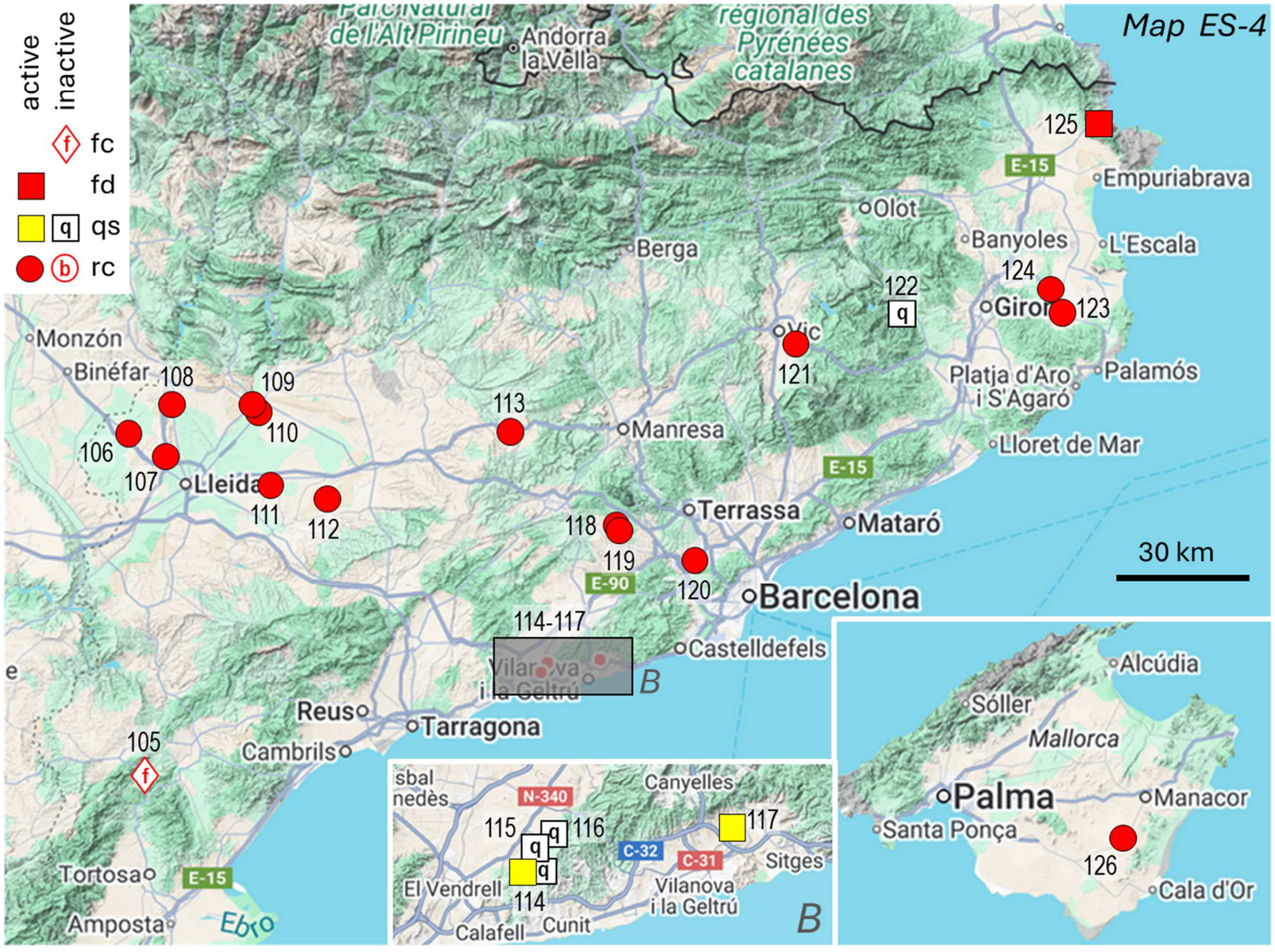
#	r.m.	st	deposit	province
1	qz	A	Mina Leymon	Zamora
2	ka	A	Penouta	Ourense
3	rc	A	Veigacha	Ourense
4	fd-qf	A	Xinzo de Limia	Orense
5	ka	O	A Guarda-El Rosal	Pontevedra
6	rc	A	Salvaterra del Miño	Pontevedra
7	rc	A	Sanxenxo	Pontevedra
8	rc	A	Vilalonga	Pontevedra
9	qz	A	Cruxeiras	A Coruña
10	ka	I	Rianxo	A Coruña
11	fd-li	O	Lalin-Forcarei	Pontevedra
12	qz	A	El Castillo	Pontevedra
13	qz	A	Mina Serrabal	A Coruña
14	qz	I	Mina Esmeralda	A Coruña
15	ka	A	Vimianzo	A Coruña
16	ka	I	Laxe	A Coruña
17	rc	A	Barreiros	A Coruna
18	rc	A	Laracha	A Coruna
19	qz	A	Cruceiro	A Coruña
20	qz	A	Frades	A Coruña
21	rc	A	Frades	A Coruna
22	rc	A	Verea	A Coruna
23	ka	A	Montesalgueiro	A Coruña
24	qz	A	Begonte	Lugo
25	qz	A	Vilalba	Lugo
26	fd	I	Silán	Lugo
27	fd	O	Puentes de Garcia Rodríguez	A Coruña
28	ol	A	Mina David-Ortigueira	A Coruña
29	qz	A	Mina Sonia	A Coruña
30	ka	I	Lago	Lugo
31	al	A	San Cibrao	Lugo
32	ka	I	San Cibrao	Lugo
33	ka	A	Cervo-Jove	Lugo
34	ka	A	Nuevo Montecastelo	Lugo
35	fd	A	Barreiros	Lugo
36	qz	A	Mondoñedo	Lugo
37	ka	O	Cádabo	Lugo
38	mg	A	Rubián	Lugo
39	rc	A	Valencia de Don Juan	Leon
40	qs	A	Adelina-Bobia	León
41	ka	I	Barzana	Oviedo
42	ka	A	Tineo	Oviedo
43	ka	I	Arbodas	Oviedo
44	ka	I	Salas	Oviedo
45	qz	A	Monteagudo-La Cuesta	Asturias
46	ka	I	Peñaflor	Oviedo
47	ka	I	Sierra del Pedroso	Oviedo
48	qs	A	Ana-Las Regueras	Asturias
49	qs	A	Corvera de Asturias	Asturias
50	qz	A	Mina Kopelia-Parres	Asturias
51	tc	I	Puebla de Lillo	León
52	qz	A	Amistad-Valdecastillo	León
53	qs	A	Villafría de la Peña	Palencia
54	qs	A	Serdio-Las Brañas	Cantabria
55	rc	I	Tejera de Navas del Turujal	Cantabria
56	qs	A	Quintanilla	Cantabria
57	qz	I	Mina San Antonio	Cantabria
58	rc	I	Muriedas	Cantabria
59	rc	A	Revilla	Cantabria
60	qs	A	Vilga-Arija	Burgos
61	qs	A	Virginia-Valdebezana	Burgos
62	wc	A	Basconcillos del Tozo	Burgos
63	qs	A	El Pino-Los Montecillos	Burgos
64	qs	A	Montorio	Burgos
65	qs	A	Cubillo del Campo	Burgos
66	qs	A	Las Arenas-Atapuerca*	Burgos
67	na	A	Santa Marta-Belorado	Burgos
68	na	A	Cerezo del Río Tirón	Burgos
69	qs	A	Guinicio	Burgos
70	rc	A	Armiñón	Álava
71	qs	A	Aveleta	Vizcaya
72	ka	I	Zizurkil-Alegia	Guipuzcoa
73	ka	I	Ziga-Puerto del Velate	Navarra
74	mg	A	Eugui	Navarra
75	rc	A	Utzubar	Navarra
76	qs	A	Mina Esther	Álava
77	qs	A	La Plana	La Rioja
78	rc	A	Sampedro-Lardero	La Rioja
79	rc	I	Moreno-Alberite	La Rioja
80	qs	A	El Salegar	Soria
81	qs	A	Carbonera de Frentes	Soria
82	qs	A	El Barrancon	Soria
83	qs	A	La Chavola-Almazan	Soria
84	qz	A	Santa Ana	Guadalajara
85	qs	A	Los Blanquizales	Soria
86	qs	A	San Pedro	Zaragoza
87	qs	A	Embid-Calatayud	Zaragoza
88	qs	I	Prado-Calatayud	Zaragoza
89	rc	A	Quinto	Zaragoza
90	na	I	Montes de Torrero	Zaragoza
91	qs	A	Santa Quiteria-Zuera	Zaragoza
92	na	I	Remolinos	Zaragoza
93	rc	A	Tudela	Navarra
94	rc	A	La Estanca-Calahorra	La Rioja
95	mg	A	Borobia	Soria
96	qs	I	Puerta del Monte	Valladolid
97	rc	A	Cistérniga	Valladolid
98	rc	A	Navas de la Asuncion	Segovia
99	fd-qf	A	Río Pirón	Segovia
100	qs	A	Sanchonuño	Segovia
101	qs	A	El Cerrillo	Segovia
102	fd-qf	A	Carrascál del Rio	Segovia
103	qs	A	Orejana	Segovia
104	qs	A	Eficacia-Arcones	Segovia
105	fc	I	Horta de Sant Joan & Pinell de Brai	Tarragona

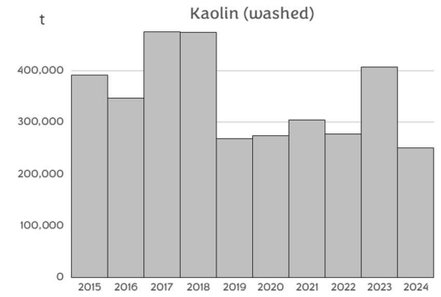


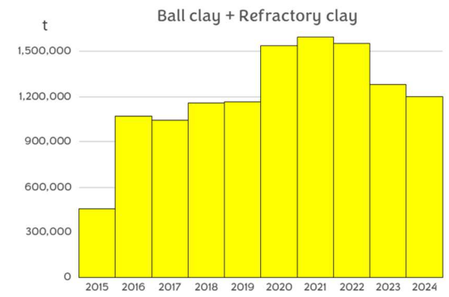
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)

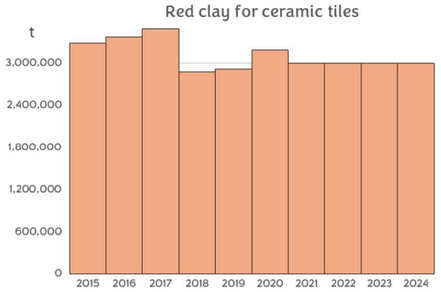
Table ES-b: deposits of raw materials for the ceramic and glass industries in Spain.

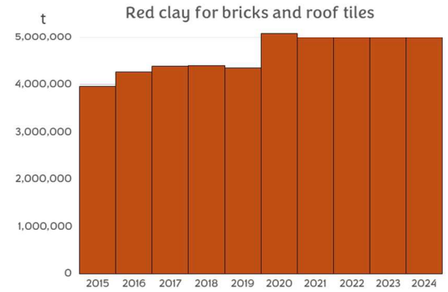
#	r.m.	st	deposit	province
106	rc	A	Almacelles	Lleida
107	rc	A	Alpicat	Lleida
108	rc	A	Almenar	Lleida
109	rc	A	Balaguer 1	Lleida
110	rc	A	Balaguer 2	Lleida
111	rc	A	Fondarella	Lleida
112	rc	A	Belianes	Lleida
113	rc	A	Calaf	Barcelona
114	qs	A	Bellvei*	Barcelona
115	qs	A	Maria I*	Barcelona
116	qs	I	La Gornal*	Tarragona
117	qs	A	Sant Pere de Ribes	Barcelona
118	rc	A	Hostalets de Pierola 1	Barcelona
119	rc	A	Hostalets de Pierola 2	Barcelona
120	rc	A	Rubì	Barcelona
121	rc	A	Santa Eugenia de Berga	Barcelona
122	qs	I	Gorners	Gerona
123	rc	A	Corçà	Girona
124	rc	A	La Pera	Girona
125	fd	A	Llançá	Girona
126	rc	A	L'Estoret	Baleares
127	fd-li	O	Pinilla de Fermoselle	Zamora
128	wc-be	A	Támame de Sayago	Zamora
129	rc	A	Corrales del Vino	Zamora
130	qs	A	Tordesillas	Valladolid
131	qz	A	Las Monjas-Arevalo	Ávila
132	rc	A	Bernuy de Porreros	Segovia
133	qs	A	Espirdo-Basardilla	Segovia
134	qs	A	Zamarramala	Segovia
135	qs	A	Juarros de Riomoros*	Segovia
136	qs	A	Riomoros	Segovia
137	qs	A	Abades*	Segovia
138	rc	A	Otero de Herreros N	Segovia
139	ka	O	Otero de los Herreros	Segovia
140	ka	O	Vegas de Matute	Segovia
141	rc	I	Los Ángeles	Segovia
142	fd	I	El Vellón	Madrid
143	fd	O	Los Rancajales - El Jaralón	Madrid
144	qz	A	Salavila 1*	Salamanca
145	qz	A	Salavila 2*	Salamanca
146	fd-li-ka	O	Golpejas	Salamanca
147	fd-li	I	La Fregeneda	Salamanca
148	wo	A	Aldea del Obispo	Salamanca
149	fd-li	O	Castillejo de Dos Casas	Salamanca
150	li	O	Piedras Albas	Cáceres
151	fd	A	Alfa I-Ceclavín	Caceres
152	li	O	Cañaveral	Cáceres
153	li	I	Valdeflorez	Cáceres
154	li	O	El Trasquilón	Cáceres
155	qz	A	Blanca-San Benito	Cáceres
156	li	O	Belvís de Monroy	Cáceres
157	rc	A	Pepino-Talavera de la Reina	Toledo
158	ka	O	San Martín de Montalbán	Toledo
159	rc	A	Los Yebenes	Toledo
160	rc	I	Mora	Toledo
161	be	A	Yunclillos-Cabañas de la Sagra	Toledo
162	rc	A	Yuncler	Toledo
163	rc	A	Villaluenga de la Sagra	Toledo
164	rc	A	Cobeja	Toledo
165	rc	A	Alameda de la Sagra S	Toledo
166	rc	A	Alameda de la Sagra N	Toledo
167	rc	A	Pantoja 2	Toledo
168	rc	A	Pantoja 1	Toledo
169	rc	A	Pantoja 3	Toledo
170	rc	A	Numancia de la Sagra S	Toledo
171	rc	A	Numancia de la Sagra N	Toledo
172	rc	A	Iliescas 1	Toledo
173	rc	A	Iliescas 2	Toledo
174	be	A	Esquivias (Illescas-Yuncos)	Toledo
175	na	A	Colmenar de Oreja	Madrid
176	na	A	Villarrubia de Santiago	Toledo
177	ka-qz-fd	A	Peñalén	Guadalajara
178	ka-qz-fd	A	Arroyo Medero (Poveda de la Sierra)	Guadalajara
179	ka-qz-fd	A	Laguna (Poveda de la Sierra)	Guadalajara
180	qs	A	Alpeñes	Teruel
181	wc	A	Los Majuelos	Teruel
182	wc	A	Campillo Bajo	Teruel
183	wc	A	Demasia	Teruel
184	wc	A	Alloza	Teruel
185	wc	A	Val de Ariño	Teruel
186	wc-rc	A	Alcañiz	Teruel
187	wc	A	Portomé	Teruel
188	wc	A	Crivillén	Teruel
189	wc	A	Rio Escuriza	Teruel
190	wc	A	Estercuel	Teruel
191	wc	A	Elena	Teruel
192	wc	A	Miviña	Teruel
193	qs	I	Pozo del Salto	Teruel
194	wc	A	La Mata de los Olmos	Teruel
195	wc	A	Los Olmos	Teruel
196	qs	A	El Olmo-Molinos	Teruel
197	qs	A	Alcorisa	Teruel
198	wc	A	Carmen y Pura	Teruel
199	wc	A	La Cañada de Verich	Teruel
200	wc	A	Capillas	Teruel
201	wc	A	Embalse de Santolea	Teruel
202	wc	A	Santolea	Teruel
203	sc	A	Galve	Teruel
204	sc	A	Morella	Castellón
205	qs	A	Sant Pau	Castellón
206	sc	A	Mora de Rubielos	Castellón
207	sc	A	Col de la Basella	Castellón
208	sc	A	San Juan de Morò	Castellón
209	sc	I	Araya	Castellón
210	sc	A	Mas Vell	Castellón

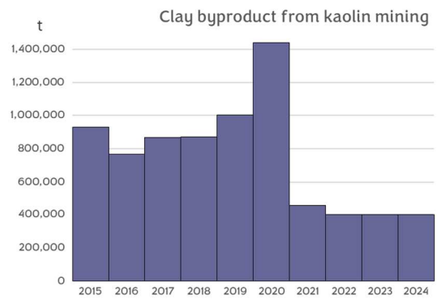

active
inactive
fc
fd
qs
rc
Map ES-4
Parc Natural de l'Alt Pirineu
Andorra la Vella
Parc régional des Pyrénées catalanes
Monzón
Binéfar
Lleida
Berga
Olot
Vic
Manresa
Terrassa
Mataró
Barcelona
Castelldefels
Empuriabrava
L'Escala
Banyoles
Girona
Platja d'Aro i S'Agaró
Palamós
Lloret de Mar
Reus
Tarragona
Cambrils
Tortosa
Amposta
Ebro
Sitges
Vilanova i la Geltrú
El Vendrell
Calafell
Cunit
Canyelles
Sóller
Alcúdia
Mallorca
Palma
Manacor
Santa Ponça
Cala d'Or
E-15
E-90
N-340
C-32
C-31
105
106
107
108
109
110
111
112
113
114
115
116
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118
119
120
121
122
123
124
125
126
114-117
30 km
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)

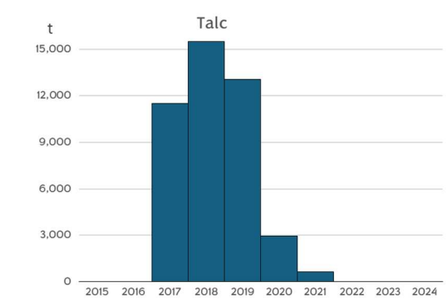

Kaolin (washed)
t
400,000
300,000
200,000
100,000
0
2015 2016 2017 2018 2019 2020 2021 2022 2023 2024

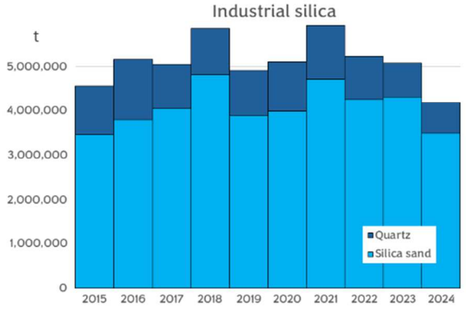

Ball clay + Refractory clay
t
1,500,000
1,200,000
900,000
600,000
300,000
0
2015 2016 2017 2018 2019 2020 2021 2022 2023 2024

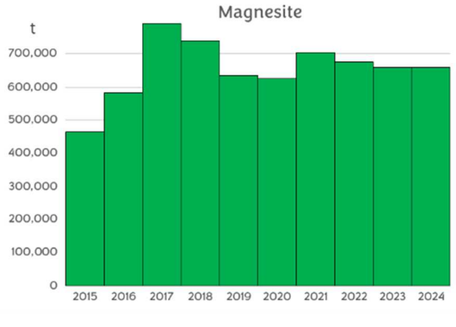

Red clay for ceramic tiles
t
3,000,000
2,400,000
1,800,000
1,200,000
600,000
0
2015 2016 2017 2018 2019 2020 2021 2022 2023 2024

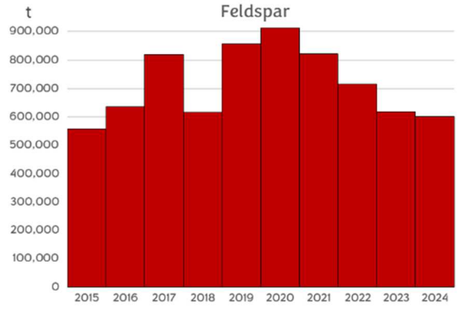

Red clay for bricks and roof tiles
t
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
2015 2016 2017 2018 2019 2020 2021 2022 2023 2024

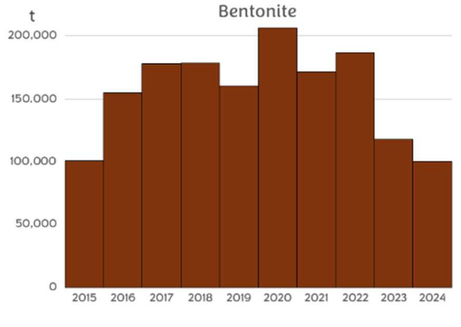

Clay byproduct from kaolin mining
t
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
2015 2016 2017 2018 2019 2020 2021 2022 2023 2024

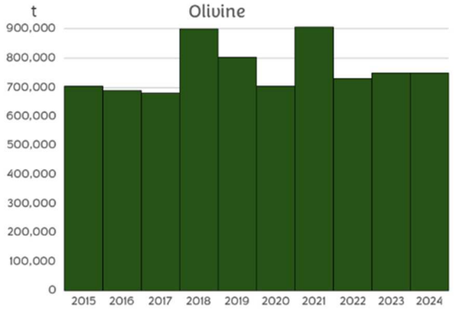

Talc
t
15,000
12,000
9,000
6,000
3,000
0
2015 2016 2017 2018 2019 2020 2021 2022 2023 2024

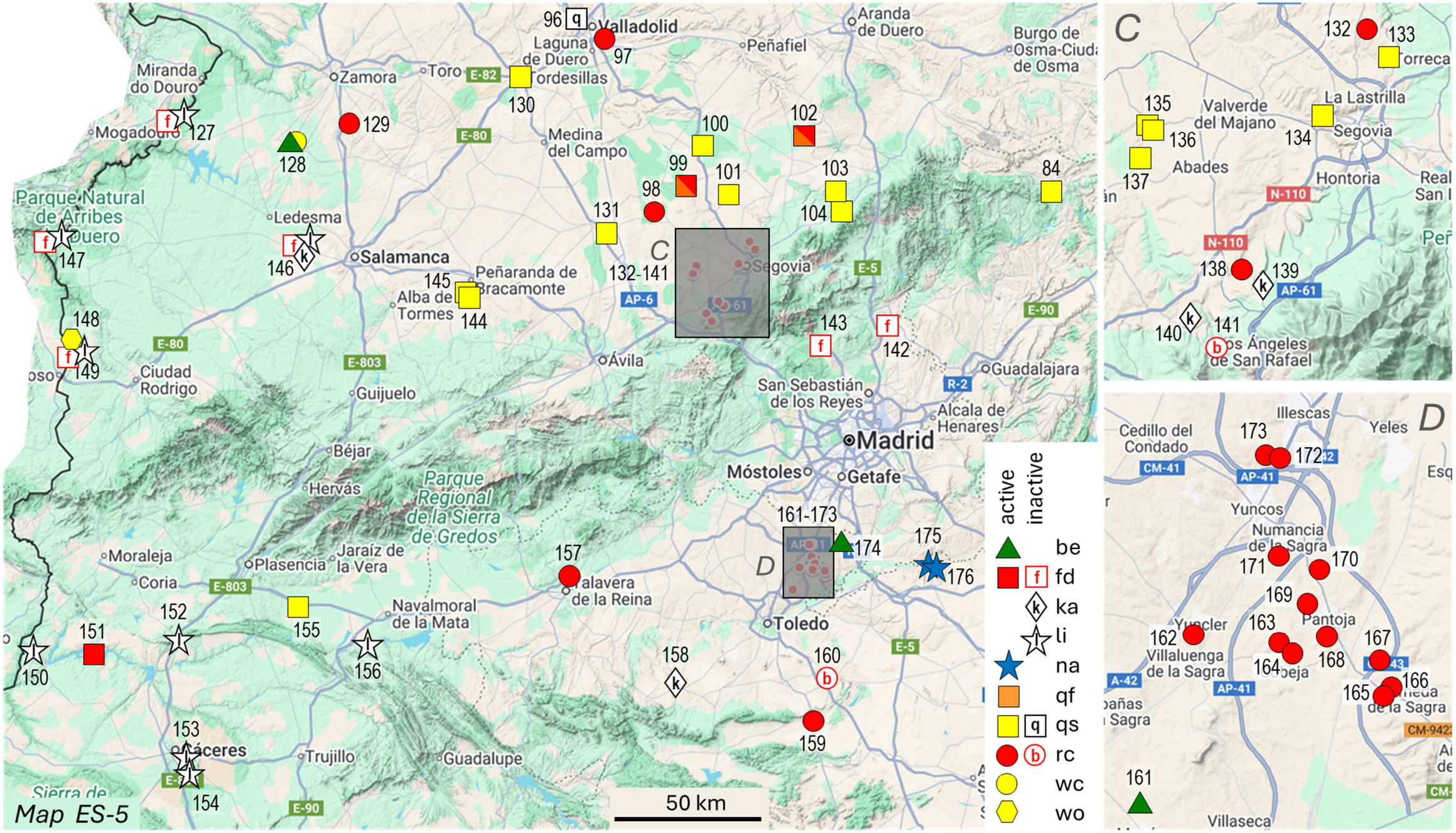

Industrial silica
t
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
Quartz
Silica sand
2015 2016 2017 2018 2019 2020 2021 2022 2023 2024


Magnesite
t
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
2015 2016 2017 2018 2019 2020 2021 2022 2023 2024

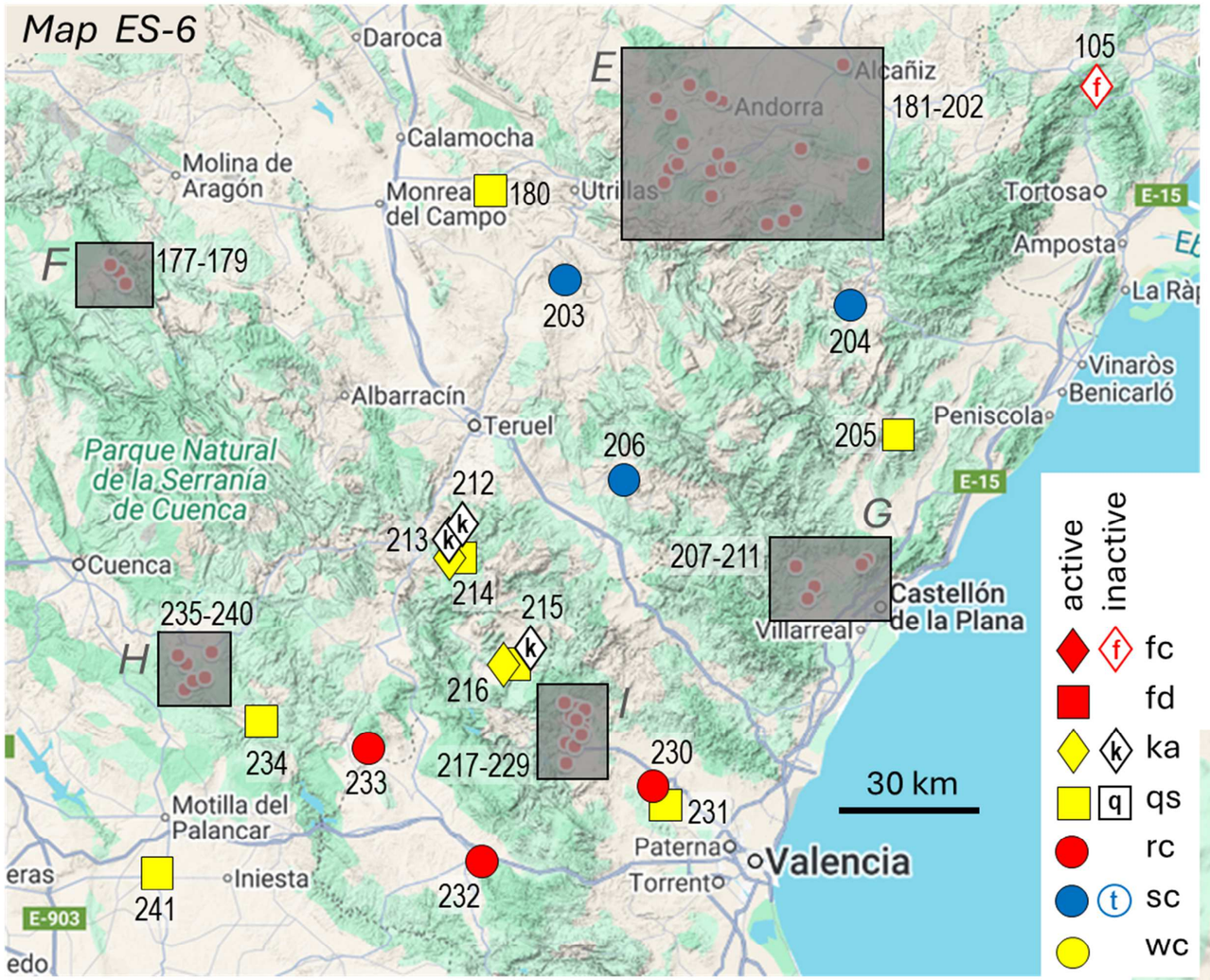

Feldspar
t
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
2015 2016 2017 2018 2019 2020 2021 2022 2023 2024

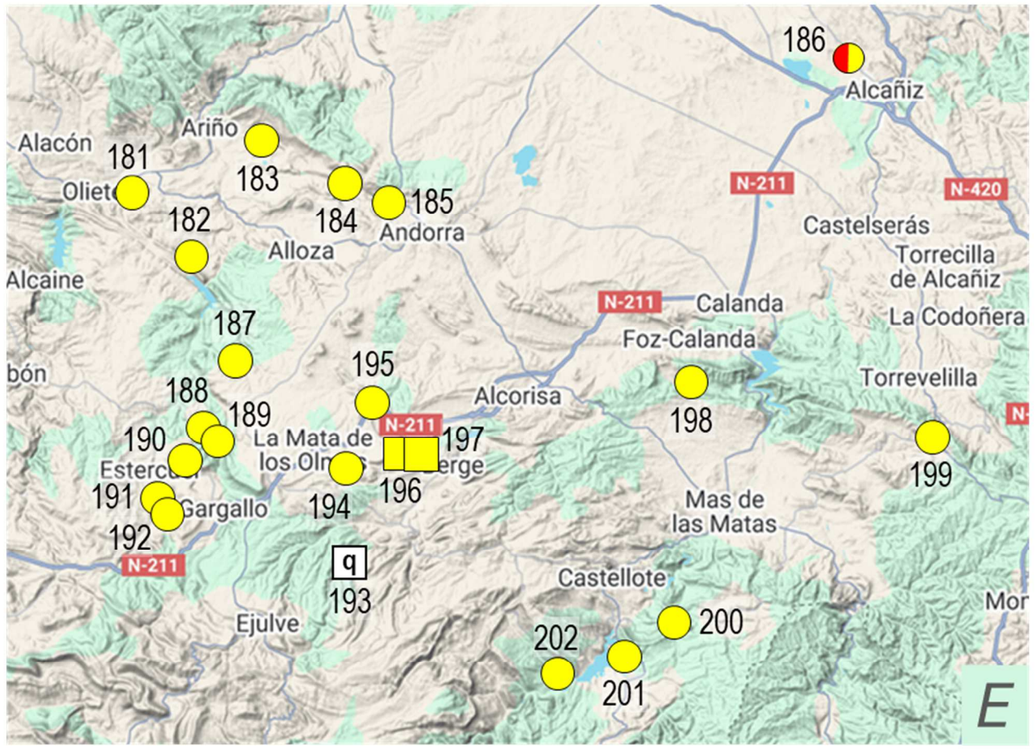

Bentonite
t
200,000
150,000
100,000
50,000
0
2015 2016 2017 2018 2019 2020 2021 2022 2023 2024

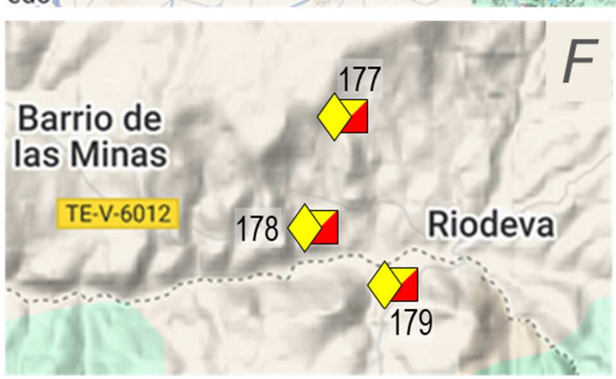

Olivine
t
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
2015 2016 2017 2018 2019 2020 2021 2022 2023 2024



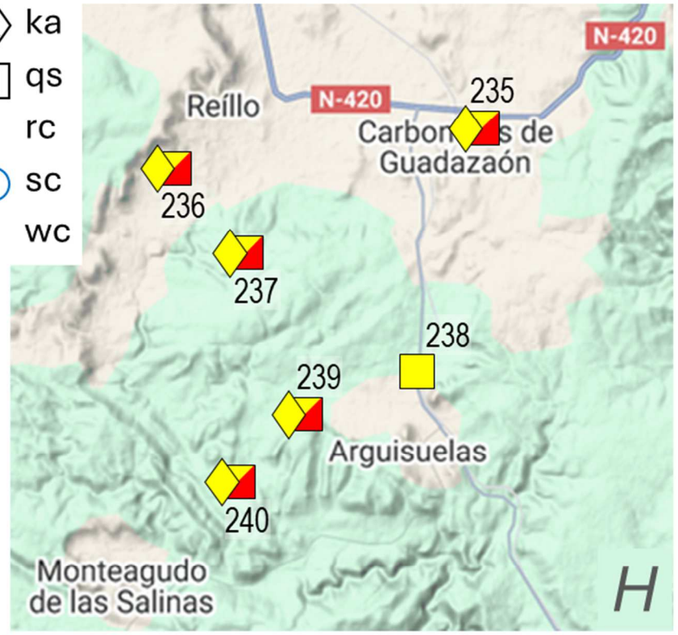
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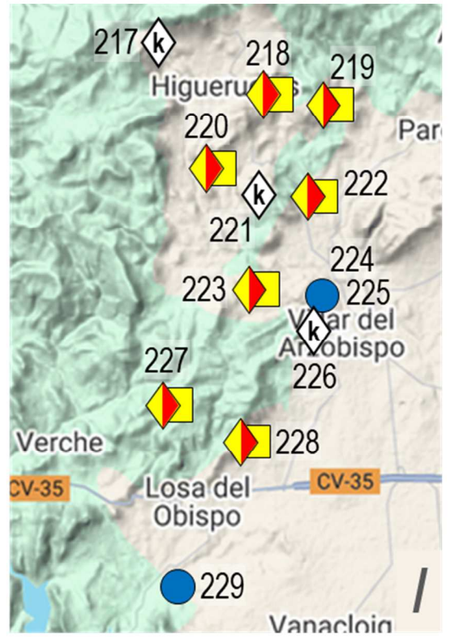










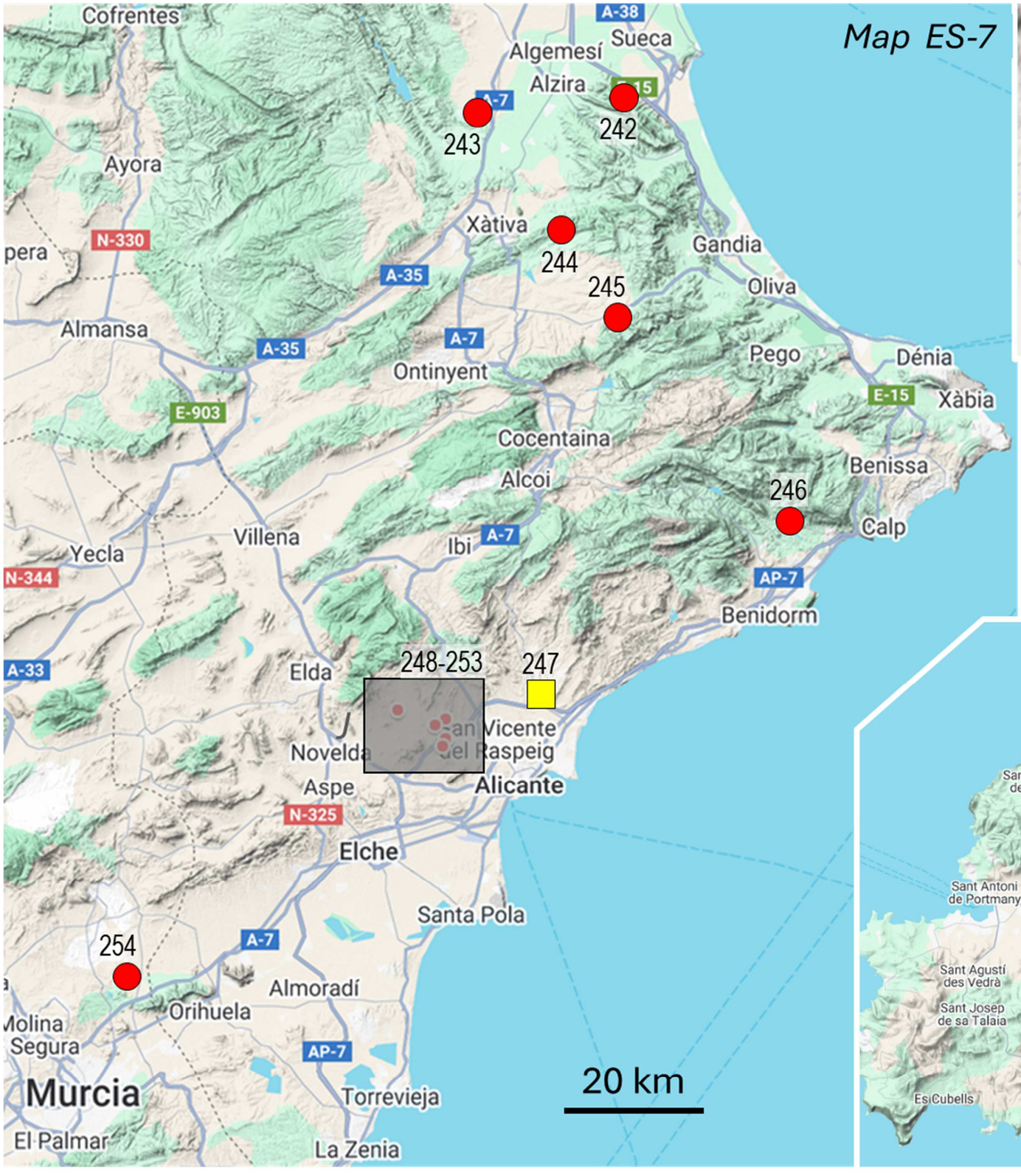


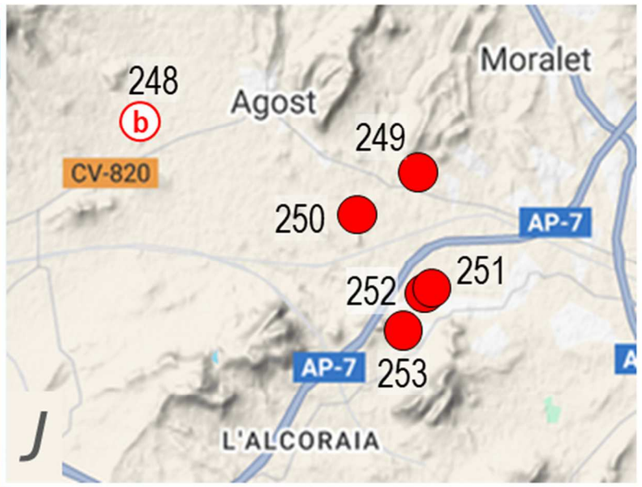
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)

Table ES-c: deposits of raw materials for the ceramic and glass industries in Spain.

#	r.m.	st	deposit	province
211	sc	I	Sitjar	Castellón
212	ka	I	Camino de los Hontanares	Teruel
213	ka	I	Barranco del Tinajo	Teruel
214	ka-qz	A	El Toconar	Valencia
215	ka	I	Atalaya Alta	Valencia
216	ka-qz	A	Puntal de Ramos	Valencia
217	ka	I	Cueva del Cojo	Valencia
218	ka-qz-fc	A	Barranco del Baladrar	Valencia
219	ka-qz-fc	A	Pinarejos	Valencia
220	ka-qz-fc	A	Villar Pardo	Valencia
221	ka	I	Cerro Madroño	Valencia
222	ka-qz-fc	A	Barranco del Salobrar	Valencia
223	ka-qz-fc	A	El Truquet	Valencia
224	ka-qz-fc	A	Valls	Valencia
225	fc	A	Villar	Valencia
226	ka	I	Valls I	Valencia
227	ka-qz-fc	A	Antonio	Valencia
228	ka-qz-fc	A	La Solana	Valencia
229	fc	A	Chulilla	Valencia
230	rc	A	Lliria	Valencia
231	qs	A	Benaguasil	Valencia
232	rc	A	Requena	Valencia
233	rc	A	Mira-Barranco de las Tejerias	Cuenca
234	qs	A	Viñas Rojas-Cardenete	Cuenca
235	ka-qz-fd	A	Carboneras de Guadazaón	Cuenca
236	ka-qz-fd	A	Las Parejas	Cuenca
237	ka-qz-fd	A	Barranco la Osa	Cuenca
238	qs	A	Claudia-Arguisuelas	Cuenca
239	ka-qz-fd	A	Rambla del Corzo	Cuenca
240	ka-qz-fd	A	Arroyo de los Quintanares	Cuenca
241	qs	A	Villanueva de la Jara	Cuenca
242	rc	A	Sueca	Valencia
243	rc	A	Guadassuar	Valencia
244	rc	A	Xativà	Valencia
245	rc	A	Ayelo de Rugat	Valencia
246	rc	A	Callosa d'En Serrà	Alicante
247	qs	A	Mutxamel	Alicante
248	rc	I	La Escandella	Alicante
249	rc	A	Agost 1	Alicante
250	rc	A	Agost 2	Alicante
251	rc	A	Agost 3	Alicante
252	rc	A	Agost 4	Alicante
253	rc	A	Agost 5	Alicante
254	rc	A	Fortuna	Murcia
255	rc	A	Ibiza-Santa Eulalia	Baleares
256	rc	A	Chinchilla-las Rozas	Albacete
257	rc	A	Chinchilla-Rubiales	Albacete
258	qs	I	El Pinarete	Albacete
259	rc	A	Santa Cruz de Mudela 2	Ciudad Real
260	rc	A	Santa Cruz de Mudela 1	Ciudad Real
261	rc	A	Santa Cruz de Mudela 3	Ciudad Real
262	rc	A	Santa Cruz de Mudela 4	Ciudad Real
263	ka	A	Almuradiel	Ciudad Real
264	rc	A	Bailén Los Lentiscares	Jaén
265	rc	A	Bailén La Zahonera	Jaén
266	rc	A	Bailén San Jacinto	Jaén
267	rc	A	Bailén San Francisco	Jaén
268	rc	A	Bailén Regajo del Cura	Jaén
269	rc	A	Bailén El Pozuelo	Jaén
270	rc	A	Bailén San Juan	Jaén
271	ka	I	Hinojosa del Duque	Cordoba
272	rc	A	Valdivia	Badajoz
273	li	O	Tres Arroyos	Alburquerque
274	wo	I	Cerro de Carija	Mérida
275	ka-py	I	Zarza de Alange	Badajoz
276	fd	O	El Cabril	Cordova
277	fd	A	Cazalla de la Sierra	Sevilla
278	fc	A	Guadalcanal	Sevilla
279	wo	I	Alto del Carmen-Aroche	Huelva
280	qs	A	Parrilla-Rio Odiel	Huelva
281	qs	A	La Parrilla	Huelva
282	qs	A	La Oliva	Cadiz
283	qs	A	El Minervo	Cadiz
284	qs	A	Las Arenosas	Cadiz
285	qs	A	El Granal	Cadiz
286	qs	A	Isabelita	Cadiz
287	qs	A	Arenas de San Pedro	Sevilla
288	qs	A	El Royuelo-El Arenal	Sevilla
289	qs	I	El Alamillo	Sevilla
290	qs	A	La Monclova	Sevilla
291	rc	A	Aguilar de la Frontera	Cordoba
292	rc	A	Herrera 2	Sevilla
293	rc	A	Herrera 1	Sevilla
294	qs	A	Cañete la Real	Málaga
295	tc	I	Mijas	Málaga
296	sr	A	Escuzar	Granada
297	sr	A	Aurora-Montevive	Granada
298	rc	A	Otura-Alhendin	Granada
299	rc	A	Alhabia	Almeria
300	qs	A	Los Almendros	Almería
301	qs	I	Lomas del Acebuche	Almería
302	be	A	Cortijo de Archidona	Almería
303	be-ze	I	Los Murcianos	Almería
304	be-ze	A	Morrón de Mateo	Almería
305	be	A	Los Trancos	Almería
306	qs	A	El Salmerón	Almería
307	be	A	Virgen del Pilar y Bemisa	Almería

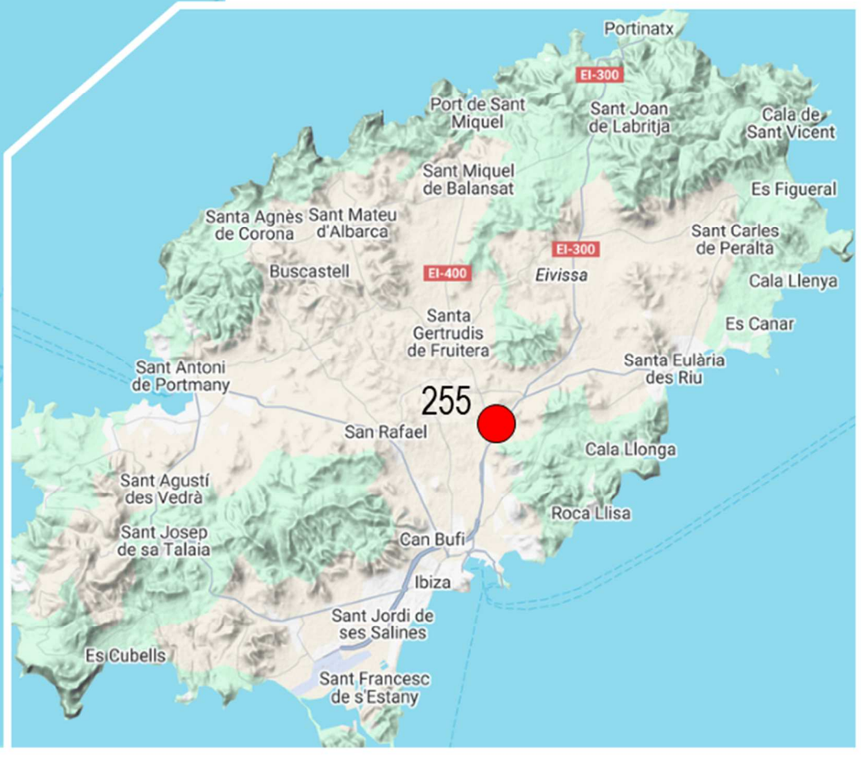
* cluster of deposits





active
inactive
qs
rc

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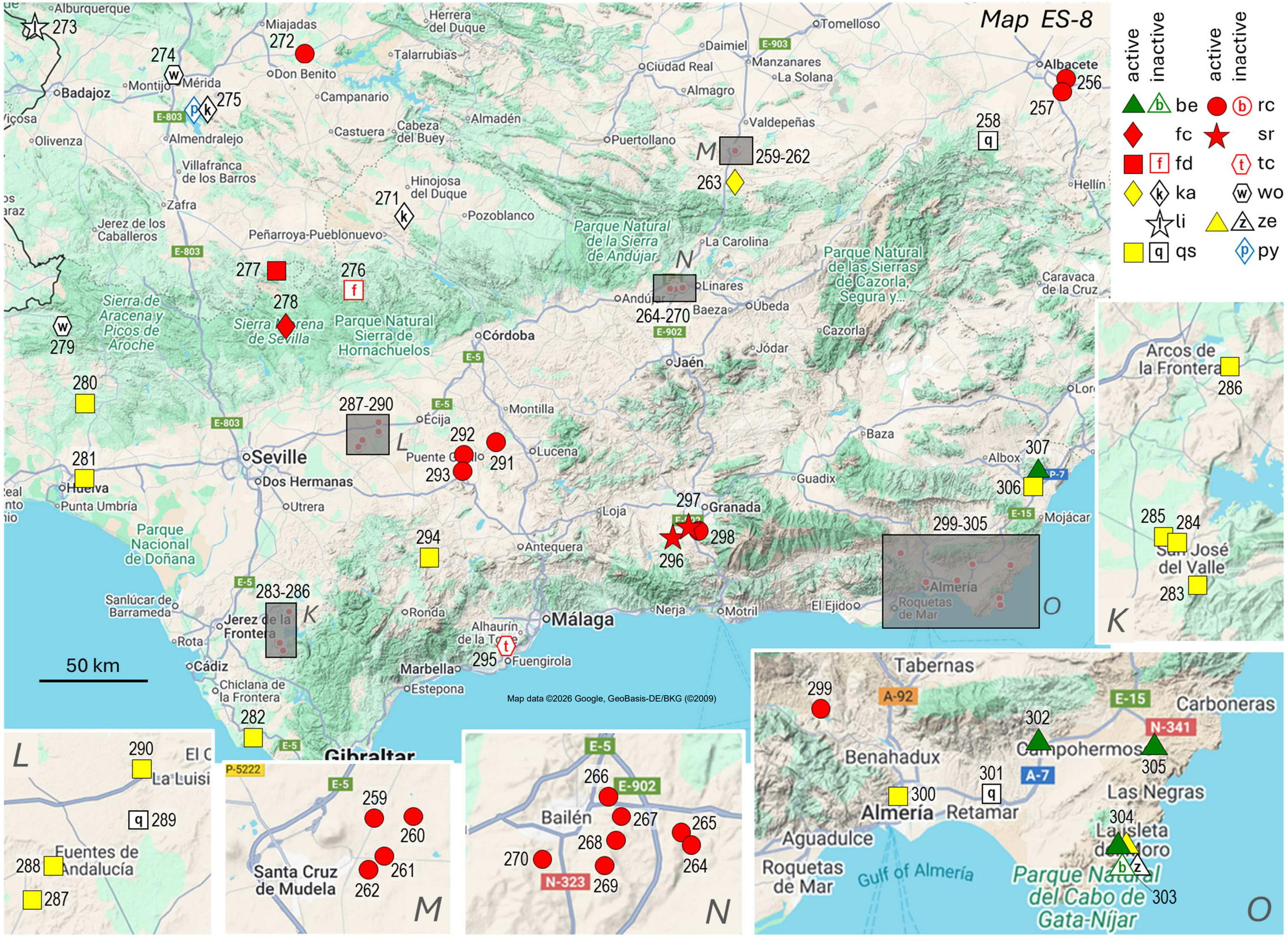


Raw material

al	alumina (artificial)
ba	barite
be	bentonite
fc	refractory clay
fd	feldspar
ka	kaolin
li	lithium minerals
mg	magnesite
na	soda ash
ol	olivine
py	pyrophyllite
qf	feldspathic sand
qs	silica sand
qz	quartz
rc	red clays
sc	red stoneware clays
sr	celestine
tc	talc
wc	white clays
wo	wollastonite
ze	zeolites

Status of deposit

A	active mine
I	inactive mine
O	occurrence


Map ES-8
active
inactive
be
fc
fd
ka
li
qs
rc
sr
tc
wo
ze
py
273
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275
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279
280
281
287-290
292
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293
294
283-286
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297
298
299-305
306
307
256
257
258
259-262
263
264-270
M
N
O
K
L
Badajoz
Mérida
Montijo
Don Benito
Miajadas
Herrera del Duque
Talarrubias
Campanario
Almendralejo
Olivenza
Villafranca de los Barros
Zafra
Jerez de los Caballeros
Peñarroya-Pueblonuevo
Hinojosa del Duque
Pozoblanco
Castuera
Cabeza del Buey
Almadén
Puertollano
Ciudad Real
Daimiel
Manzanares
La Solana
Almagro
Valdepeñas
Tomelloso
Albacete
Hellín
Caravaca de la Cruz
La Carolina
Linares
Andújar
Úbeda
Baeza
Jódar
Cazorla
Jaén
Córdoba
Montilla
Écija
Seville
Dos Hermanas
Utrera
Huelva
Punta Umbría
Lucena
Loja
Granada
Antequera
Ronda
Málaga
Nerja
Motril
Almería
Roquetas de Mar
El Ejido
Albox
Guadix
Baza
Mojácar
Sanlúcar de Barrameda
Jerez de la Frontera
Rota
Cádiz
Chiclana de la Frontera
Alhaurín de la Torre
Fuengirola
Marbella
Estepona
Gibraltar
Arcos de la Frontera
286
285
284
San José del Valle
283
Tabernas
Benahadux
Almería
Retamar
Aguadulce
Roquetas de Mar
Gulf of Almería
Campohermoso
Carboneras
Las Negras
La Isleta del Moro
Parque Natural del Cabo de Gata-Níjar
299
300
301
302
303
304
305
Fuentes de Andalucía
288
289
290
287
Santa Cruz de Mudela
259
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261
262
Bailén
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267
268
269
270
264
Parque Natural Sierra de Hornachuelos
Sierra de Aracena y Picos de Aroche
Sierra Morena de Sevilla
Parque Natural de la Sierra de Andújar
Parque Natural de las Sierras de Cazorla, Segura y...
Parque Nacional de Doñana
E-803
E-5
E-902
E-903
E-15
A-92
A-7
N-341
N-323
P-5222
P-7
50 km
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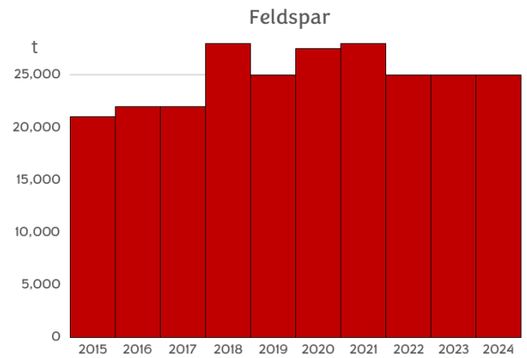
Sweden

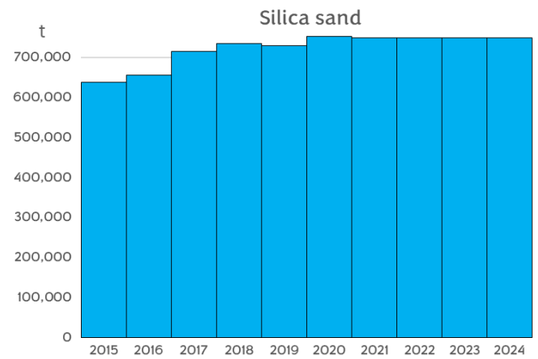
There are numerous occurrences of raw materials for ceramics and glass on the Swedish territory. Active extraction results for feldspar, quartz, talc, fireclay and basalt (for stone wool). Along with these, deposits of lithium minerals, nepheline syenite and wollastonite are being developed. In addition, occurrences of barite, bentonite, chromite, kaolin, magnesite, olivine and andalusite-kyanite-sillimanite are recorded [1-3].

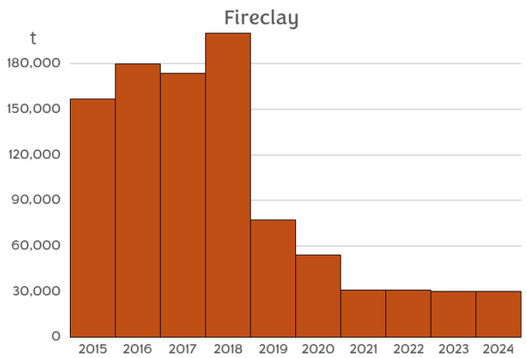
Feldspar is obtained from granitic pegmatites, which are very frequent both in the Svecofennian Shield (where the only active mine operates in Forshammar/Limbergsbo, *Map SW-4*) and in the Sveco-Norwegian province (*Map SW-3*) between Gothenburg and Malmö [2-5]. The average production over the last decade is 25,000 tpa [6,7]. The deposit with the greatest potential is undoubtedly the Hörningsholm-Norra Kärr nepheline syenite within the Transscandinavian Igneous Belt, for its location and composition (rich in nepheline and relatively low in iron). This deposit is being evaluated for the extraction of rare earth elements, of which feldspar would be a by-product [8-10].
Industrial silica is extracted from both Proterozoic quartzites of the Svecofennian Domain (Jämtland and Västra Götaland) and Paleozoic sandstones in central and southern Sweden [1-3]. Average production was 720,000 tpa in the period 2015-2024.
Talc: several mineralizations, formed by metasomatism of ultrabasic rocks (talc-chlorite assemblages), are present in the Caledonian nappes [11]: the only active mines are in Handöl-Gunnarslåtten (*Map SW-6*). **Olivine** and **chromite** deposits mainly occur in the Caledonian nappes as well, but no mining activity is reported [1-3,12].
Refractory clays are found in the far south of the country in Jurassic continental deposits, intensively exploited in the past (~100,000 tpa as average of the last decade) but mining activity is currently in sharp contraction [13].
Wollastonite: some deposits have been recognized in the Fennoscandian Shield: at the moment, two are reported under development in the Örebro county (*Map SW-4*) where the mineralization occurs in marble horizons, intercalated in thick sequences of volcaniclastic sediments of Mid-Proterozoic age [14]. Reserves are around 3.4 million tonness [14].
Basalt for stone wool production [1] is mined in Västra Götaland (where bentonite has also been reported) and southern Sweden (Scania and Blekinge).
Lithium minerals (spodumene ± petalite ± lepidolite) are found within Lithium-Cesium-Tantalum (LCT) Paleoproterozoic pegmatites of the Svecofennian Shield in central Sweden [15]. Various deposits are being developed, for example in the Västernorrland [16] and Varuträsk areas [17].
Kaolin deposits, which took origin from weathering of granites, are known in Scania beneath Cretaceous sedimentary rocks [18], but there is no active mining.
Magnesite mineralizations are known both in the Caledonian nappes of the Norrbotten region (*Map SW-6*) and in the Fennoscandian domain: in both cases, they are associated to intense Mg-metasomatism on ultrabasics or metagabbro [1,19].
Deposits of **barite** (e.g., Hartung-Pottäng) as well as **andalusite** (Mångfallberget, Säter), **kyanite** (Hålsjöberg, Hökensås) and **sillimanite** (Kölaberget) are known in north-central Sweden but never mined [2-3].

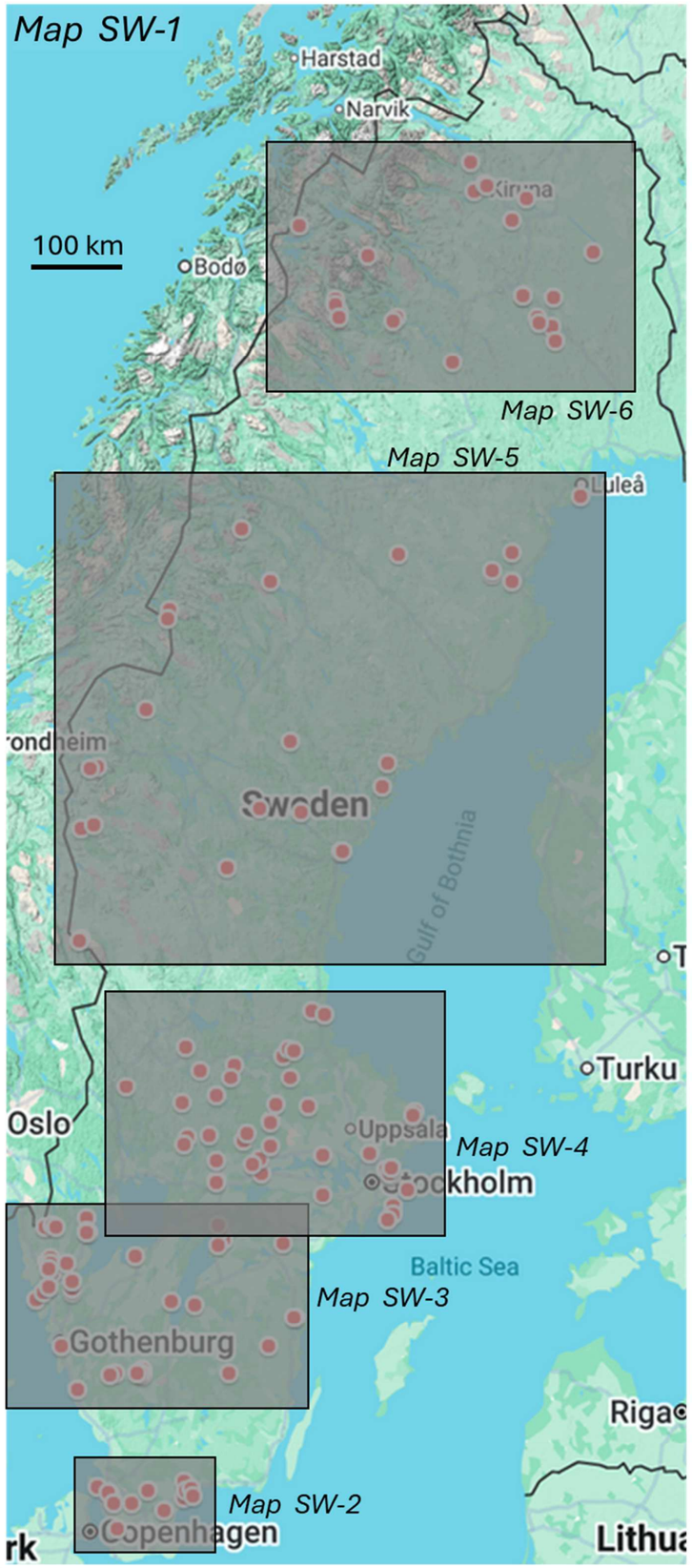
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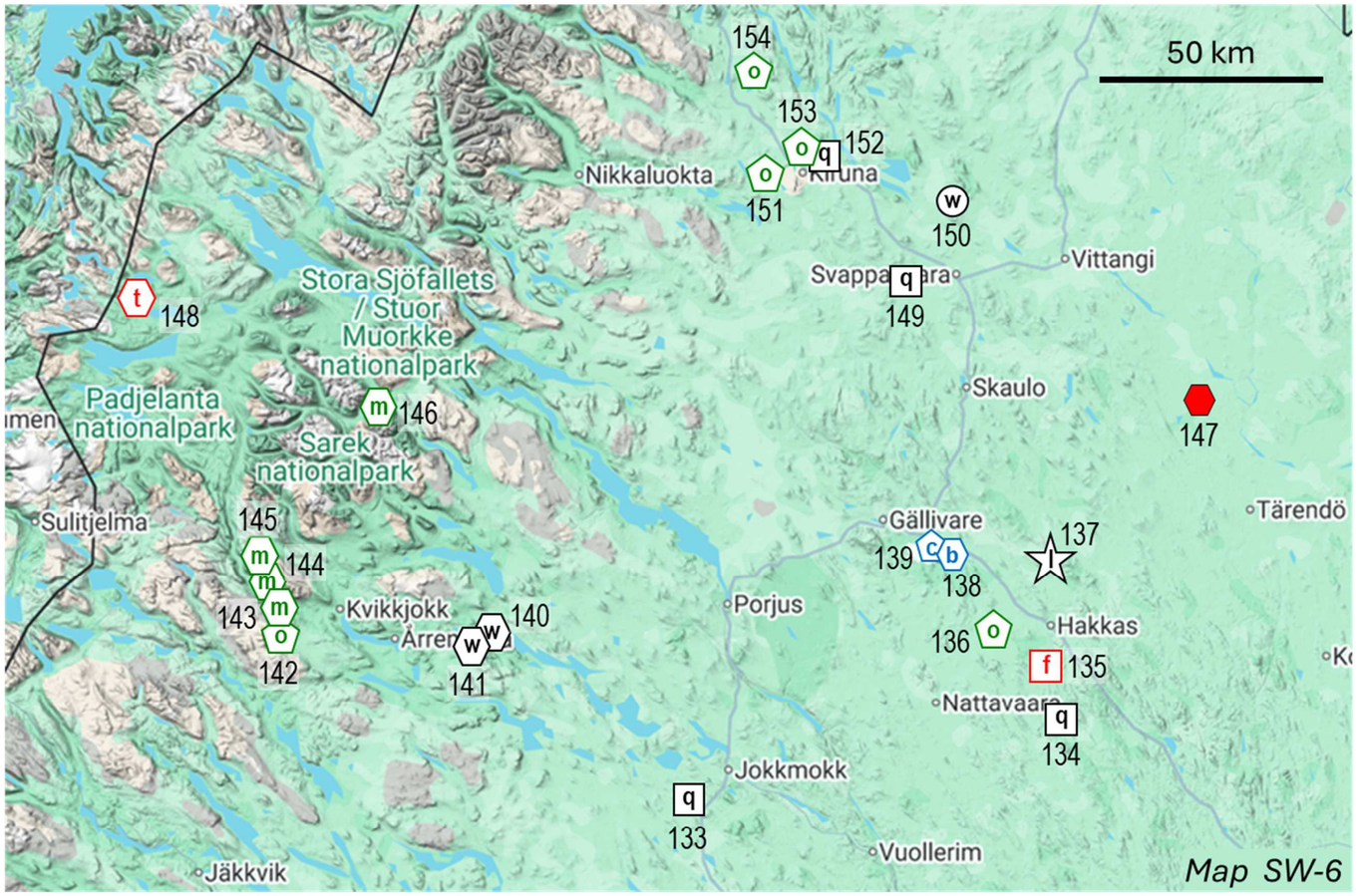






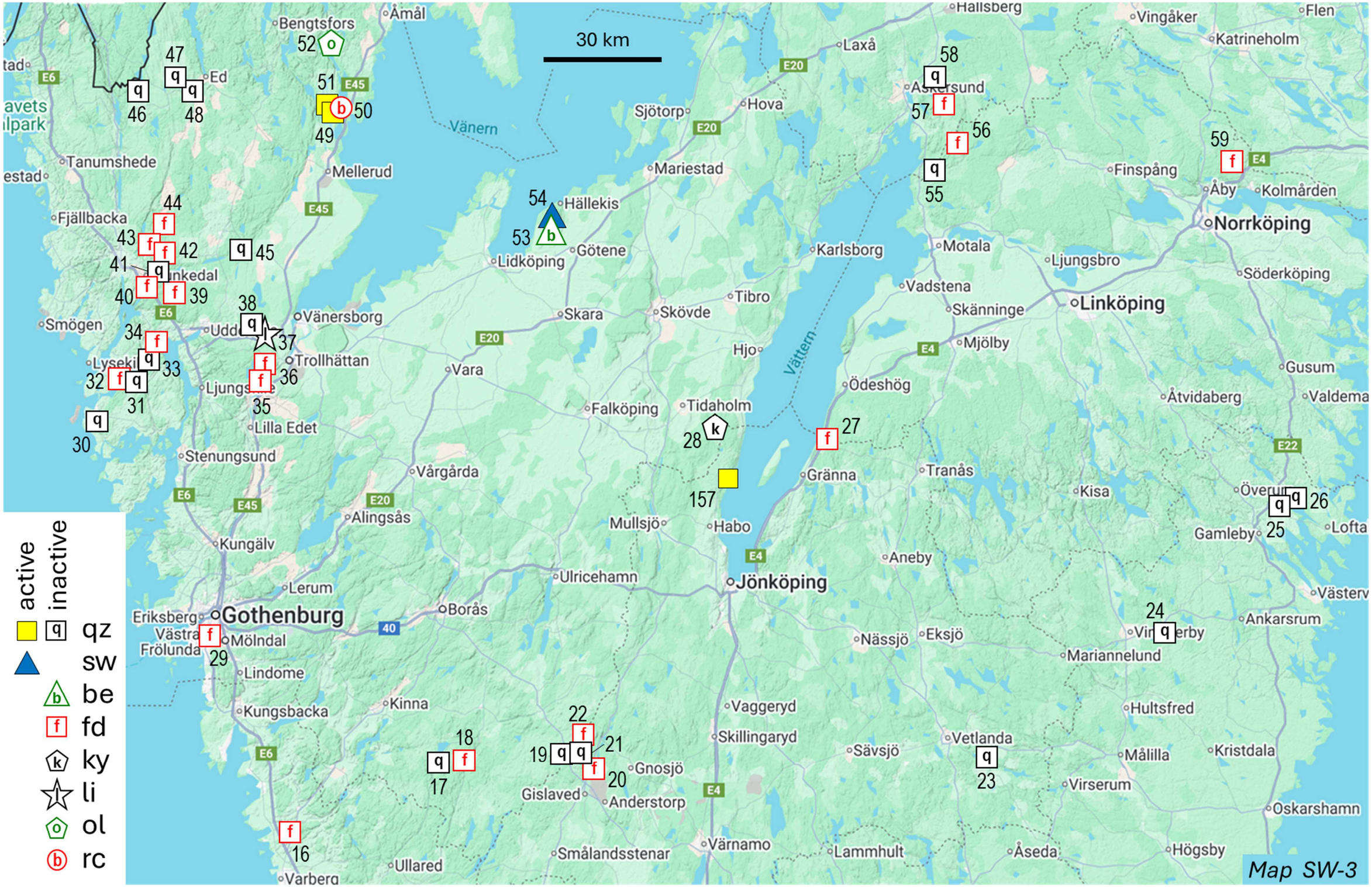


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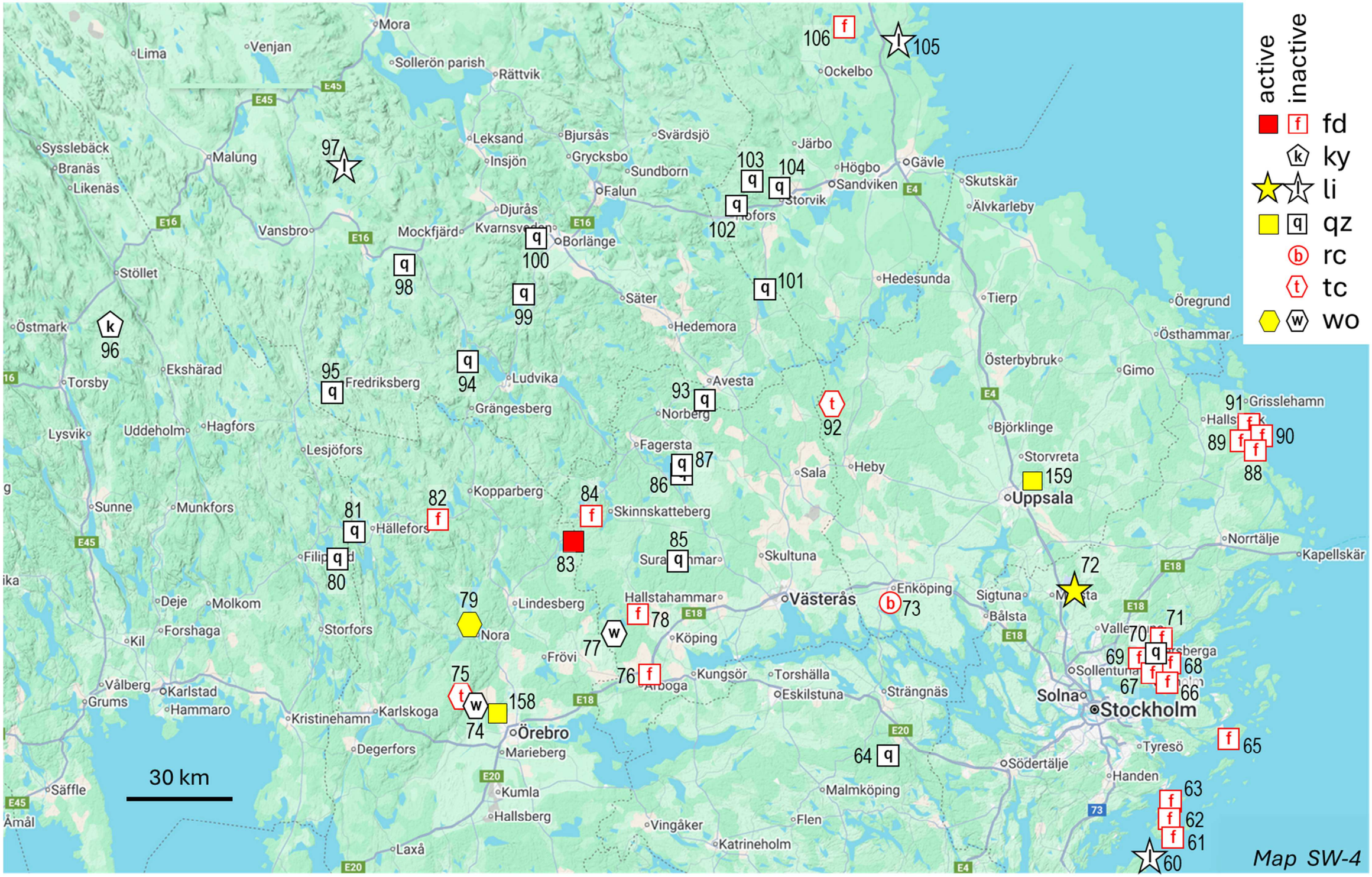
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tc	t	ba	b
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fd	f	li	
ka	k	mg	m
qz	q	ol	o
rc	b	wc	w
fc	f	wo	w



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Table SW-a: deposits of raw materials for the ceramic and glass industries in Sweden.

#	raw material	st	deposit	county
1	rc	I	Fjelie-Lomma	Skåne
2	fc	O	Vram	Skåne
3	fc	O	Mossen	Skåne
4	fd	I	Svinninge	Skåne
5	ka	I	Åsen	Skåne
6	ka	I	Ivön	Skåne
7	fc	O	Odersberga	Skåne
8	sw	A	Hässleholm	Skåne
9	ka	I	Mjölkalånga	Skåne
10	ka	O	Billinge	Skåne
11	fc	I	Skromberga	Skåne
12	fc	I	Lunnom	Skåne
13	fc	I	Bjuv	Skåne
14	fc	I	Nyvång-Hyllinge	Skåne
15	fc	A	Höganäs	Skåne
16	fd	I	Ödsmål	Halland
17	qz	I	Flintsjön	Västra Götaland
18	fd	I	Spattgruvan	Västra Götaland
19	qz	I	Nukutusvaara	Västra Götaland
20	fd	I	Skinnardal	Jönköping
21	qz	I	Härsbacka	Jönköping
22	fd	I	Ingelsbo	Jönköping
23	qz	I	Acktjärn	Jönköping
24	qz	I	Ingalsbo	Kalmar
25	qz	I	Gräne	Kalmar
26	qz	I	Buxungeröd	Kalmar
27	ns	O	Hörningsholm-Norra Kärr	Jönköping
28	ky	O	Hökensås	Västra Götaland
29	fd	I	Högsbo	Västra Götaland
30	qz	I	Bjusan	Västra Götaland
31	qz	I	Ingridstorp	Västra Götaland
32	fd	O	Ruoutevare	Västra Götaland
33	qz	I	Stale	Västra Götaland
34	fd	I	Mariagruvan	Västra Götaland
35	fd	I	Långgruvan	Västra Götaland
36	fd	I	Metholmen	Västra Götaland
37	li	I	Essljung	Västra Götaland
38	qz	I	Rådanefors	Västra Götaland
39	fd	I	Björkeröd	Västra Götaland
40	fd	I	Slätteryd	Västra Götaland
41	qz	I	Stackberget	Västra Götaland
42	fd	I	Ytterby	Västra Götaland
43	fd	I	Barhult	Västra Götaland
44	fd	I	Kopparhult	Västra Götaland
45	qz	I	Näsvhult	Västra Götaland
46	qz	I	Bro	Västra Götaland
47	qz	I	Långsjökullen	Västra Götaland
48	qz	I	Äskja	Västra Götaland
49	qz	A	Ulerud	Västra Götaland
50	rc	I	Åmåls	Västra Götaland
51	qz	A	Flåtungebyn/Ämnebyn	Västra Götaland
52	ol	O	Valkeasiipivaara	Västra Götaland
53	be	I	Hulegården	Västra Götaland
54	sw	A	Hällekishamn	Västra Götaland
55	qz	I	Kvarnvreten	Örebro
56	fd	I	Perstorp	Östergötland
57	fd	I	Vånkobben	Örebro
58	qz	I	Stegliden	Örebro
59	fd	I	Drömgruvan	Östergötland
60	li	I	Nyköpingsgruvan	Stockhom
61	fd	I	Valje	Stockhom
62	fd	I	Lugnet	Stockhom
63	fd	I	Skarpö	Stockhom
64	qz	I	Flintgruvan	Stockhom
65	fd	I	Stackebo	Stockhom
66	fd	I	S. Munkeby	Stockhom
67	fd	I	Västerby	Stockhom
68	fd	I	Lervik	Stockhom
69	fd	I	Storön	Stockhom
70	qz	I	Hopukka	Stockhom
71	fd	I	Idsättragruvan	Stockhom
72	li	A	Norrskogen Arlanda	Stockhom
73	rc	I	Bredsand	Uppsala
74	wo	I	Frösvidal	Örebro
75	tc	O	Vietjervaratj	Örebro
76	fd	I	Himlaberget	Västmanland
77	wo	I	Silveron	Örebro
78	fd	I	Kolsva	Västmanland
79	wo	A	Hulta-Gruvor	Örebro
80	qz	I	Varuträsk	Varmland

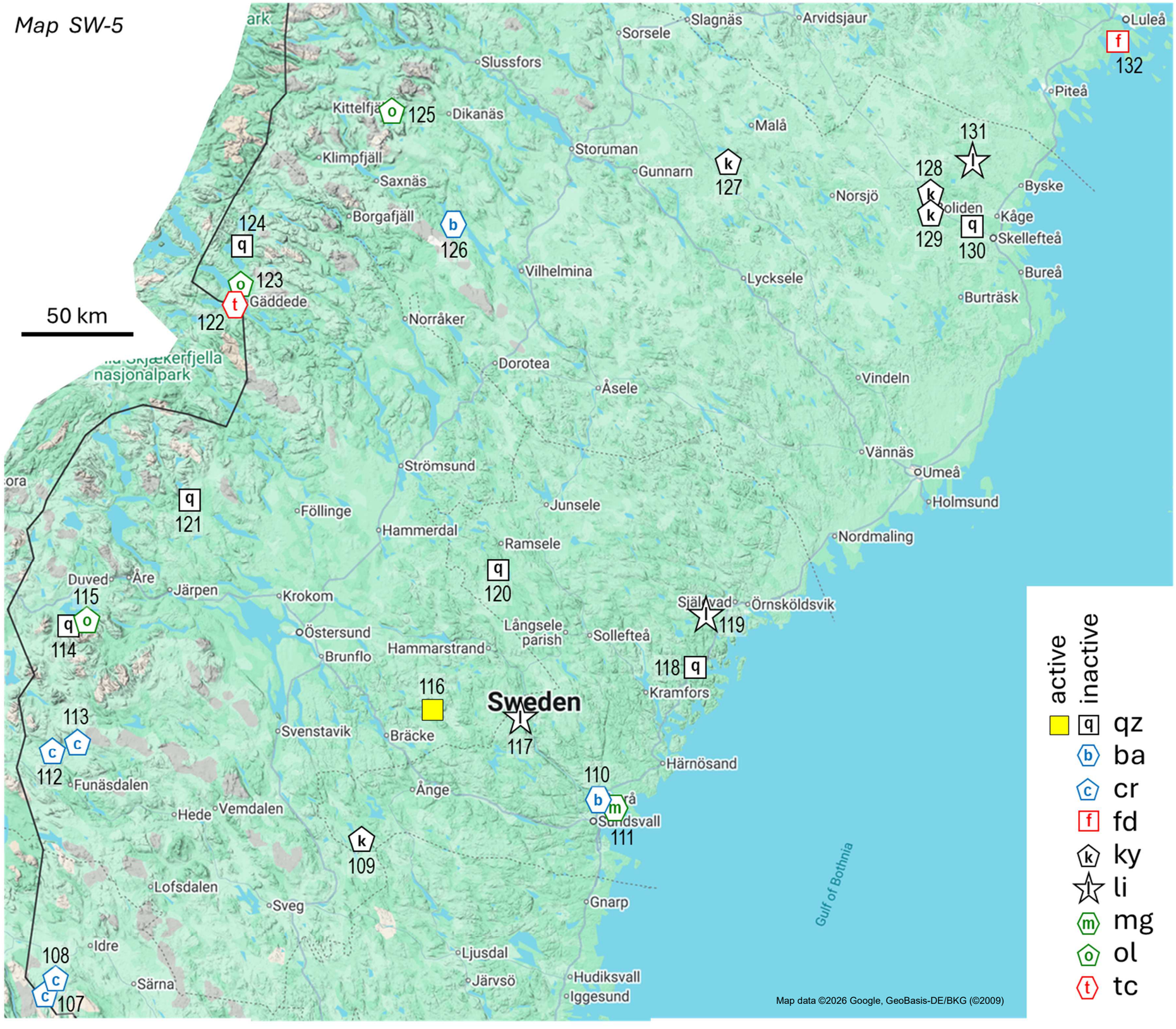


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Table SW-b: deposits of raw materials for the ceramic and glass industries in Sweden.

#	raw material	st	deposit	county
81	qz	I	Kattstensgruvan	Örebro
82	fd	I	Östergård	Örebro
83	fd	A	Forshammar/Limbergsbo	Örebro
84	fd	I	Höjderna	Västmanland
85	qz	I	Tranåsen	Västmanland
86	qz	I	Trappberget	Västmanland
87	qz	I	Knuthöjden	Västmanland
88	fd	I	Mälby	Stockhom
89	fd	I	Nytorp	Stockhom
90	fd	I	Mossgruvan	Stockhom
91	fd	I	Nothamn	Stockhom
92	tc	O	Muruhatten	Uppsala
93	qz	I	Mon	Dalarna
94	qz	I	Tyskbo	Dalarna
95	qz	I	Springberget	Dalarna
96	ky	O	Hålsjöberg	Varmland
97	li	O	Flatberget	Dalarna
98	qz	I	Flakaberget	Dalarna
99	qz	I	Flintgruvan	Dalarna
100	qz	I	Alseda	Dalarna
101	qz	I	Nilivaara	Dalarna
102	qz	I	Abborrselet	Gävleborg
103	qz	I	Småbergshön	Gävleborg
104	qz	I	Stimmerkulla	Gävleborg
105	li	O	Bergby	Gävleborg
106	fd	I	Sommartorn	Gävleborg
107	cr	I	Röfjällsgruvan	Dalarna
108	cr	I	Lejargruvan	Dalarna
109	ky	O	Kölaberget	Västernorrland
110	ba	I	Hartung-Pottäng	Västernorrland
111	mg	O	Äpartjåkkå	Västernorrland
112	cr	O	Njeretjakke	Jämtland
113	cr	O	Kroksjön	Jämtland
114	qz	I	Ödebyn	Jämtland
115	ol	I	Purnu-Puolalaki	Jämtland
116	qz	A	Valön/Kilane	Jämtland
117	li	O	Järkvissle	Västernorrland
118	qz	I	Åskagens kvartsbrott	Västernorrland
119	li	O	Orrvik	Västernorrland
120	qz	I	Lilla Kettstaka	Västernorrland
121	qz	I	Skuleboda	Jämtland
122	tc	O	Klumplidklumpen	Jämtland
123	ol	I	Ädnamvare	Jämtland
124	qz	I	Hebbersberget	Jämtland
125	ol	O	Junsterklumpen	Västerbotten
126	ba	O	Strömnäs Västra	Västerbotten
127	ky	O	Säter	Västerbotten
128	ky	O	Mångfallberget	Västerbotten
129	ky	O	Boliden	Västerbotten
130	qz	I	Ullnäset	Västerbotten
131	li	O	Åkerberg	Västerbotten
132	fd	I	Kallaxön	Norrbotten
133	qz	I	Djursnäs	Norrbotten
134	qz	I	Myrsjö	Norrbotten
135	fd	I	Hammanen	Norrbotten
136	ol	I	Iso Sormus	Norrbotten
137	li	O	Suorravaara	Norrbotten
138	ba	O	Aitik	Norrbotten
139	cr	O	Leipijärvi	Norrbotten
140	wo	O	Banmossen	Norrbotten
141	wo	O	Tjåmotisjaure	Norrbotten
142	ol	O	Kittelfjäll	Norrbotten
143	mg	O	Måstatkaise	Norrbotten
144	mg	O	Rakas	Norrbotten
145	mg	O	Kämpetorp	Norrbotten
146	mg	O	Tarrekaise	Norrbotten
147	tc	A	Handöl/Gunnarslåtten	Norrbotten
148	tc	O	Lauttakoski	Norrbotten
149	qz	I	Hjulbynäs	Norrbotten
150	wc	O	Leveäniemi	Norrbotten
151	ol	I	Tjuoltatjåkkah	Norrbotten
152	qz	I	Norr-Darlkarlssjön	Norrbotten
153	ol	O	Ruopsok	Norrbotten
154	ol	I	Stora Rödberget	Norrbotten
155	sw	I	Stärnö	Blekinge
156	qs	I	Fuglunda	Skåne
157	qs	A	Baskarp	Jönköping
158	qs	A	Broby	Örebro
159	qs	A	Brogården	Uppsala

Map SW-5



Raw material

ba	barite
be	bentonite
cr	chromite
fc	refractory clay
fd	feldspar
ka	kaolin
ky	kyanite group
li	lithium minerals
mg	magnesite
ol	olivine
qz	quartz, quartz sand
rc	red clays
sw	stone wool
tc	talc
wc	white clays
wo	wollastonite

Status of deposit

A	active mine
I	inactive mine
O	occurrence

Switzerland

In the Swiss Confederation, amongst raw materials for the ceramic and glass industries, only red clays are extracted from deposits distributed mostly between Lake Geneva and Lake Constance. The main clay resources are exploited from the Swiss Molasse Basin and the Jura Molasse, essentially for the production of bricks and roof tiles [1-4].

Red clay is currently extracted in about thirty quarries, but data on production and amount of reserves are not disclosed. The Swiss brick industries exploit three main geological sources [2,3,5]:
- the Opalinus clay (a Jurassic shale, also called *Tonstein*) deposited in a shallow marine, epicontinental environment of the Jura Molasse Basin [6];
- various near-shore marine-fluvial marly sediments, which overall represent the main brick clay resource in Switzerland, pertaining to the Oligocene Lower Marine Molasse (e.g., Meletta Mergelstein) and the Miocene Upper Marine Molasse [4,7,8];
- Pleistocene clay tills and glacio-lacustrine deposits [9,10].

An additional, minor source is given by Eocene continental deposits, rich in lateritic remains (the so-called *Siderolithic* or *Hupper*) of the Plateau Molasse [2-4].

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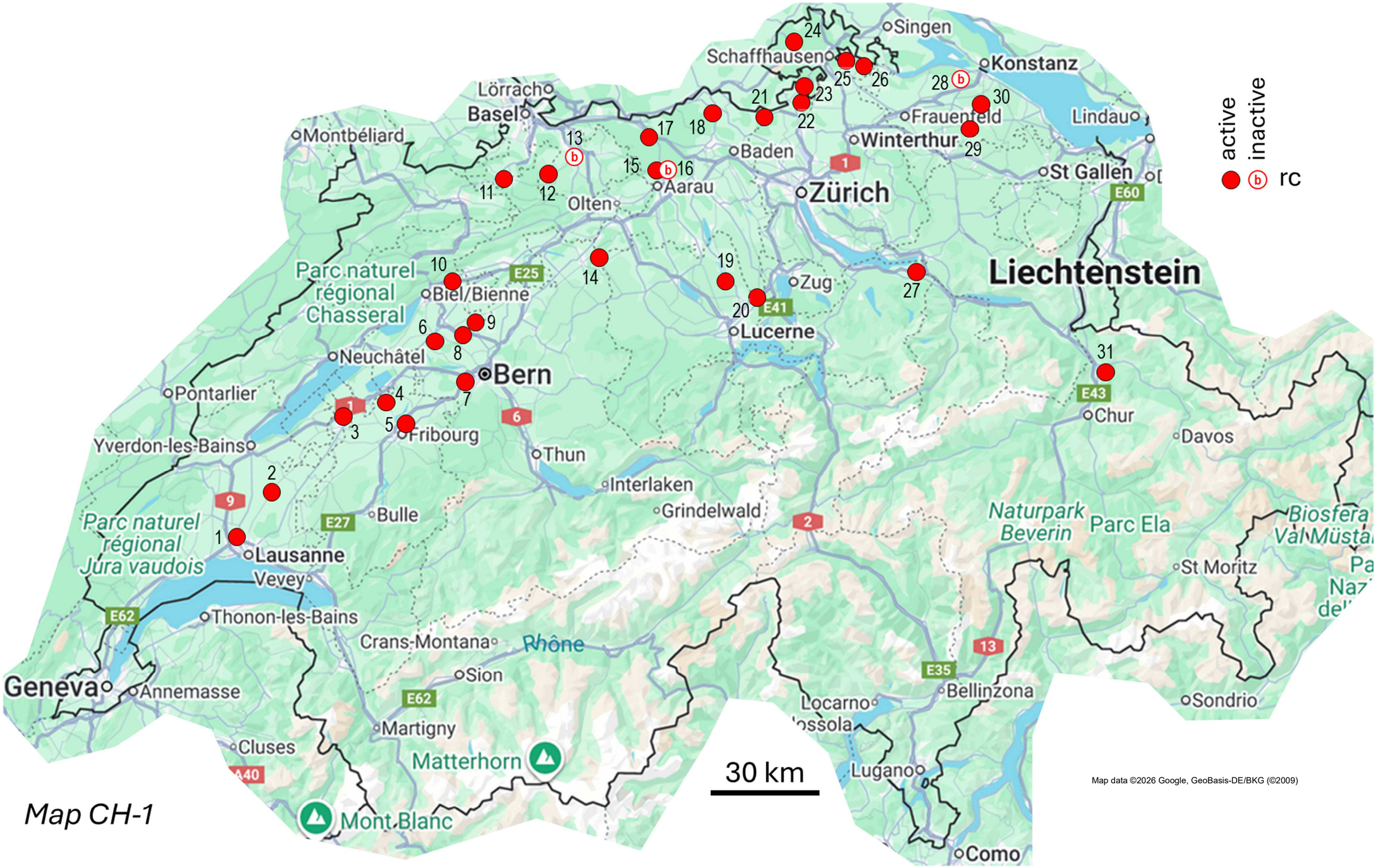
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Table CH-a: deposits of raw materials for the ceramic and glass industries in Switzerland.

#	raw material	st	deposit	canton
1	red clay	A	Crissier	Vaud
2	red clay	A	Possens	Vaud
3	red clay	A	Corcelles-près-Payerne	Vaud
4	red clay	A	Wallenried	Fribourg
5	red clay	A	Düdingen	Fribourg
6	red clay	A	Radelfingen	Bern
7	red clay	A	Rehhag	Bern
8	red clay	A	Schüpfen	Bern
9	red clay	A	Rapperswil	Bern
10	red clay	A	Pieterlen	Bern
11	red clay	A	Laufen	Basel LS
12	red clay	A	Seewen	Solothurn
13	red clay	I	Lausen	Basel LS
14	red clay	A	Roggwil	Bern
15	red clay	A	Küttigen 1	Aarau
16	red clay	I	Küttigen 2	Aarau
17	red clay	A	Frick	Aargau
18	red clay	A	Böttstein	Aargau
19	red clay	A	Hochdorf	Luzern
20	red clay	A	Pfaffwil-Gisikon	Luzern
21	red clay	A	Fisibach	Aarau
22	red clay	A	Buchberg	Schaffhausen
23	red clay	A	Rafz	Zurich
24	red clay	A	Siblingen	Schaffhausen
25	red clay	A	Neuparadis-Schlatt	Thurgau
26	red clay	A	Basandingen	Thurgau
27	red clay	A	Tuggen	Schwyz
28	red clay	I	Hohenrain-Waldi	Thurgau
29	red clay	A	Istighofen-Rohren	Thurgau
30	red clay	A	Berg	Thurgau
31	red clay	A	Landquart	Graubunden


active
inactive
rc
Singen
Schaffhausen
Konstanz
Lörrach
Basel
Lindau
Montbéliard
Frauenfeld
Winterthur
Baden
Zürich
St Gallen
Aarau
Olten
Liechtenstein
Parc naturel régional Chasseral
Biel/Bienne
Zug
Lucerne
Neuchâtel
Bern
Pontarlier
Yverdon-les-Bains
Fribourg
Thun
Interlaken
Grindelwald
Chur
Davos
Parc naturel régional Jura vaudois
Bulle
Lausanne
Vevey
Thonon-les-Bains
Crans-Montana
Rhône
Sion
Geneva
Annemasse
Martigny
Cluses
Matterhorn
Mont Blanc
Naturpark Beverin
Parc Ela
St Moritz
Sondrio
Bellinzona
Locarno
Lugano
Como
E25
E41
E60
E43
E27
E62
E35
A40
30 km
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)

Map CH-1

Syria

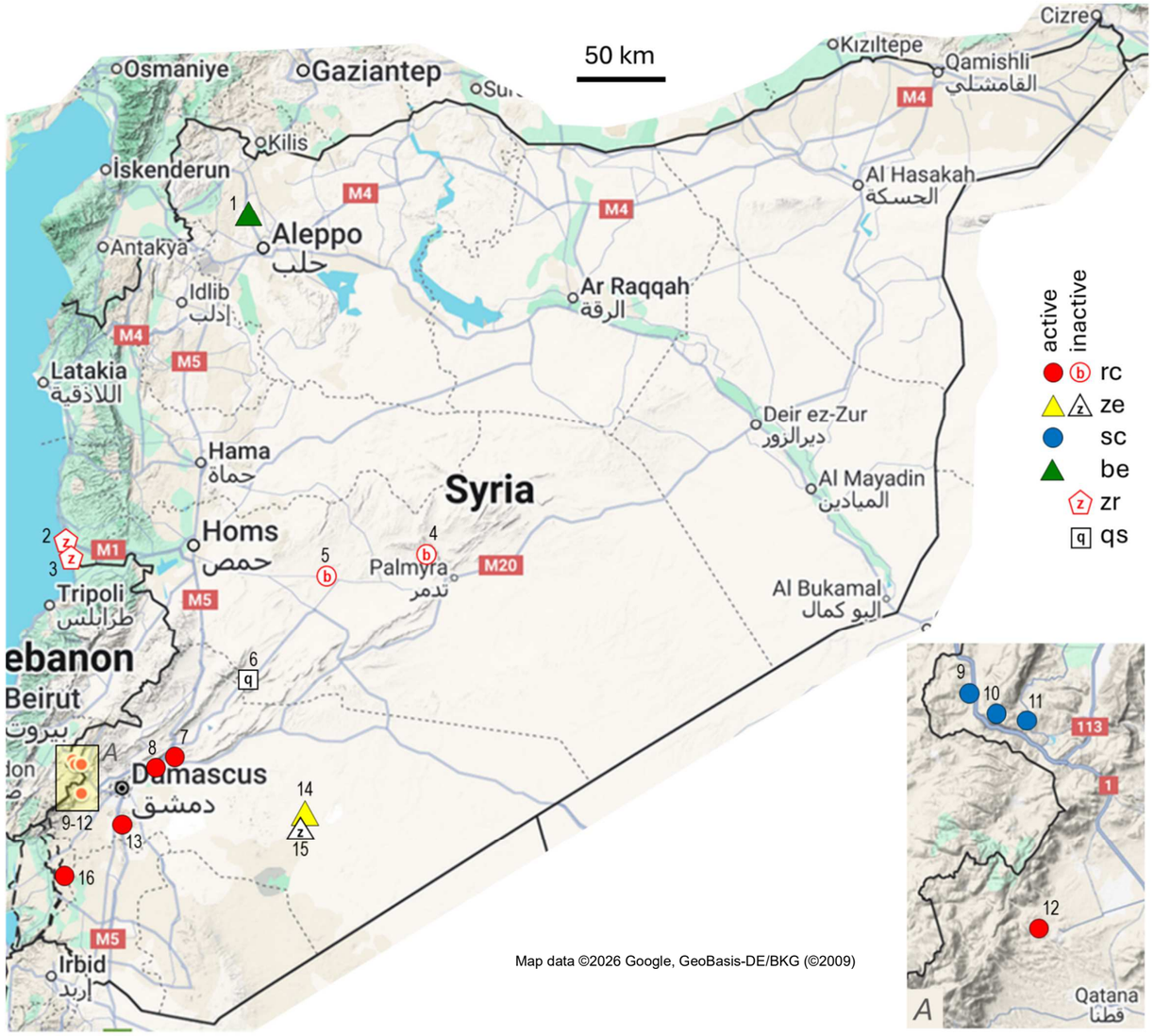
Syria produces bentonite, red clay (including stoneware clay) and zeolites, but neither quantities mined nor the amount of reserves are accessible. In addition, resources of silica sand and heavy sands (containing zircon) have been reported.

Stoneware clays are mined in the Kfer Yabous pole (Qudsaiya district) in the Anti-Lebanon Mountains. The source is the Cretaceous (Lower Aptian) Jeitah Formation, which hosts lenses of grey clay that is kaolinitic but contains 2-6% of iron oxide [1-3].

Red clays are quarried mainly around Damascus from Paleogene marine sediments and Neogene continental deposits [4].

Zeolites (phillipsite-chabazite-analcime) are found in the volcanic province located in southwestern part of the country, where eruptive activity continued from Eocene to Quaternary. Both zeolitized tuffs and epiclastics are the target of exploitation, especially in the pyroclastic-sedimentary sequence of the Pliocene Sis Formation [5].

Bentonite is extracted from the Beyanun deposits, north of Aleppo [6,7]. **Silica sand** is reported in the Homs area [8,9]. **Zirconium minerals**: beach sands in the coast from south of Tartous to the border of Lebanon contain heavy minerals, but zircon was found up to 1 wt.% [10].



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Table SY-a: deposits of raw materials for the ceramic and glass industries in Syria.

#	r.m.	st	deposit	district
1	be	A	Beyanun	Azaz
2	zr	O	Ash Shaykh Muhammad	Tartus
3	zr	O	Al-Hamidiyah	Tartus
4	rc	I	Al-Zuqara	Palmyra
5	rc	I	Al-Mkamen	Homs
6	qs	O	Al-Qaryatain	Homs
7	rc	A	Al-Qutaifa	Al-Qutaifa
8	rc	A	Tall al-Kurdi	Duma
9	sc	A	Kfer Yabous	Qudsaiya
10	sc	A	Jadidat Yabus	Qudsaiya
11	sc	A	Al-Rawda Al-Batroneh	Qudsaiya
12	rc	A	Kafrquq	Qatana
13	rc	A	Khiyarat Danun	Rif Dimashq
14	ze	A	Tell Mukleihat	Duma
15	ze	O	Jabal al Sis	Duma
16	rc	A	Kammuniyah	Al-Quneitra

Raw material

be	bentonite
qs	silica sand
rc	red clay
sc	stoneware clay
ze	zeolites
zr	zirconium minerals

Status of deposit

A	active mine
I	inactive mine
O	occurrence

Tunisia

Ceramic and glass raw materials, mainly intended to feed domestic industry, are intensively mined in Tunisia: red clay, silica sand, and white clay (but quantities are not revealed). The Tunisian mining industry is also extracting barite (7th producer in the Euro-Mediterranean area) and resources of kaolin, bentonite and strontium minerals are reported [1,2].

Barite is obtained (10,000 tpa, mean 2015-2024) as byproduct of fluorite mining in the Zaghouan district in north-eastern Tunisia. These Mississippi Valley-type deposits consist mainly of fluorite and barite with minor sphalerite and galena [3,4]. **Celestite**-rich and Pb-Zn-poor mineralizations, with barite among gangue minerals, occur at Aïn Allega and other localities in northwestern Tunisia. Such deposits, related to Triassic diapirs, are no longer exploited [5-7].

Red clays are utilized in the production of bricks, roof tiles, pottery and ceramic tiles, with the main manufacturing districts operating in Sousse-Monastir (*Map TN-1A*) and Nabeul (*Map TN-1B*). Although clay resources are reported from several geological sources, ranging from Quaternary to Triassic in age [8], the Tunisian brick industry is employing essentially Pliocene-Miocene clays [9-14]. Other important clay deposits are found throughout the country (but currently used in central Tunisia) in various Early Cretaceous (Valanginian to Aptian) marine formations [15-24] and uppermost Jurassic units [25-28]. Additional clay resources, not yet exploited, are known in Paleogene to Late Cretaceous marine sediments [10,29,30] as well as in Permo-Triassic fluvio-deltaic deposits in southeastern Tunisia [31-33].

Stoneware clays have been identified within Cretaceous units in north-central Tunisia [34,35] and Oligo-Miocene Numidian flysch in the Tellian Atlas [36,37]. Altered facies of the Numidian units occur in northwestern Tunisia (*Map TN-1C*) giving rise to **white clay** deposits [38-40] that are used in the production of porcelain stoneware tiles [41]. In the same area, white clay materials were also formed by alteration of Miocene rhyodacite domes [42,43], while sedimentary **kaolin** (halloysite + kaolinite) is reported in the Pliocene Tamra Formation [43]. In central Tunisia, halloysite characterizes the Miocene sedimentary deposits of Aïn Khemouda [44].

Silica sand is extracted in three main poles, close to Zéramdine (*Map TN-1D*), Kairouan and Touzert in central Tunisia. Active quarries exploit the lacustrine sandstones of the Early Cretaceous Sidi Aïch Formation [45-47] as well as deltaic to alluvial sandstones of the Oligocene-Miocene Fortuna [48] and Saouaf formations [13]. Numerous deposits have been explored in the north [49], centre [25,35,50] and south of Tunisia [51].

Bentonite and smectitic-rich clay prospects are known in central Tunisia, hosted in Cretaceous [52,53] and Eocene formations [54] as well as in the Miocene units of northern Tunisia [42].

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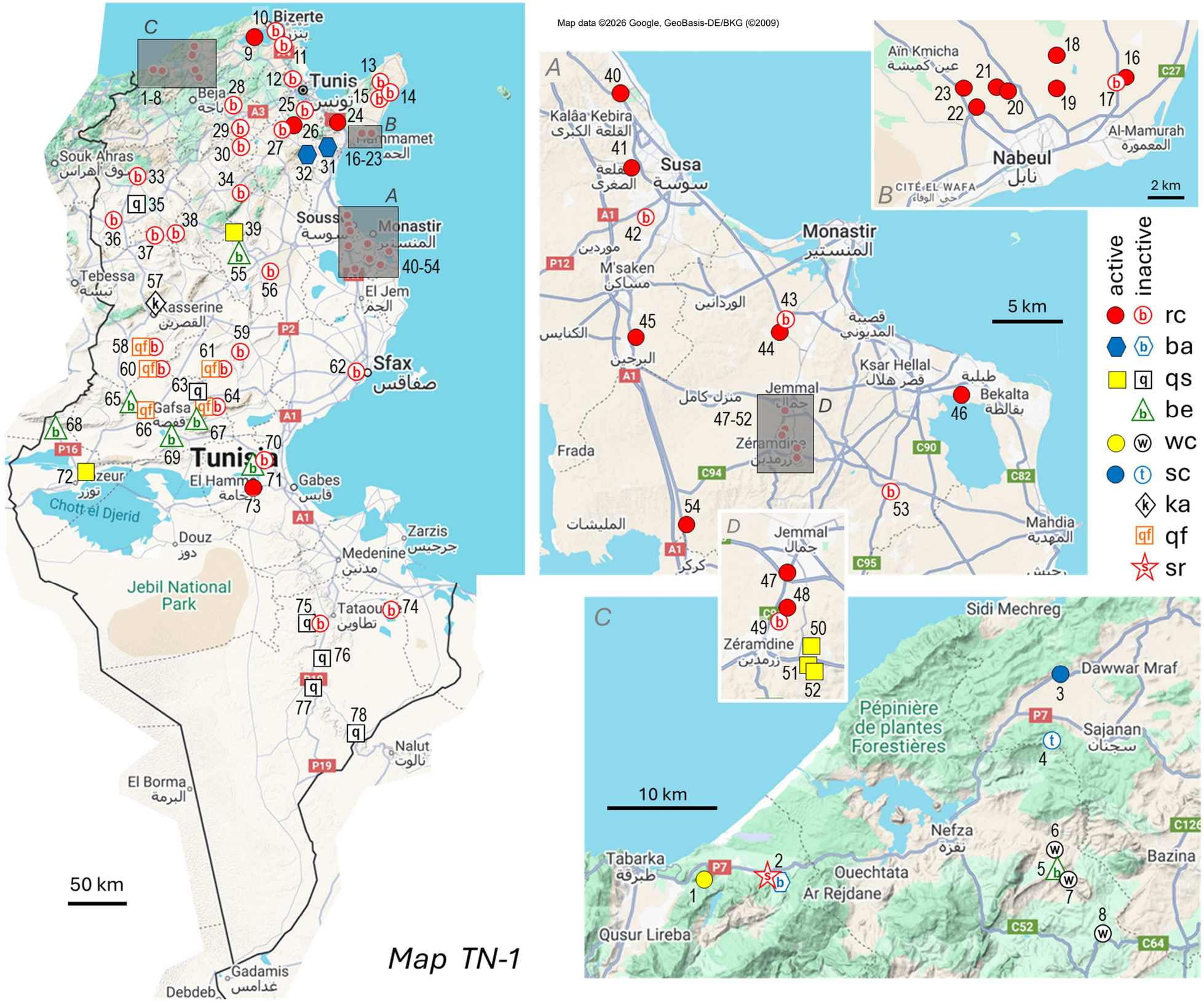
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Table TN-a: deposits of raw materials for the ceramic and glass industries in Tunisia.

#	r.m.	st	deposit	governatorate
1	wc	A	Sidi El Bader-Tabarka	Jendouba
2	ba-sr	I	Aïn Allegua	Jendouba
3	sc	A	Sejnène	Bizerte
4	sc	O	Om Tebal	Bizerte
5	be	O	Oued Belif-Nefza	Béja
6	wc	I	Aouinet	Béja
7	ka	O	Tamra	Béja
8	wc	O	Boukhchiba	Béja
9	br	A	Louata	Bizerte
10	br	I	Menzel Jemil	Bizerte
11	br	I	El Khitmin	Bizerte
12	br	O	Jebel Ammar	Ariana
13	br	O	Tazoghrane	Nabeul
14	br	O	Menzel Temime	Nabeul
15	br	O	Al Middah-Tamozrat	Nabeul
16	br	A	Diar Ben Salem	Nabeul
17	br	I	Essidhi	Nabeul
18	br	A	Amroun 1	Nabeul
19	br	A	Dar Chaabane Al Fehri	Nabeul
20	br	A	Amroun 2	Nabeul
21	br	A	Amroun 3	Nabeul
22	br	A	Route Nabeul-Hammamet	Nabeul
23	br	A	Al Noor	Nabeul
24	br	A	Grombalia	Nabeul
25	br	I	Khledia	Ben Arous
26	br	A	Jebel Oust	Zaghouan
27	br	O	Bir M'Cherga	Zaghouan
28	br	O	Oued Zarga	Béja
29	br	O	Gram	Béja
30	br	O	Jebel Bou Arada	Siliana
31	ba	A	Hammam Jedidi	Nabeul
32	ba	A	Hammam Zriba	Zaghouan
33	br	I	Makthar	Kef
34	br	O	Jebel Bargou	Siliana
35	qs	O	Jezza	Kef
36	br	O	Jebel Slata	Kef
37	br	O	Jebel er Rouis	Kef
38	br	I	El Ksour	Kef
39	qs	A	Al-Waslatiyah	Kairouan
40	br	A	Akouda	Sousse
41	br	A	Sousse	Sousse
42	br	I	Zawia	Sousse
44	br	A	Mazdour	Monastir
43	br	I	Menzel Harb	Monastir
45	br	A	El Borjine	Sousse
46	br	A	Téboulba	Monastir
47	br	A	Jemmal	Monastir
48	br	A	Zéramdine Lamhar	Monastir
49	br	I	Zéramdine Menhi	Monastir
50	qs	A	Tyayra 3	Monastir
51	qs	A	Tyayra 1	Monastir
52	qs	A	Tyayra 2	Monastir
53	br	I	Menzel Fersi	Monastir
54	br	A	Menzel Hayet	Monastir
55	be	O	El Gnater	Kairouan
56	br	O	Chouamekh	Kairouan
57	ka	O	Ain Khemouda	Kasserine
58	qf-br	O	Jebel Ouaddada	Kasserine
59	br	O	Jebel Boudinar	Sidi Bouzid
60	qf-br	O	Jebel Sidi Aïch	Gafsa
61	qf-br	O	Jebel Meloussi	Sidi Bouzid
62	br	I	Riadh	Sfax
63	qs	O	Jebel Ad-Darin	Gafsa
64	qf-br	O	Jebel Bouhedma	Gafsa
65	be	O	Oued Tefal	Gafsa
66	qf	O	Jebel Attaf	Gafsa
67	be	O	Jebel Hamadi	Gafsa
68	be	O	Chbika	Tozeur
69	be	O	Jebel Berda	Gafsa
70	br	O	Jebel Zimlet El Beida	Gabès
71	be	O	Jebel Aïdoudi	Gabès
72	qs	A	Oued Zitouna	Tozeur
73	br	A	El Hamma	Gabès
74	br	O	Al-Sammar	Tataouine
75	qs-br	O	Douiret	Tataouine
76	qs	O	Oum diab	Tataouine
77	qs	O	Ouni	Tataouine
78	qs	I	Dehibat	Tataouine



Map TN-1

Raw material

ba	barite
be	bentonite
ka	kaolin
qs	silica sand
rc	red clays
sc	stoneware clays
sr	celestine (strontium)
wc	white clays

Status of deposit

A	active mine
I	inactive, mine closed
O	occurrence

Türkiye

Türkiye is the major player on the Euro-Mediterranean chessboard of ceramic and glass raw materials, being the leading supplier of bauxite, bentonite, borates, chromite, feldspar, kaolin, magnesite, perlite, pyrophyllite, quartzous materials, soda ash and white clays, as well as the second larger producer of barite, celestine, olivine and red clays. In addition, the Turkish mining industry is in the European top ten of zeolites, talc and wollastonite producers. Also, kyanite and zircon deposits are reported but not currently exploited [1-9].

Bauxite deposits are mainly concentrated in eight mining provinces, six of which are in the Anatolide-Tauride block, plus one each in the Pontides and in the Arabian Platform [10]. Turkish production (2,132,000 tpa, mean 2015-2024) is mainly achieved from deposits within Cretaceous units of the Seydişehir-Akseki (Konya) and Payas-Isahiye (Hatay-Gaziantep) provinces, and from high-grade metamorphosed units of the Milas-Yatagan (Aydın) province [10,11]. Mines in the Triassic-Jurassic bauxites (Alanya and Tufanbeyli-Saimbeyli-Kadirli provinces) appear inactive, as those in the Jurassic units of the Yalvaç-Şarkikaraagaç and Bolkardagı-Karaman provinces [10,12]. Reserves are about 69 million tonnes [13]. **Alumina** is produced (300,000 tpa, mean 2015-2024) by the plant in Seydişehir [1].

Chromite: numerous deposits are found in Mesozoic ophiolites outcropping along two Tethyan tectonic zones: the Izmir-Ankara-Erzincan suture in the north and the Anatolide-Tauride suture in the south [14]. Chromitites are always associated to dunite metasomatism of harzburgite host rocks [15]. Turkish production of raw chromite (8,050,000 tpa, 2015-2024 average) comes from over 30 mine clusters, concentrated in the following districts [9,14,15]: Bursa-Kütahya-Eskisehir [16] and Sivas-Erzincan-Bayburt [17] along the northern suture; Mugla-Burdur-Denizli [18-20], Adana-Hatay-Kayseri [21,22], and Elazig-Tunceli-Malatya [23,24] in the southern zone. Reserves are indicated in 27 million tonnes [13].

Boron deposits are present in various Miocene formations within volcano-sedimentary sequences filling the easternmost part of the Aegean extensional basins [25-27]. Four mining districts are in operation, producing in total 6,604,000 tpa [9] of borax (predominant at Kirka), colemanite (mainly at Emet and Kestelek) and ulexite, mostly at Bigadiç [25-30]. Further deposits, currently not exploited, are characterized by probertite (Göcenoluk and Doganlar) or priceite in Sultançayırı [25,31,32]. Reserves as high as 563 million tonnes of B_2O_3 are reported [30]. Recently, **lithium minerals** (hectorite) have been discovered within the Miocene volcano-sedimentary units hosting the Bigadiç and Emet borate deposits, where concentrations up to 0.5% Li_2O in smectite-rich claystones [33,34].

Feldspar: the most important deposits consist of albitized pegmatites, embedded within the Precambrian metamorphic basement of the Menderes massif in southwestern Türkiye [35]. There are around fifty active mines, concentrated in an area of approximately 60 x 30 km between Milas and Çine (*Map TR-9*), where multi-kilometric vein systems are exploited [36,37]. In addition to the main alignment (Karadere, where about twenty mines operate) there are another half a dozen lineaments, subparallel with an orientation nearly SSW-NNE, which become progressively richer in quartz moving eastwards. Significant feldspar resources are present in the rest of Türkiye [5] but only a few deposits are currently mined: aplite-pegmatite in Bilecik and Denizli [38,39], rhyolite in Konya [40,41], and nepheline syenite in Orhaneli and Kırşehir [42-47]. Occurrences of granites [48,49] and felsic pyroclastics [50-52] are reported in various zones of Anatolia. Turkish production is on average 10,882,000 tpa, of which 24,500 tpa of nepheline syenite [9], while reserves amount overall to 720 million tonnes.

Kaolin is found in numerous deposits, which present a range of genetic conditions, differentiated in the various mining districts [5,53,54]. In Balıkesir and Çanakkale provinces, kaolin deposits were formed mainly through acid-sulphate epithermal alteration at the expense of Oligocene-Miocene volcanics [55-59], while halloysite arose from a mixed hypogene and hydrothermal origin [59-62]. In the Kütahya-Uşak-Afyonkarahisar area, kaolin is the product of supergene alteration of Miocene pyroclastics and Paleozoic metamorphics [63-72]. Kaolinization by action of hydrothermal fluids on felsic volcanics is the genetic model also for deposits of Miocene age in central Anatolia [73-76]; Eocene in Thrace [77]; Eocene and Cretaceous in the Pontides [78,79]. Supergene origin can involve intrusives, like Eocene syenite in Sivas [80]. Over twenty mines are in operation, for a total production of 1,594,000 tpa, mean 2015-2024 [9]. Reserves are estimated at 89 million tonnes (15-37% Al_2O_3).

White clay: at least 25 deposits are mined (4,986,000 tpa, mean 2015-2024) to obtain various grades, from ball clay to refractory clay, with 354 million tonnes of reserves [5,6,81]. The major deposits are found within fluvio-lacustrine Miocene sediments, often together with coal seams and/or silica sands, on both sides of the Bosphorus: the Şile district (*Map TR-2B*) on the Asian side [82-85] and the Agaçlı district (*Map TR-2A*) on the European side [86]. Analogous Neogene deposits are exploited in the Uşak [87,88], Afyonkarahisar [89-91] and Konya provinces [92-94]. In the Sögüt area, kaolinitic clays are found in both Neogene sedimentary formations and hydrothermally altered granitoids of the Palaeozoic basement [95]. **Fireclay** is extracted in Demirözü (Bayburt), and further deposits are reported in the Pontides [96]. Underclays beneath lignite deposits have been considered promising resources, e.g., in the Miocene fluvio-lacustrine basins of the Kütahya province [97-100].

Pyrophyllite is found within Paleozoic orthogneisses of the Pütürge massif, located in the collision zone of the Arabian and Anatolian plates [101-104]. These pyrophyllite deposits are aligned along a 10 km long belt in the southern part of the massif (*Map TR-12Y*) and produce on average 201,000 tpa [9]. Reserves are around 15 million tonnes [13]. In addition, pyrophyllite is associated with kyanite in highly metamorphosed schists and gneisses of the Precambrian Bitlis terrain, another massif along the Anatolian-Arabian suture zone [105-107]. **Kyanite** is also reported in high-grade metamorphics in the Manisa-Gördes-Demirci region [6] but none of these occurrences are exploited, besides overall reserves are estimated to be 3.8 million tonnes at 21-52% Al_2O_3 [6].

Bentonite is extracted from about 15 mines (1,995,000 tpa, mean 2015-2024) located in five main poles, with 250 million tonnes of reserves [9,13]. In the Ankara (*Map TR-6M*), Balikesir (*Map TR-5J*) and Çankiri (*Map TR-3E*) districts, bentonites derive from alteration of volcanic tuffs in Miocene lacustrine basins [108-110]. In the Edirne province (*Map TR-2*), bentonites occur in the volcano-sedimentary Islambeyli Formation of Eocene age [111,112]. The Ordu-Giresun pole (*Map TR-4*) exploits altered trachytic-dacitic-andesitic pyroclastics of Upper Cretaceous [113-116]. Other occurrences are known, but not mined at the moment, in the Tokat province, where bentonite is found in Upper Cretaceous pyroclastics of the Reşadiye Formation [117] as well as in the Kütahya province, where bentonite was formed by alteration of Pliocene perlite and pyroclastic rocks [118,119].

Soda ash: Turkish production (11,296,000 tpa, mean 2015-2024) comes from both mineral deposits (10,839,000 tpa) and synthetic sodium carbonate (457,000 tpa) manufactured in two plants in Ankara [1,9]. The Beypazari basin (*Map TR-6*) hosts the second largest Na-carbonate deposit in the world, with total reserves estimated to be 240 million tonnes [120,121]. Evaporite lenses (trona with pirssonite and nahcolite) occur within fluvial, lacustrine, and playa-lake sediments of the Upper Miocene Hirka Formation [120-123]. In addition, glauberite replaced gypsum in the evaporite member of the coeval Kirmir Formation [120,124]. A second trona source is exploited in the Kazan Basin, north of Ankara, within lacustrine sequences of the Eocene Mülk Formation [120,125].

Magnesite and hydromagnesite are produced (1,999,000 tpa on average) by several mines operating in three main districts: Kütahya-Eskişehir-Bursa, Konya, and Çankırı-Erzincan-Erzurum-Sivas [1,6,9,126]. All deposits are associated with ultramafic rocks of Cretaceous ophiolite complexes and two main occurrences of magnesite and hydromagnesite have been identified: stockwork veins (cryptocrystalline) and sedimentary [126]. Such different types of deposits occur in the Kütahya-Eskişehir region [127-129], as well as in the Erzincan-Erzurum zone [130] and in the Konya province [131]. Total reserves of magnesite are around 110 million tonnes, at 41-48% MgO [13,126]. **Huntite** deposits are being excavated from Neogene lacustrine sediments in the Çameli district (Denizli) where huntite replaced the primary aragonite [132,133]. **Olivine** deposits are also hosted in the Tethyan ophiolites, both along the Izmir-Ankara-Erzincan and Tauride-Anatolide suture zones [126]. Turkish production (301,000 tpa, mean 2015-2024) is mostly achieved in Bursa, Isparta, and Mugla provinces [134,135].

Perlite: several deposits are found within the Neogene-Quaternary volcanic provinces of Anatolia. The main districts are in Bergama [136,137] and Ankara [138], with further quarries in operation in the Eskişehir, Erzurum,

Erzincan, Neuşehir and Çankiri provinces [7,139]. Total production is on average 1,121,000 tpa [9] and reserves of perlite are around 5 million tonnes [7].

Barite: a broad distinction has been proposed between magmatism-associated and passive margin-hosted deposits: the former are linked to the Cretaceous Pontide magmatic arc or Oligocene carbonatites in northwestern Anatolia, while the latter occur within various Lower Paleozoic sedimentary units in the Taurides and the Arabian Platform [140]. The Paleozoic deposits account for most of Turkish barite reserves (34 million tonnes at 71-99% $BaSO_4$) and active mines are situated along a belt extending from Isparta [141,142] through Konya [142], Antalya [143], Mersin [144,145] and Kahramanmaraş [146,147]. Other deposits are located further east, in the provinces of Malatya and Batman [148,149]. Total production is 351,000 tpa of barite, mean 2015-2024 [9].

Celestine is discontinuously exploited in the Akkaya deposit (on average 7,400 tpa in the last decade) located in the Sivas Basin, central Anatolia [1,9]. Strontium sulphate mineralizations, epigenetic in origin, occur at three levels within a sedimentary sequence of shallow shelf, lagoon and sabkha environments, which correspond to distinct Eocene, Oligocene and Miocene formations [150,151]. Reserves are indicated in 670,000 tonnes (>72% $SrSO_4$).

Red clays are extracted for the production of bricks, roof tiles, pottery and lightweight aggregates (7,066,000 tpa, mean 2015-2024) by at least one hundred clusters, where sometimes dozens of individual (industrial and/or artisanal) manufacturers operate [9]. Such brickmaking centres are scattered throughout the country, with major clusters located in: Izmir-Manisa [152-155] (*Map TR-8T*), Afyon [156] (*Map TR-8T*), Tekirdag [157] (*Map TR-2*), Eskişehir [158,159] (*Map TR-6O*), Tokat-Çorum [160,161] (*Map TR-3*), Sinop [162,163] (*Map TR-3C*), and Bartin-Zonguldak [164] (*Map TR-3*). Turkish brick industry makes recourse to a wide range of clay sources, including Quaternary alluvial deposits in Izmir, Manisa, Afyon and Kastamonu [152-156,165]; Neogene fluvial-lacustrine deposits in Eskişehir, Tokat, Çorum [158-161] as well as in central and southern Anatolia [166-172]; Paleogene marine and continental sediments in Tekirdag, Sinop and Bartin [157,162-164]; and even Paleozoic weathered shales [173].

Quartzous raw materials: Turkish production, on average 15,441,000 tpa [9], is achieved by exploiting silica sand (11,041,000 tpa) together with quartzite (2,966,000 tpa) and quartz (1,435,000 tpa). Major silica sand quarrying districts are in northwestern Türkiye (Istanbul, Edirne, Kırklareli, Kocaeli and Tekirdag) along with Bilecik and Manisa, where Neogene formations are excavated [174,175]. Quartzite deposits, hosted in Silurian-Devonian metamorphic formations, are mainly found in Adana-Mersin and Zonguldak regions [174,176,177]. Quartz vein deposits are principally exploited in the Menderes Massif [178]. Resources are estimated to be around 2 billion tonnes.

Talc is produced from small deposits in Balıkesir, Kütahya and Bursa provinces, for a mean output of 16,700 tpa [5,9]. The reserves amount to nearly one million tonnes, the larger being in currently unexploited deposits in Aydin (Bozdogan), Eskisehir (Mihalıççik) and Sivas (Zara), but several other deposits have been explored [5]. Talc deposits were formed by hydrothermal alteration of basic and ultrabasic rocks: in most cases those of Cretaceous ophiolitic complexes or related Paleogene siliciclastic sediments [179-181]; also, the Triassic complexes in Balıkesir [182].

Zeolites (mostly clinoptilolite and heulandite) are exploited (65,000 tpa) in the Manisa-Kütahya-Uşak provinces, particularly in the Gördes and Simav volcano-sedimentary basins, where Miocene zeolitized tuffs occur [183-185]. Again heulandite and clinoptilolite are recovered from pyroclastics of the Oligocene Mezardere Formation in Thrace [186] and were mined also from Eocene volcaniclastics in Yalova and Çanakkale [187,188] along with zeolites occurring in Cretaceous sediments in eastern Anatolia [189]. Chabazite characterizes the zeolitized tuffs of the Miocene Aktepe Formation quarried near Ankara [190].

Zircon production has been carried out until 2018, peaking to 1950 tonnes of raw ore [9], from the heavy-mineral deposit of Ormanli, northwest of Istanbul. The mining target are beach and dune sands along the western Black Sea Coast, containing ilmenite and rutile along with zircon [191].

Wollastonite deposits are mainly reported in the northern Aegean region (Çanakkale, Bursa and Balıkesir provinces) where most of the reserves are found, in total estimated to be around 1.5 million tonnes [5]. Two deposits in this area (Inegöl and Yenice) are apparently in operation, although officially there is no production of wollastonite [9]. All deposits were formed by thermo-metamorphism of marbles or limestones due to intrusion of granites [192-194] or syenite, in the case of the Buzlukdag deposit in Kırşehir province [195-197].

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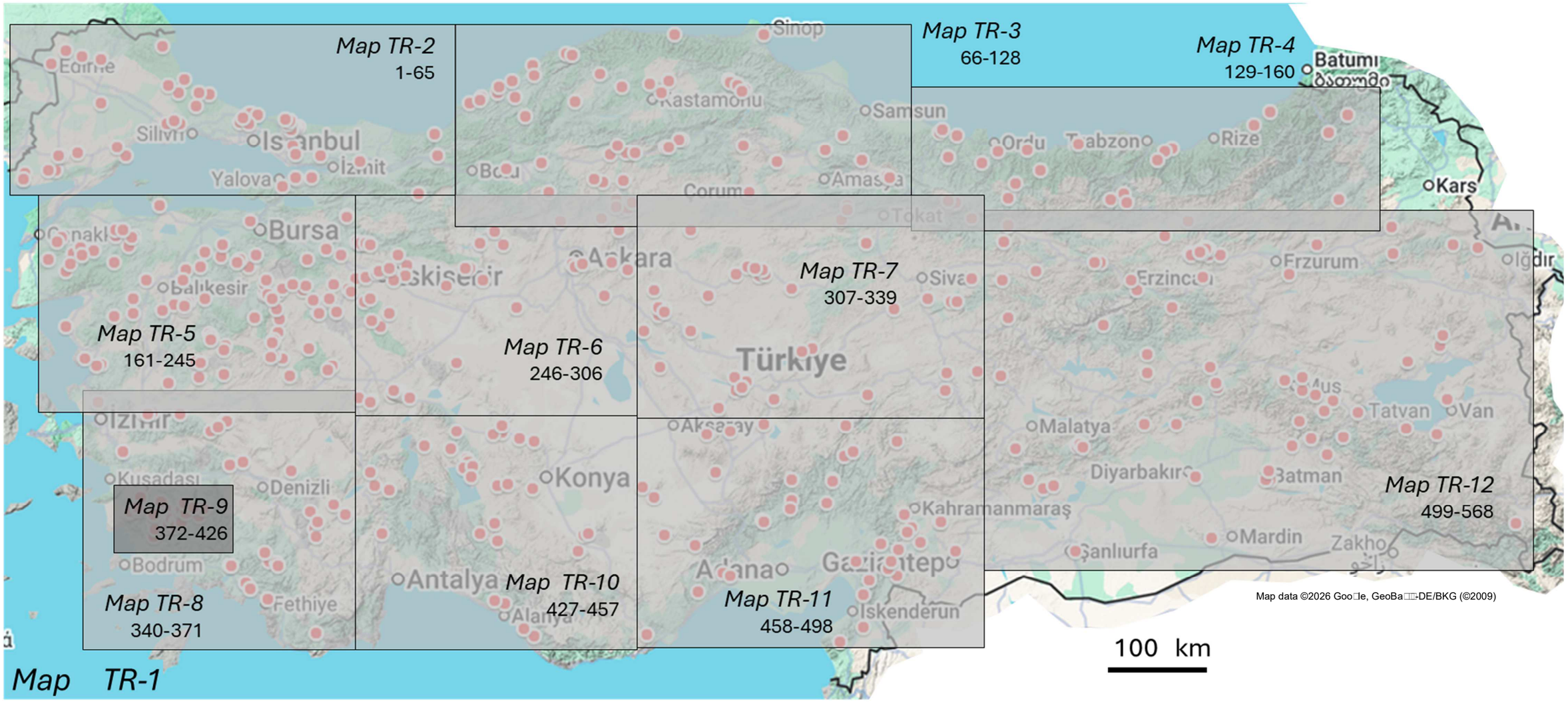
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Raw material

al	alumina
ba	barite
be	bentonite
bo	boron, borates
bx	bauxite
cr	chromite
ec	expanded clay
fc	fireclay
fd	feldspar, nepheline syenite
ka	kaolin
ky	kyanite
li	lithium minerals

Raw material

mg	magnesite
na	soda ash (natural)
ol	olivine
pe	perlite
py	pyrophyllite
qz	silica sand, quartz
rc	red clays
sa	soda ash (synthetic)
sr	celestine
tc	talc
wc	white clays

Raw material

wo	wollastonite
ze	zeolites
zr	zirconium minerals

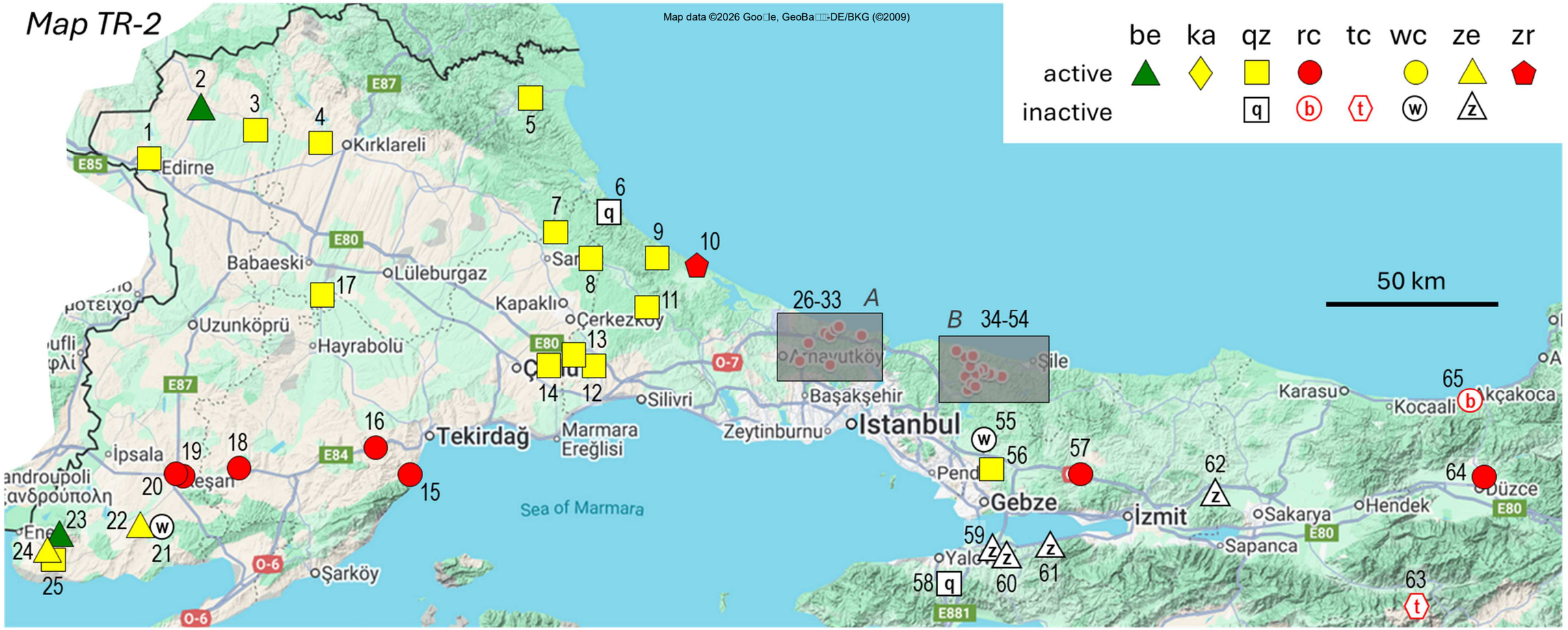
Status of deposit

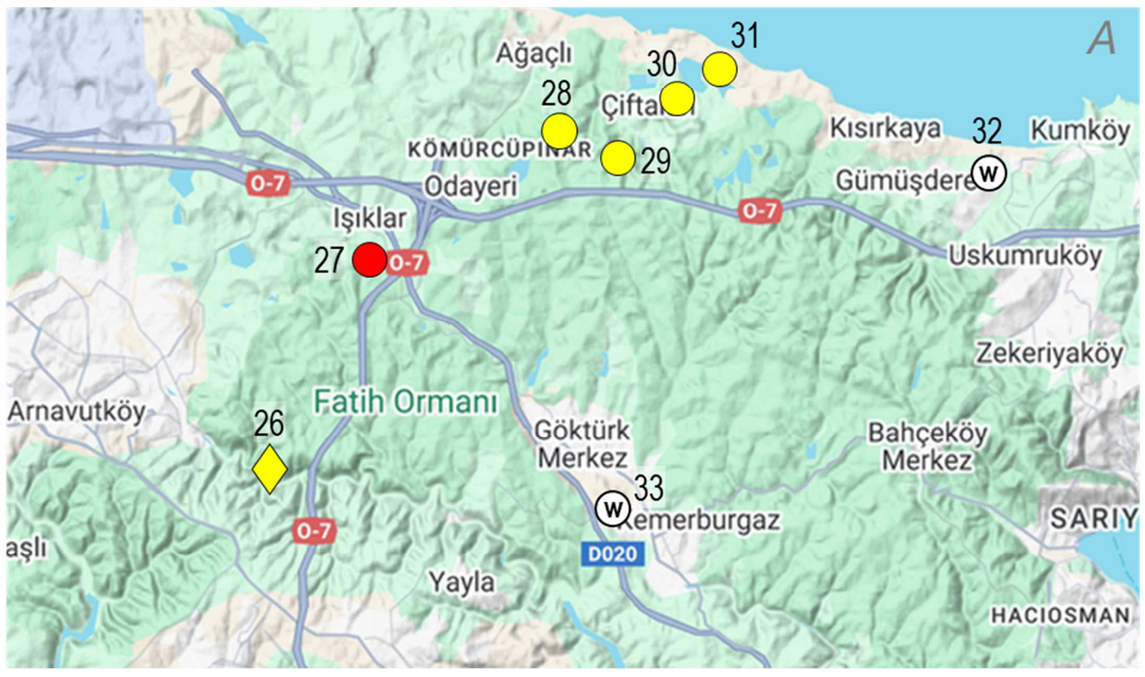
A	active mine
I	inactive
O	occurrence

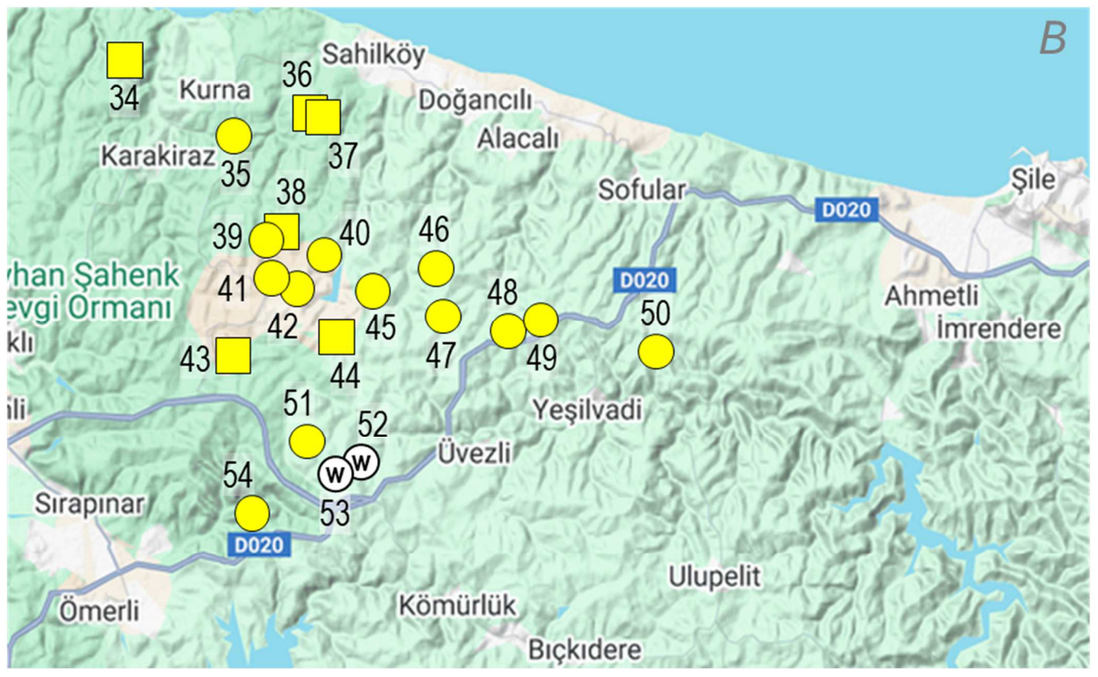
Table TR-a: deposits of raw materials for the ceramic and glass industries in Türkiye (*cluster of deposits).

#	r. m.	st	deposit	province
1	qs	A	Yeniimaret	Edirne
2	be	A	Sinanköy	Edirne
3	qs	A	Süleoğlu	Edirne
4	qs	A	Koyunbaba	Kırklareli
5	qs	A	Avcılar	Kırklareli
6	qs	I	Fatih	Istanbul
7	qs	A	Ayvacık	Tekirdağ
8	qs	A	Safaalan	Tekirdağ
9	qs	A	Çatalca*	Istanbul
10	zr	A	Ormanlı	Istanbul
11	qs	A	Danamandıra-Gümüşpınar*	Istanbul
12	qs	A	Çeltik-Beyciler	Istanbul
13	qs	A	Seymen	Tekirdağ
14	qs	A	Önerler	Tekirdağ
15	rc	A	Naipköy	Tekirdağ
16	rc	A	Nusratfakı	Tekirdağ
17	qs	A	Sinanlı	Kırklareli
18	rc	A	Malkara	Tekirdağ
19	rc	A	Istasyon 1	Edirne
20	rc	A	Istasyon 2	Edirne
21	wc	O	Karliköy-Mercan	Edirne
22	ze	A	Kızkapan	Edirne
23	be	A	Hisarlı	Edirne
24	be	A	Çavuşköy-Yenice	Edirne
25	qs	A	Küçük Evren	Edirne
26	ka	A	Arnavutköy	Istanbul
27	rc	A	Işıklar	Istanbul
28	wc	A	Ağaçlı	Istanbul
29	wc	A	Çiftalan	Istanbul
30	wc	A	Ergeneçiftliği S	Istanbul
31	wc	A	Ergeneçiftliği N	Istanbul
32	wc	I	Gümüşdere	Istanbul
33	wc	I	Kemerburgaz	Istanbul
34	qs	A	Karakiraz	Istanbul
35	wc	A	Kurna	Istanbul
36	qs	A	Sahilköy 6	Istanbul
37	qs	A	Kurnaköy*	Istanbul
38	qs	A	Sahilköy 5	Istanbul
39	wc	A	Sahilköy 4	Istanbul
40	wc	A	Sahilköy 1	Istanbul
41	wc	A	Sahilköy 2	Istanbul
42	wc	A	Sahilköy 3	Istanbul
43	qs	A	Avcıkoru 2	Istanbul
44	qs	A	Avcıkoru 1	Istanbul
45	wc	A	Doğancılı 2	Istanbul
46	wc	A	Doğancılı 1	Istanbul
47	wc	A	Alacalı 2	Istanbul
48	wc	A	Alacalı 1	Istanbul
49	wc	A	Sofular	Istanbul
50	wc	A	Kızılcaköy	Istanbul
51	wc	A	Avcıkoru 3	Istanbul
52	wc	I	Avcıkoru 4	Istanbul
53	wc	I	Avcıkoru	Istanbul
54	wc	A	Ömerli	Istanbul
55	wc	I	Göçbeyli	Istanbul
56	qs	A	Gebze	Kocaeli
57	rc	A	Karayakuplu	Kocaeli
58	qs	O	Elmalık	Yalova
59	ze	I	Havuzdere	Yalova
60	ze	I	Geyikdere	Yalova
61	ze	I	Tepeköy	Kocaeli
62	ze	I	Kızılcıklı	Sakarya
63	tc	O	Dereköy	Bolu
64	rc	A	Çavuşlar	Düzce
65	rc	O	Hacıdere	Düzce
66	qz	A	Kandilli	Zonguldak
67	qz	O	Uzungüney	Zonguldak
68	qz	I	Kozlu	Zonguldak
69	bx	I	Kokaksu	Zonguldak
70	qz	A	Kokurdan	Zonguldak
71	rc	A	Gökçeler	Zonguldak
72	rc	A	Çaycuma	Zonguldak
73	fd	O	Kilyos	Karabük
74	rc	A	Şiremir Çavuş	Bartın
75	rc	I	Kaman	Bartın
76	qz	O	Ikyasgeçidi	Bartın
77	qs	O	Kömeç	Bartın
78	qs	O	Döngelce	Kastamonu
79	qs	A	Çatak	Karabük
80	rc	O	Pınarbaşı	Kastamonu
81	qz	O	Daday	Kastamonu
82	rc	O	Küçüksu	Kastamonu
83	wc	O	Ömerli	Kastamonu
84	ka	O	Örhen	Kastamonu
85	fd	O	Ilçe	Kastamonu
86	qs	I	Sarıkum	Sinop
87	rc	A	Hacıahmetli	Sinop
88	rc	A	Yabanlı	Sinop
89	rc	A	Salar*	Sinop
90	rc	A	Tekke	Sinop
91	rc	A	Osmanköy	Sinop
92	rc	A	Karacaören*	Sinop
93	rc	A	Köprübaşı	Sinop
94	rc	A	Çatpınar	Sinop
95	rc	A	Kavak	Samsun
96	qz	A	Ladik	Samsun
97	be	I	Sepetli	Amasya
98	rc	A	Erbaa W	Tokat
99	rc	A	Erbaa E	Tokat
100	rc	A	Hacılar	Tokat
101	rc	A	Güneş	Tokat
102	rc	A	Zile	Tokat
103	rc	A	Yaydiğin*	Çorum
104	rc	A	Çepni*	Çorum
105	fc	O	Keçiköy	Amasya
106	rc	A	Osmancık*	Çorum
107	rc	A	Karasapaça	Kastamonu
108	rc	A	Yavuz Selim	Kastamonu
109	rc	A	Suluca E*	Kastamonu
110	rc	A	Suluca W*	Kastamonu
111	rc	A	Ömerli	Cankiri
112	be	O	Eskice	Çankırı
113	be	O	Kızılibrik	Çankırı
114	mg	I	Sarıalan	Çankırı

Map TR-2


Map data ©2026 Goo□le, GeoBa□□-DE/BKG (©2009)
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active
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50 km
Edirne
Kırklareli
Babaeski
Lüleburgaz
Uzunköprü
Hayrabolu
Kapaklı
Çerkezköy
Silivri
Tekirdağ
Marmara Ereğlisi
İpsala
Keşan
Enez
Şarköy
Sea of Marmara
Arnavutköy
Başakşehir
Zeytinburnu
İstanbul
Şile
Karasu
Kocaali
Akçakoca
Gebze
İzmit
Sakarya
Hendek
Düzce
Sapanca
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A
B
26-33
34-54
E80
E87
E84
E85
E881
O-6
O-7
D020


A
Ağaçlı
Çiftalan
KÖMÜRCÜPINAR
Odayeri
Işıklar
Kısırkaya
Gümüşdere
Kumköy
Uskumruköy
Zekeriyaköy
Fatih Ormanı
Arnavutköy
Göktürk Merkez
Bahçeköy Merkez
Kemerburgaz
Yayla
SARIY
HACIOSMAN
O-7
D020


B
Sahilköy
Kurna
Doğancılı
Karakiraz
Alacalı
Sofular
Şile
Ahmetli
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Ömerli
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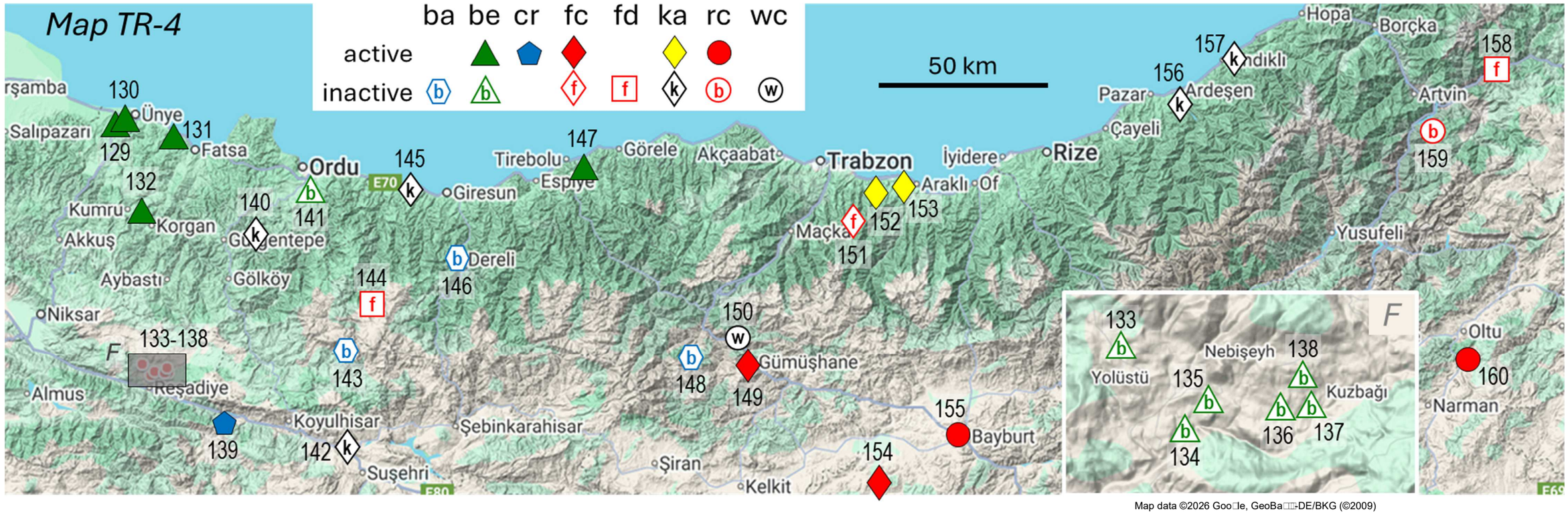
Map TR-3

Map data ©2026 Goo□le, GeoBa□□-DE/BKG (©2009)

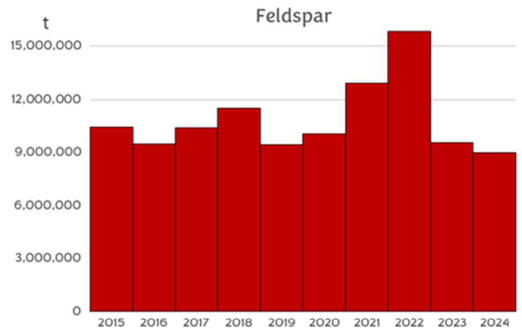
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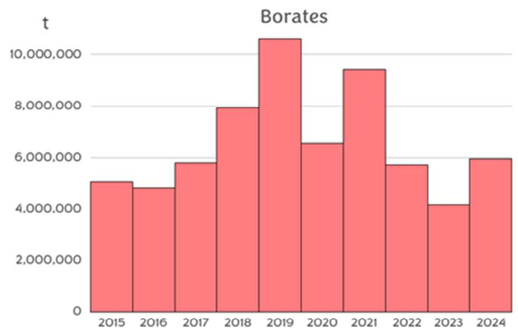
İnebolu 85 f
Sinop
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Erfelek
Gerze
Cide
76 77 q q q 78
75 b
Amasra
Bartın
71
70
Musu
68 q q
Z guldak
x 69
72
66
67
74
b 80
Azdavay
Abdipaşa
79
q 81
Daday
82 b
Devrekani
k 84
83 w
Kastamonu
Taşköprü
87-94
C
Hanönü
Yakakent
Alaçam
Bafra
19 Mayıs
Samsun
E95
Çarşa
Ereğli
Alaplı
Devrek f 73
Karabük
Safranbolu
İğdir
Araç
Kargı
Vezirköprü
95
111-115
D
108 107
ya
109
110
Ilgaz
E
mancık
106
Havza
Ladik
96
Merzifon
97 b
Taşova
Mengen
Bolu
E80 k 128
Gered b 127
Çerkeş
E80
f 105
İskilip
Bayat
Amasya
98 99
baa
117
f
116
118
f
119-123
E
Çankırı
104
Çorum
103
100
101
urhal
Zil
102
Tokat
126 p
Kızılcahamam
124
125
Okçumehmetli
87
88
Yabanlı
89
Salar
Ilıcaköy
Ömerköy
Çulhalı
Aydoğan
D785
Hamzalı
Çaltı
Kılıçlı
Darıözü
90
91
Cemalettinköy
92
Karacaören
Alibeyli
94
Boyabat
D030
93
Çarşak
Gazideretabaklı
Kuzveren
C
Boyali
114 m
Bayramören
115 b
Yeşildumlupınar
112 b
111
Yenidemi er
113 b
Sağırlar
Hacımuslu
Belören
E80
Kurşunlu
D
Eldivan
Gürpınar
Şabanözü
119
120
Gümerdiğin
123 b
122
121
Hisarcıkkayı
İnandık
Tüney
E

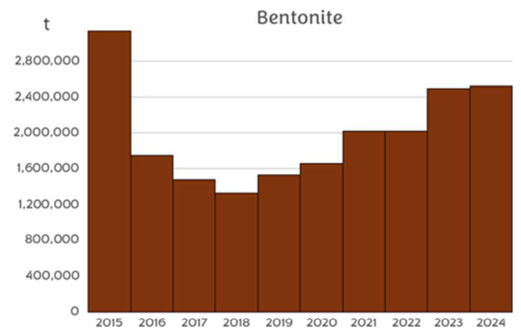
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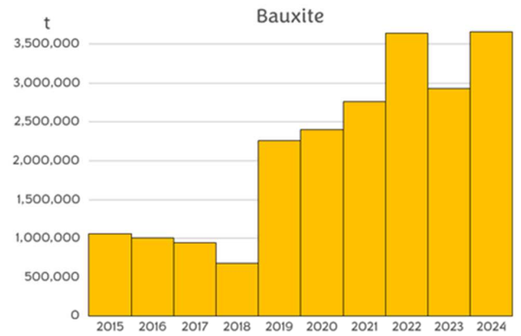


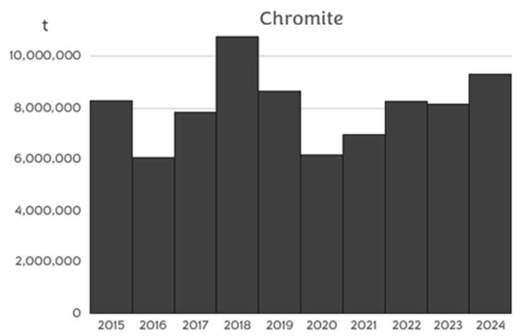
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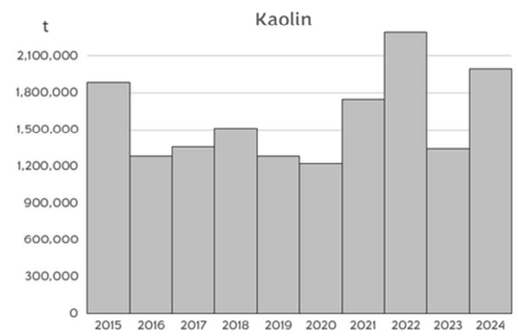


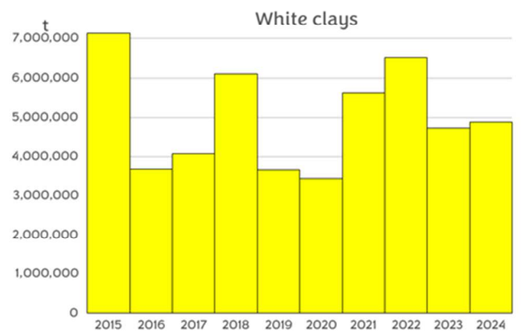












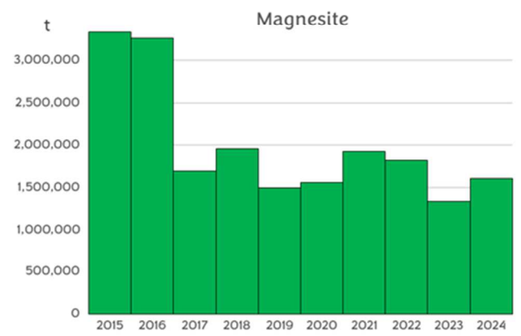


Table TR-b: deposits of raw materials for the ceramic and glass industries in Türkiye (*cluster of deposits).

#	r. m.	st	deposit	province
115	be	O	Madenli	Çankırı
116	pe	A	Orta	Çankırı
117	fc	O	Sakarcaören	Çankırı
118	fc	O	Maruf	Çankırı
119	be	A	Karayatak	Çankırı
120	be	A	Küçükhacıbey	Çankırı
121	be	A	Hisarcik	Ankara
122	be	A	Hançılı	Ankara
123	be	I	Ödek	Çankırı
124	pe	A	Yukarıemirler	Ankara
125	na	A	Kazan	Ankara
126	pe	I	Kuşçular	Ankara
127	rc	I	Akçaşehir	Bolu
128	ka	I	Büyükocak	Bolu
129	be	A	Göbü	Ordu
130	be	A	Kizilkaya	Ordu
131	be	A	Kavaclar	Ordu
132	be	A	Guneycik	Ordu
133	be	I	Yolüstü	Tokat
134	be	I	Güvenlik	Tokat
135	be	I	Kuruköprü (Kaşpınar)	Tokat
136	be	I	Köriakup (Kaşpınar)	Tokat
137	be	I	Pertek (Akdoğmuş)	Tokat
138	be	I	İbrahimşeyh	Tokat
139	cr	A	Göldamı*	Sivas
140	ka	O	Ulubey	Ordu
141	be	I	Usuniza	Ordu
142	ka	I	Iğdirdağ	Sivas
143	ba	O	Karacaören	Ordu
144	fd	O	Aydındere	Giresun
145	ka	O	Osmaniye	Giresun
146	ba	I	Dereli-Kirazören	Giresun
147	be	A	Demirci	Giresun
148	ba	I	Güvemli	Gümüşhane
149	fc	A	Süleymaniye	Gümüşhane
150	wc	O	Mescitli	Gümüşhane
151	fc	O	Yomra-Arsin	Trabzon
152	ka	A	Arakli	Trabzon
153	ka	A	Arsin	Trabzon
154	fc	A	Edire-Gümüşgöze	Bayburt
155	rc	A	Şyngah	Bayburt
156	ka	O	Ardeşen	Rize
157	ka	O	Fındıklı	Rize
158	fd	O	Alabalik	Artvin
159	rc	O	Derinköy	Artvin
160	rc	A	Toprakkale	Erzurum
161	ka	A	Bodurlar	Çanakkale
162	ka	A	Sarıbeyli-Sığırlı	Çanakkale
163	qs	O	Çamlıca-Gökçeiçi	Çanakkale
164	wc	O	Kurşunlu	Çanakkale
165	wo	O	Karaköy-Yesilköy	Çanakkale
166	ka	A	Çaltıkara	Çanakkale
167	ka	A	Duman	Çanakkale
168	ka	A	Bahadırlı	Çanakkale
169	wo	I	Etili	Çanakkale
170	ka	A	Büyüktepe	Çanakkale
171	ka	A	Arabaalan	Çanakkale
172	ka	A	Işıkeli	Çanakkale
173	pe	O	Biga	Çanakkale
174	ka	A	Şaroluk	Balıkesir
175	ka	A	Aracaoluk	Balıkesir
176	wo	A	Kurilar	Çanakkale
177	tc	A	Erdek	Balıkesir
178	rc	A	Bademli	Bursa
179	wo	A	Mesruriye	Bursa
180	mg	I	Topuk	Bursa
181	ns	A	Orhaneli	Bursa
182	cr	A	Çivili E*	Bursa
183	cr	A	Çivili W*	Bursa
184	ol	O	Yongalık	Bursa
185	mg	I	Söğütalan	Bursa
186	bo	A	Kestelek	Bursa
187	ka	A	Kayabaşı	Bursa
188	tc	I	Serçeören	Balıkesir
189	bo	I	Sultançayırı	Balıkesir
190	wo	O	Serçaören	Balıkesir
191	ka	A	Alidemirci	Balıkesir
192	ka	I	Ivrindi	Balıkesir
193	ka	A	Ayvalık	Balıkesir
194	tc	O	Gümeli	Balıkesir
195	pe	O	Sindirga	Balıkesir
196	be	I	Bereketli	Balıkesir
197	be	A	Çağış	Balıkesir
198	be	A	Çaldere	Balıkesir
199	be	A	Yeniköy	Balıkesir
200	bo(li)	A	Değirmenli	Balıkesir
201	bo(li)	A	Bigadiç	Balıkesir
202	fd	O	Kireç	Balıkesir
203	cr	I	Çakmak*	Bursa
204	cr	A	Saçaklı*	Bursa
205	tc	A	Ishaklar N	Bursa
206	cr	A	Ishaklar S*	Bursa
207	tc	A	Dümrekorta	Kütahya
208	cr	A	Madanlar*	Kütahya
209	mg	A	Çamalan*	Kütahya
210	mg	A	Elmaağacı*	Kütahya
211	fc	O	Tunçbilek basin	Kütahya
212	mg	A	Elmalı*	Kütahya
213	mg	A	Tavşanlı*	Kütahya
214	fc	O	Çobanköy	Kütahya
215	wc	O	Gümüşköy	Kütahya
216	fc	O	Şahin	Kütahya
217	bo(li)	A	Espey	Kütahya
218	ka	O	Yaylayolu	Kütahya
219	fd	I	Külcü	Kütahya
220	ka	A	Düvertepe-Moren N	Balıkesir
221	ka	A	Düvertepe-Moren S	Balıkesir
222	ka	A	Devletlibaba	Balıkesir
223	ka	A	Şapçı-Arpatarla	Balıkesir
224	pe	O	Deliktaş-Demirtaş	Izmir
225	pe	A	Zeytindağ	Izmir
226	pe	A	Örlemiş	Izmir
227	rc	A	Menemen	Izmir
228	qs	A	Akselendi S	Manisa

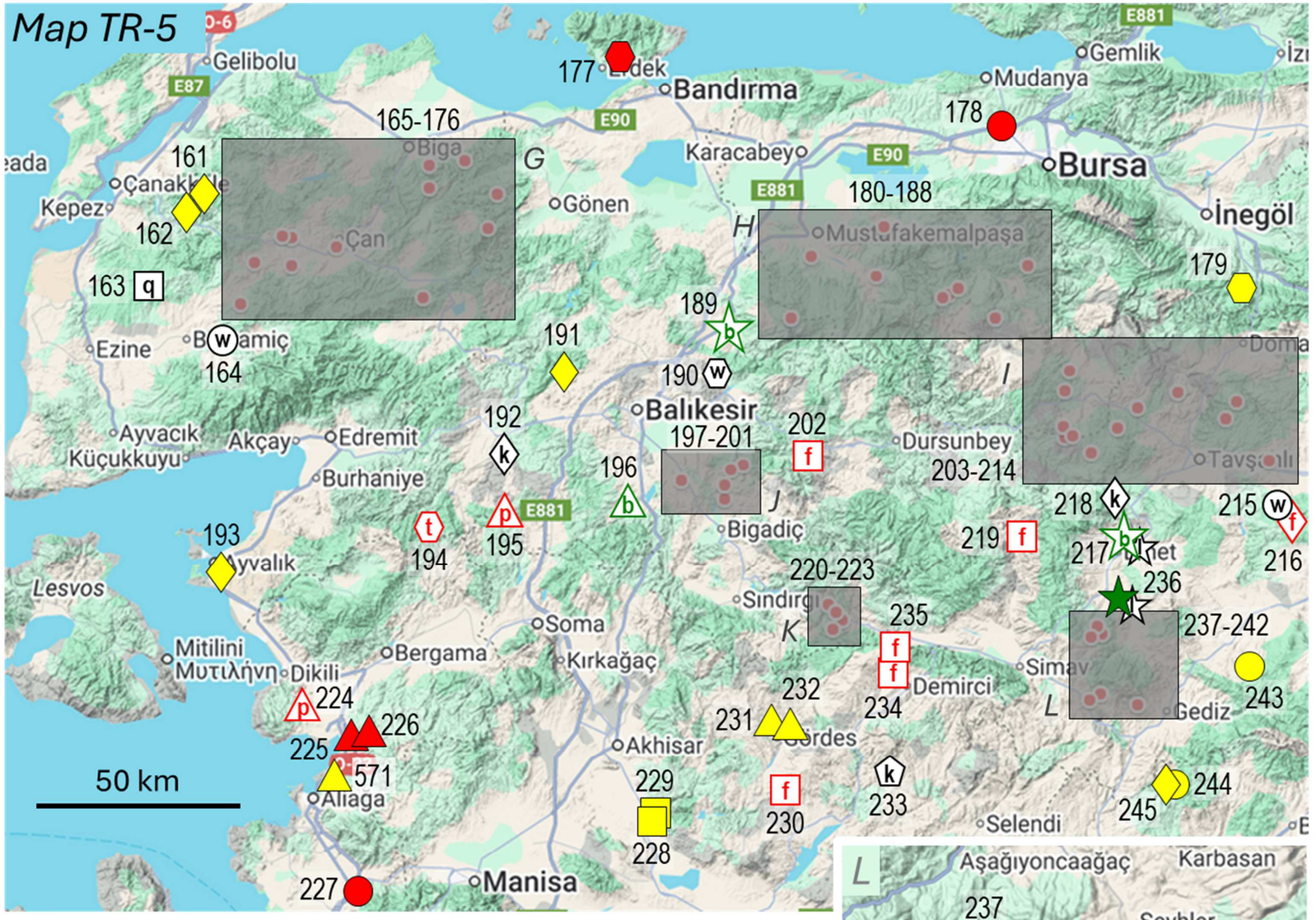
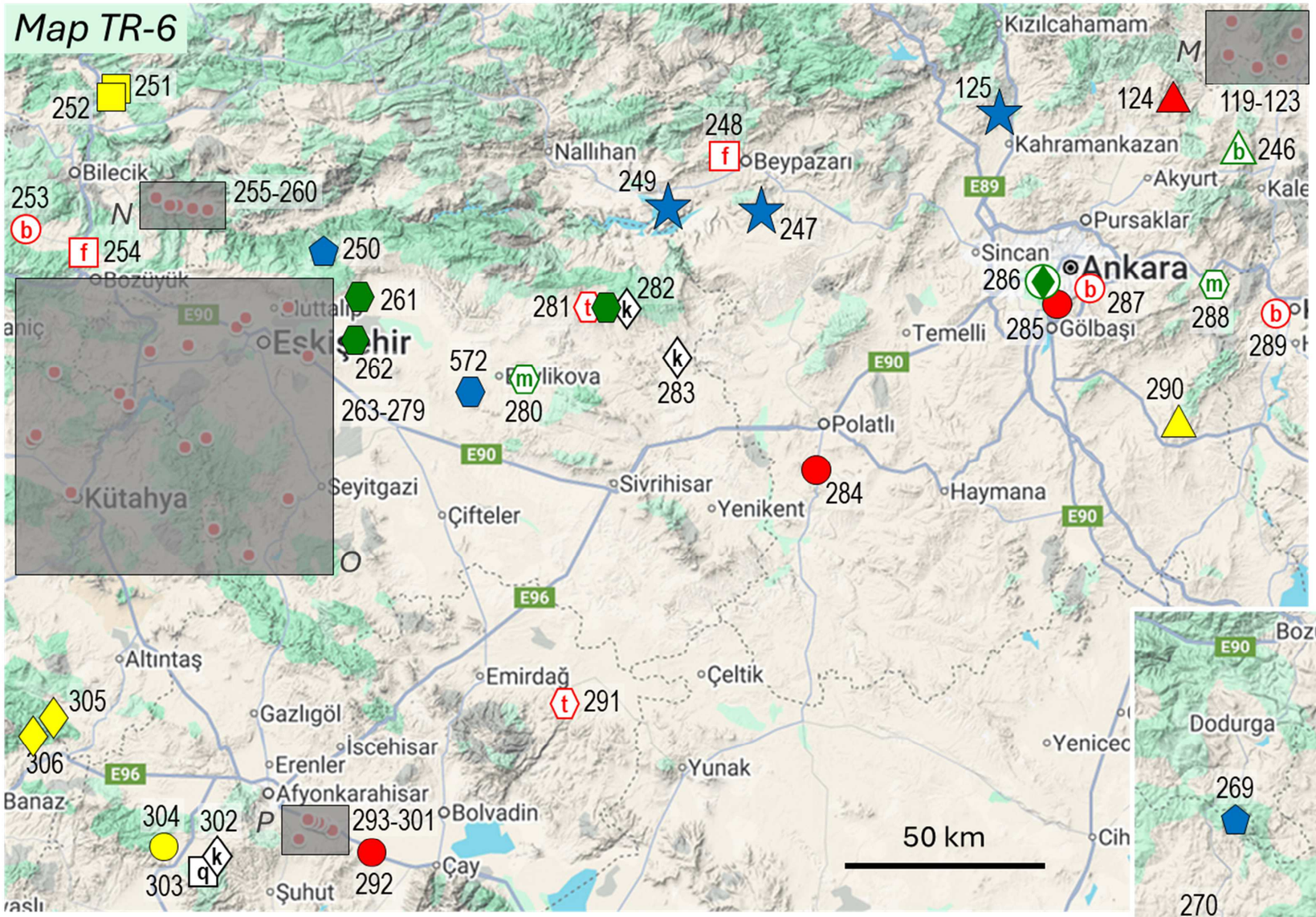
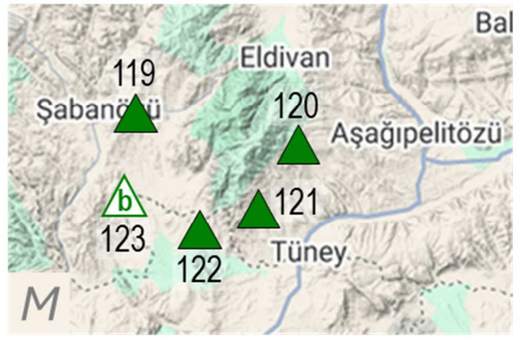
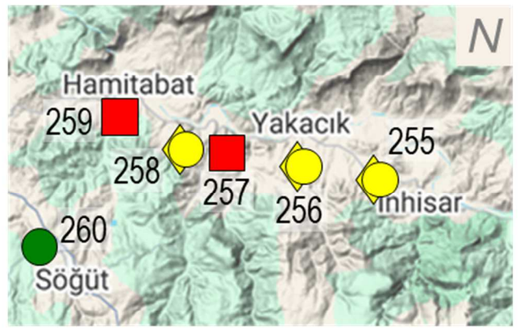

Map TR-5
Gelibolu
E87
Çanakkale
Kepez
Ezine
Ayvacık
Küçükkuyu
Akçay
Edremit
Burhaniye
Lesvos
Mitilini
Μυτιλήνη
Dikili
Bergama
Aliaga
Çandarlı
Foça
Menemen
Bandırma
Karacabey
Gönen
Mustafakemalpaşa
Balıkesir
Bigadiç
Dursunbey
Sındırgı
Soma
Kırkağaç
Akhisar
Demirci
Simav
Gediz
Selendi
Manisa
Mudanya
Gemlik
Bursa
İnegöl
Domaniç
Tavşanlı
E881
E90
D-6
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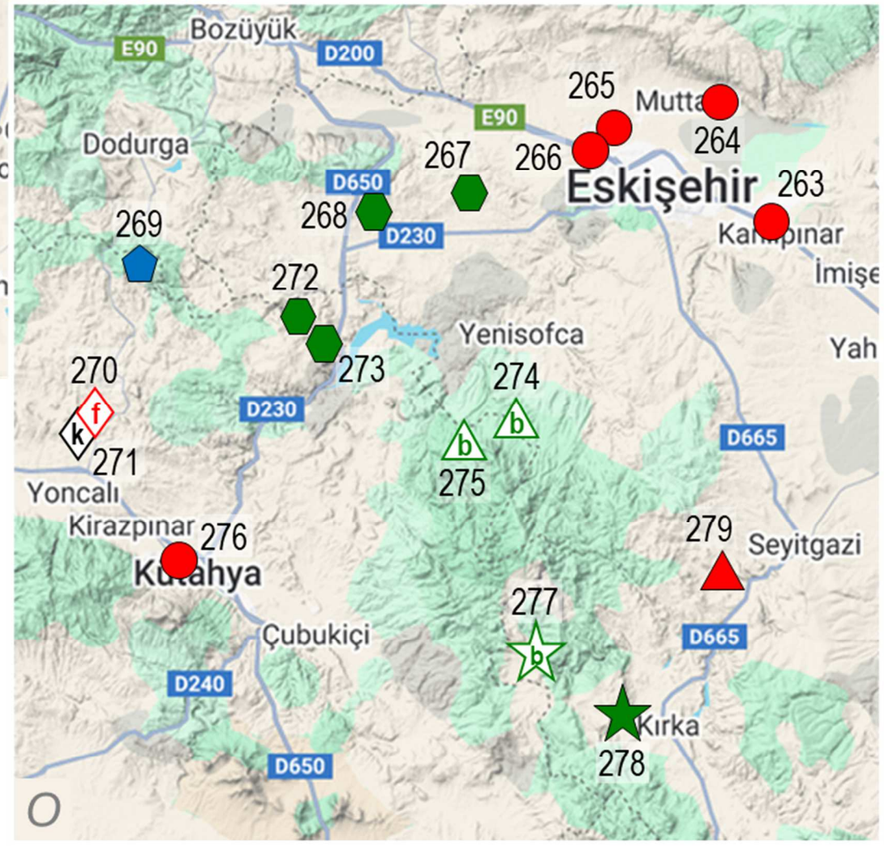
Table TR-c: deposits of raw materials for the ceramic and glass industries in Türkiye (*cluster of deposits).

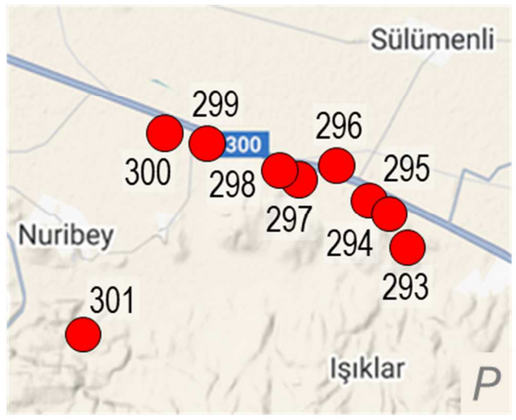
#	r. m.	st	deposit	province
229	qs	A	Akselendi N	Manisa
230	fd	I	Alanyolu	Manisa
231	ze	A	Kiran	Manisa
232	ze	A	Kuşluk	Manisa
233	ky	O	Üşümüş	Manisa
234	fd	I	Mahmutlar	Manisa
235	fd	I	Yeniköy	Kütahya
236	bo(li)	A	Hisarcık	Kütahya
237	wc	I	Kurtdere-Saklar	Kütahya
238	wc	I	Kızılçukur	Kütahya
239	wc	I	Ulaşlar	Kütahya
240	ze	A	Karacaderbent	Kütahya
241	ka	I	Şaphane	Kütahya
242	ka	I	Gediz	Kütahya
243	wc	A	Yağmurlar	Afyonkarahisar
244	wc	A	Çakmaktepe	Uşak
245	ka	A	Karaçayır	Uşak
246	be	I	Karahüyük	Ankara
247	fd	I	Oymaağaç	Ankara
248	na	A	Bağözü	Ankara
249	na	A	Çayırhan	Ankara
250	cr	A	Dağküplü	Eskişehir
251	qs	A	Kazancı N	Bilecik
252	qs	A	Kazancı S	Bilecik
253	rc	I	Kınık	Bilecik
254	fd	I	Karaköy	Bilecik
255	wc-ka	A	Inhisar	Bilecik
256	wc-ka	A	Yakacık	Bilecik
257	fd	A	Akçasu	Bilecik
258	wc-ka	A	Çaltı	Bilecik
259	fd	A	Küre N	Bilecik
260	ec	A	Küre S	Bilecik
261	mg	A	Sepetçi*	Eskişehir
262	mg	A	Kireçköyü*	Eskişehir
263	rc	A	Odunpazarı	Eskişehir
264	rc	A	Muttalip*	Eskişehir
265	rc	A	Sakintepe	Eskişehir
266	rc	A	Aşağısöğütönü	Eskişehir
267	mg	A	Yukarıkartal*	Eskişehir
268	mg	A	Dutluca-Nemli*	Eskişehir
269	cr	A	Körpe*	Kütahya
270	fc	O	Seyitömer basin	Kütahya
271	ka	O	Gevrekseydi	Kütahya
272	mg	A	Sofça*	Kütahya
273	mg	A	Beşcam*	Kütahya
274	be	I	Sariokuz	Kütahya
275	be	I	Başören	Kütahya
276	rc	A	Bölücek	Kütahya
277	bo	I	Göcenoluk	Eskişehir
278	bo	A	Kırka	Eskişehir
279	pe	A	Seyitgazi	Eskişehir
280	mg	I	Emircik*	Eskişehir
281	mg-tc	A	Ömer	Eskişehir
282	ka	I	Yarikçi	Eskişehir
283	ka	I	Ahırözü	Eskişehir
284	rc	A	Karahamzalı	Ankara
285	rc	A	Çankaya	Ankara
286	sa	A	Ankara	Ankara
287	rc	I	Yukarı İmrohor	Ankara
288	mg	I	Ediğe	Ankara
289	rc	O	Bahşılı	Kırıkkale
290	ze	A	Akvirançarsak	Ankara
291	tc	O	Davulga	Afyonkarahisar
292	rc	A	Gözsüzlü	Afyonkarahisar
293	rc	A	Işıklar 4*	Afyonkarahisar
294	rc	A	Işıklar 3*	Afyonkarahisar
295	rc	A	Işıklar 2*	Afyonkarahisar
296	rc	A	Işıklar 1*	Afyonkarahisar
297	rc	A	Karaarslan 1*	Afyonkarahisar
298	rc	A	Karaarslan 2*	Afyonkarahisar
299	rc	A	Karaarslan 3*	Afyonkarahisar
300	rc	A	Karaarslan 4*	Afyonkarahisar
301	rc	A	Nuribey	Afyonkarahisar
302	wc	A	Akharım	Afyonkarahisar
303	qs	O	Şuhut-Taşoluk	Afyonkarahisar
304	ka	O	Taşoluk	Afyonkarahisar
305	ka	A	Yüylük	Kütahya
306	ka	A	Hallaçlar	Uşak
307	cr	A	Salur	Tokat
308	be	I	Karaçay-İmirli	Çorum
309	fd	O	Sarıhacılı-Kayabağı	Yozgat
310	rc	A	Çalatlı	Yozgat
311	rc	I	Fakıbeyli	Yozgat
312	fd	O	Gözbaba	Yozgat
313	rc	A	Babalı	Yozgat
314	rc	A	Mükremin	Yozgat
315	qz	O	Sarıkaya-Sorgun	Yozgat
316	rc	I	Çiçekdağı	Kırşehir
317	be	O	Beşler	Kırıkkale
318	ns	A	Hamit	Kırşehir
319	ns	A	Durmuşlu	Kırşehir
320	wo	O	Buzlukdağ	Kırşehir
321	ns	A	Bayındır	Kırşehir
322	wo	O	Saucılı	Kırşehir
323	rc	I	Boztepe	Kırşehir
324	fd	I	Ağaçören-Ortaköy	Aksaray
325	pe	A	Karapinar	Nevşehir
326	rc	A	Ayhanlar	Nevşehir
327	ka	A	Avanos	Nevşehir
328	rc	A	Avanos*	Nevşehir
329	ns	O	Idişdağı	Nevşehir
330	rc	O	Incesu	Kayseri
331	ka	I	Felahiye	Kayseri
332	ns	O	Özvatan	Kayseri
333	cr	A	Pınarbaşı*	Kayseri
334	na	O	Gürün	Sivas
335	cr	I	Gürün*	Sivas
336	rc	A	Hanlı	Sivas
337	sr	A	Akkaya	Sivas
338	tc	O	Yağmurluseki	Sivas
339	cr	A	Kuzköy*	Sivas
340	rc	A	Turgutlu WM	Manisa
341	rc	A	Turgutlu W*	Manisa
342	rc	A	Turgutlu W*	Izmir







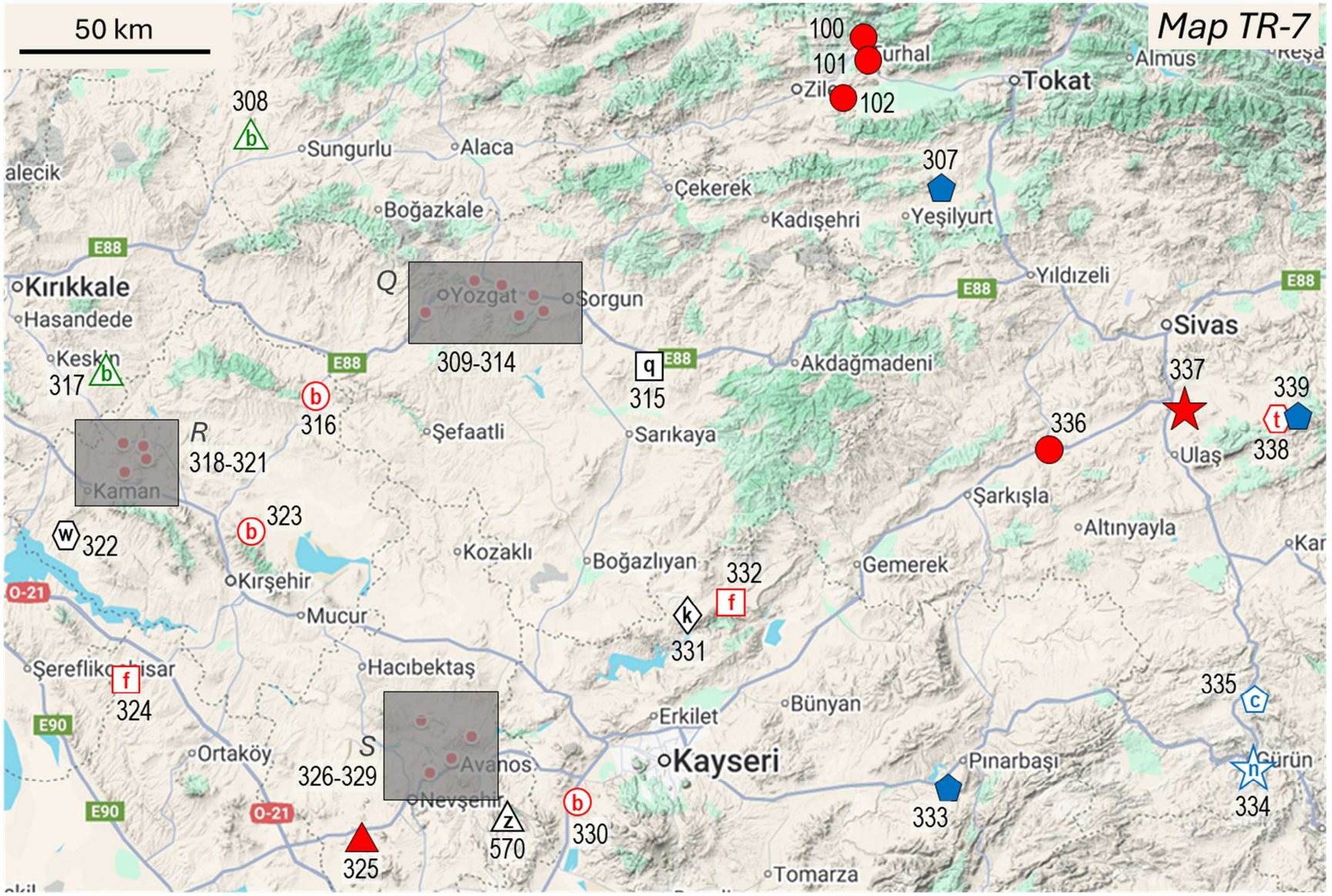


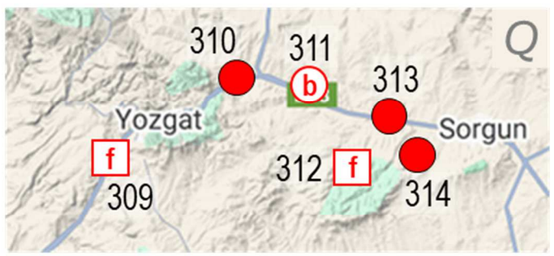


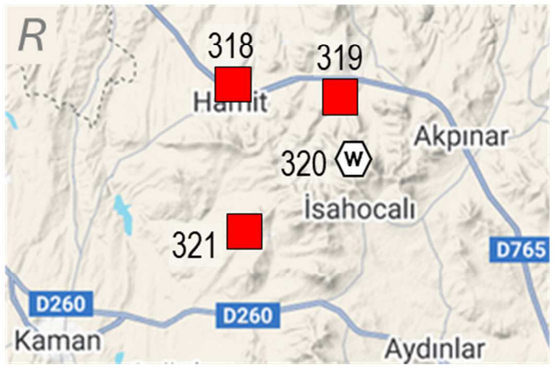
	ba	be	bo	cr	ec	fc	fd	ka	mg
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inactive		b	b			f	f	k	m

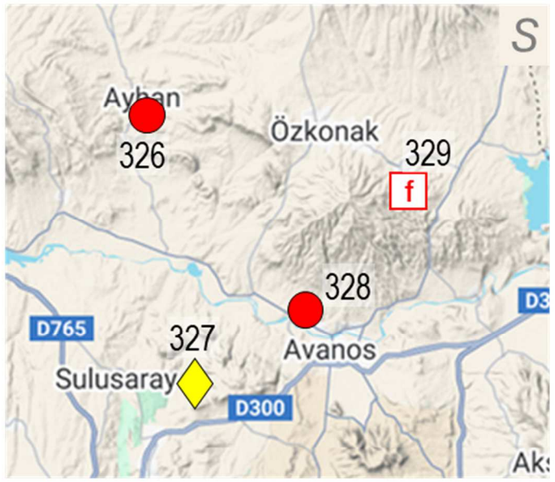
	na	pe	qz	rc	sa	tc	wc	ze
active	★	▲	■	●	◆		●	▲
inactive			q	b		t		

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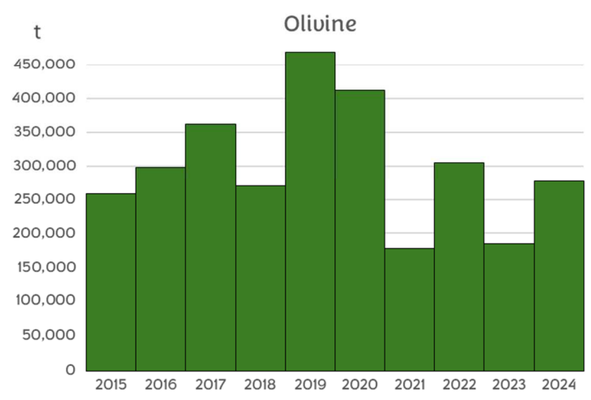


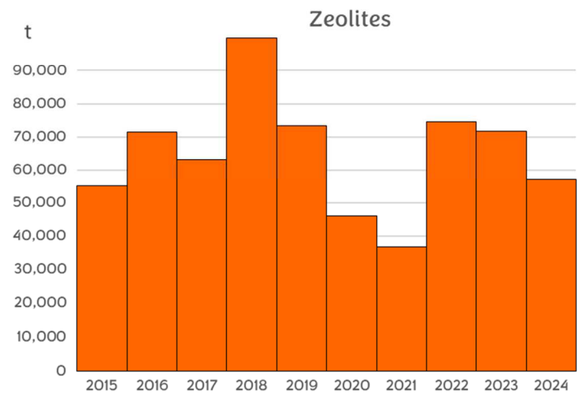




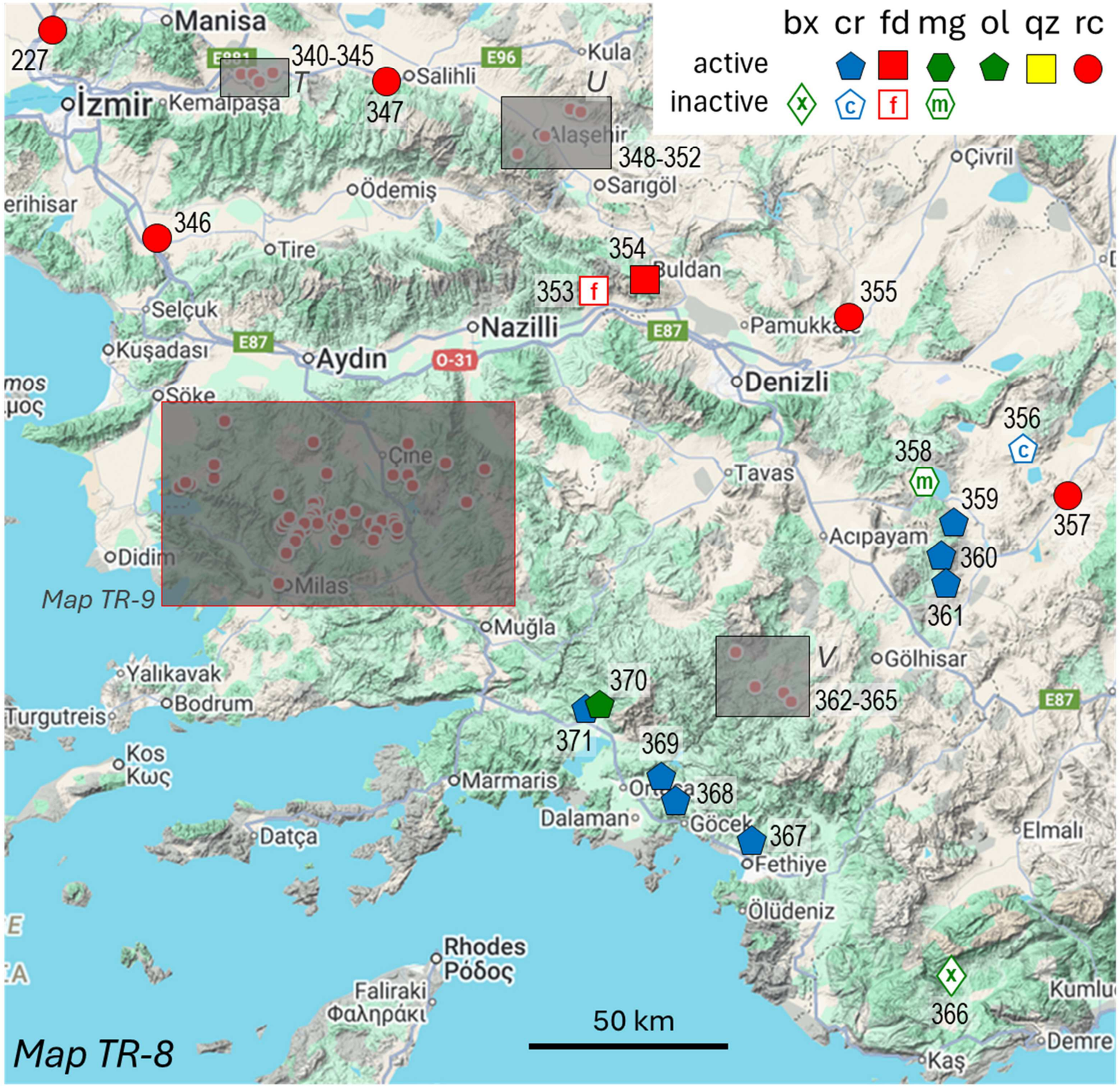


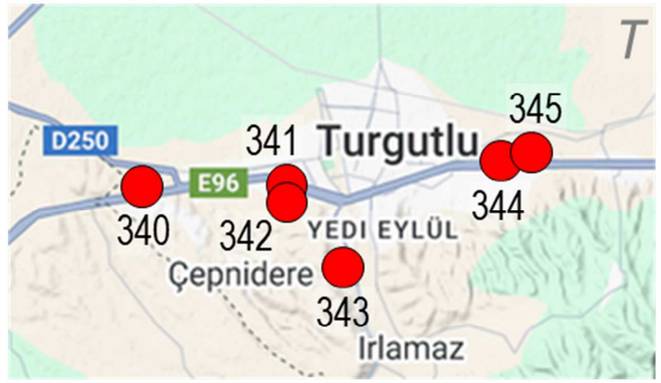


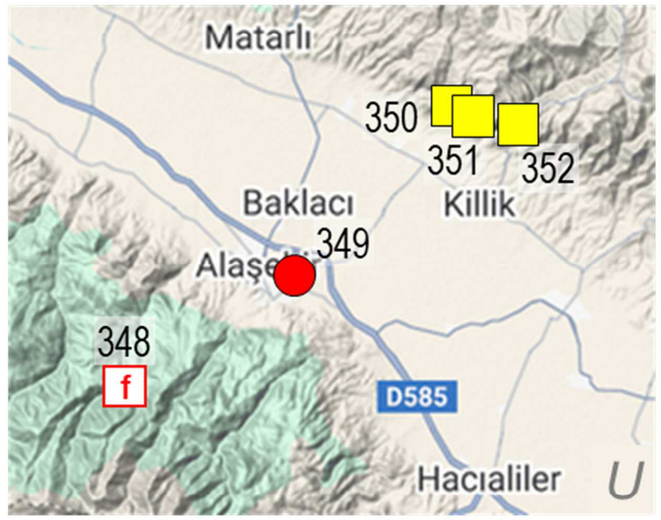


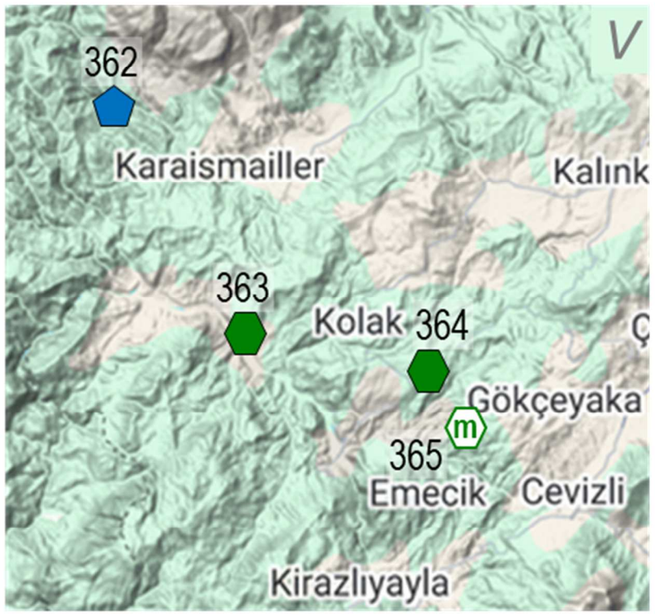


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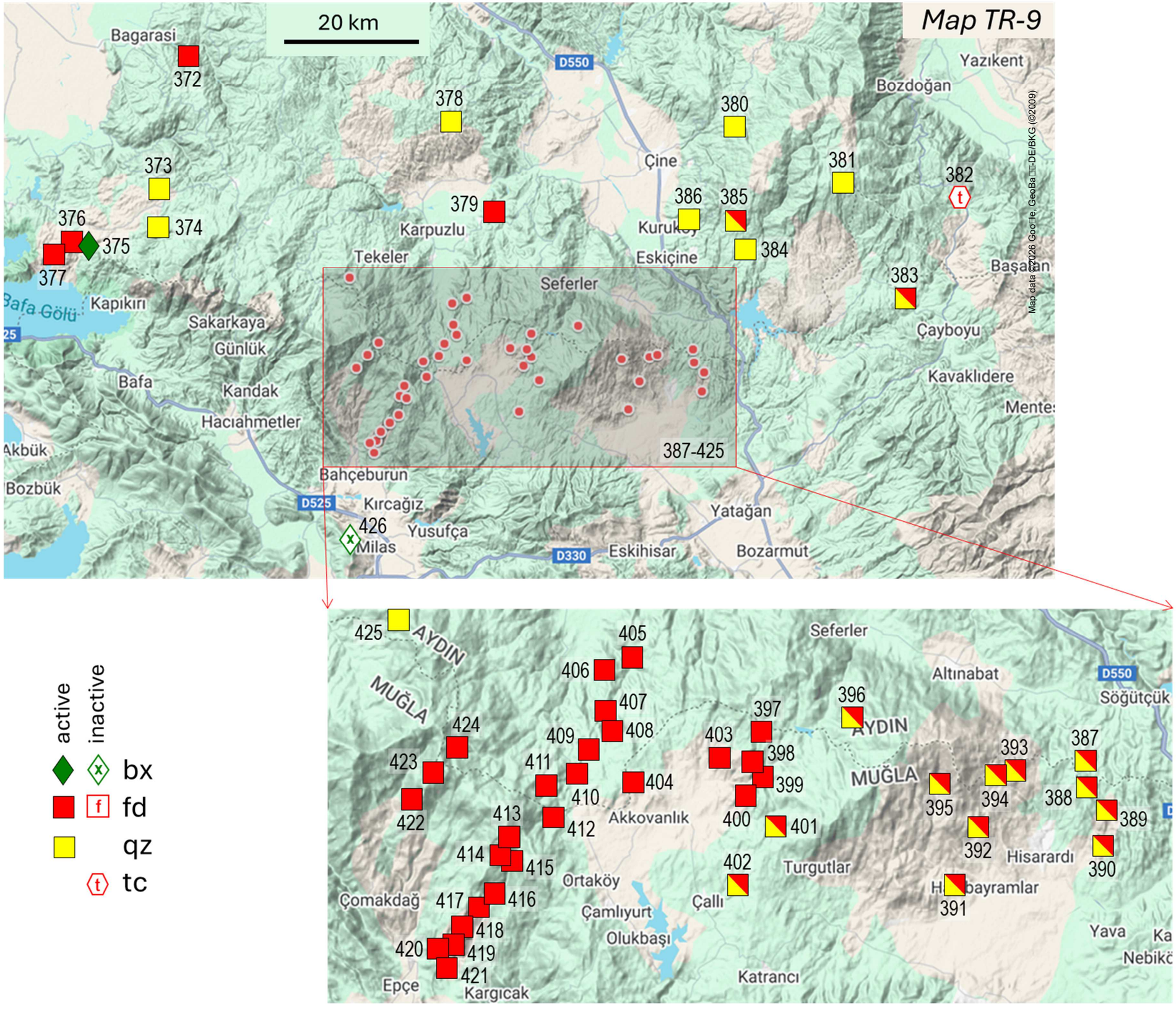


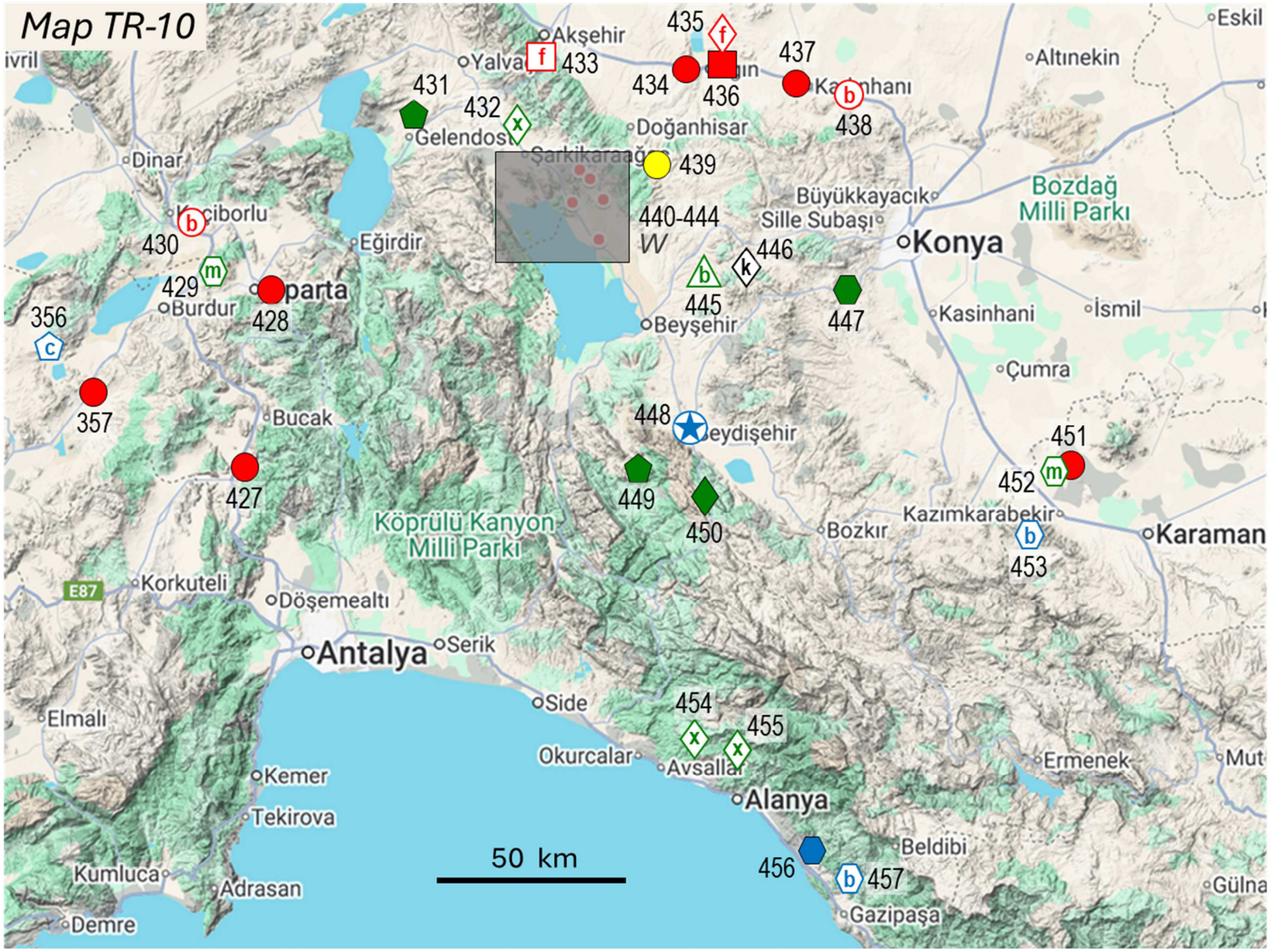


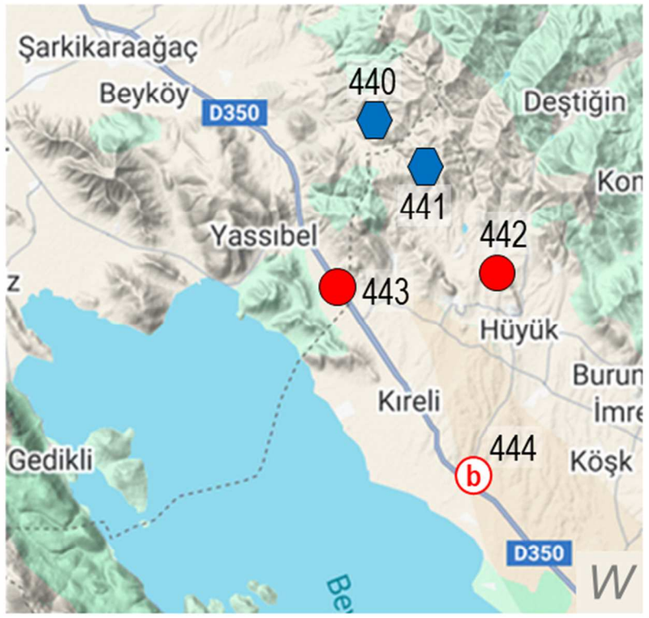
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Table TR-d: deposits of raw materials for the ceramic and glass industries in Türkiye (*cluster of deposits).

#	r. m.	st	deposit	province
343	rc	A	Turgutlu S*	Manisa
344	rc	A	Turgutlu E*	Manisa
345	rc	A	Turgutlu E*	Izmir
346	rc	A	Pamukyazı*	Izmir
347	rc	A	Caferbey*	Izmir
348	fd	O	Alaşehir	Manisa
349	rc	A	Alaşehir	Manisa
350	qs	A	Caberfakılı 1	Manisa
351	qs	A	Caberfakılı 2	Manisa
352	qs	A	Caberfakılı 3	Manisa
353	fd	I	Altintaş	Aydin
354	fd	A	Buldan	Denizli
355	rc	A	Belevi	Denizli
356	cr	I	Büyükyaka*	Burdur
357	rc	A	Boğaziçi	Burdur
358	mg	I	Salda Lake	Burdur
359	cr	A	Niyazlar*	Burdur
360	cr	A	Karamanlı*	Burdur
361	cr	A	Tefenni*	Burdur
362	cr	A	Elmaslar*	Denizli
363	ht	A	Suçati	Denizli
364	ht	A	Sarniç	Denizli
365	ht	I	Yaylacik	Denizli
366	bx	I	Susuzdağ	Antalya
367	cr	A	Kargi	Muğla
368	cr	A	Kayadibi*	Muğla
369	cr	A	Ilikdere*	Muğla
370	ol	A	Yayla	Muğla
371	cr	A	Akçaalan*	Muğla
372	fd	A	Bağarası	Aydın
373	qz	A	Karakaya N	Aydın
374	qz	A	Karakaya N	Aydın
375	bx	A	Köprüalan	Aydın
376	fd	A	Yeşilköy	Aydın
377	fd	A	Bafa	Aydın
378	qz	A	Karpuzlu-Kuşcamii	Aydin
379	fd	A	Ömerler	Aydın
380	qz	A	Kavşıt	Aydin
381	qz	A	Söke-Yatağan	Aydin
382	tc	I	Genzile	Aydin
383	fd-qz	A	Yeşilköy	Muğla
384	qz	A	Alabayır	Aydin
385	fd-qz	A	Tatarmemişler	Aydın
386	qz	A	Kuruköy	Aydin
387	fd-qz	A	Harımcık	Aydın
388	fd-qz	A	Kabalar	Aydın
389	fd-qz	A	Çobanlar N	Muğla
390	fd-qz	A	Çobanlar S	Muğla
391	fd-qz	A	Hacıbayramlar	Muğla
392	fd-qz	A	Hisarardı 3	Muğla
393	fd-qz	A	Hisarardı 2	Muğla
394	fd-qz	A	Hisarardı 1	Muğla
395	fd-qz	A	Hacıveliler	Muğla
396	fd-qz	A	Kadılar	Aydın
397	fd	A	Eğlencederesi 4	Muğla
398	fd	A	Eğlencederesi 3	Muğla
399	fd	A	Eğlencederesi 2	Muğla
400	fd	A	Eğlencederesi 1	Muğla
401	fd-qz	A	Çallı N	Muğla
402	fd-qz	A	Çallı S	Muğla
403	fd	A	Yeniköy	Muğla
404	fd	A	Yılanlıpınar	Muğla
405	fd	A	Kuşçam	Aydın
406	fd	A	Ovapınarı	Aydın
407	fd	A	Meşeligedil	Aydın
408	fd	A	Cevizdere	Aydın
409	fd	A	Alipaşa N	Muğla
410	fd	A	Alipaşa S	Muğla
411	fd	A	Sarıkışık N	Aydın
412	fd	A	Sarıkışık S	Muğla
413	fd	A	Yassitaş	Muğla
414	fd	A	Söbçayırı	Muğla
415	fd	A	Karadere	Muğla
416	fd	A	Sarıkaya 4	Muğla
417	fd	A	Sarıkaya 3	Muğla
418	fd	A	Sarıkaya 2	Muğla
419	fd	A	Sarıkaya 1	Muğla
420	fd	A	Alakaya	Muğla
421	fd	A	Çınarlı-Kutay	Muğla
422	fd	A	Ekiztaş S	Muğla
423	fd	A	Ekiztaş N	Muğla
424	fd	A	Işiklar	Aydın
425	qz	O	Karpuzlu-Çukurköy	Aydin
426	bx	I	Küçükçamlık Tepe-Savran-Damlıboğaz	Muğla
427	rc	A	Karapınar	Burdur
428	rc	A	Davraz	Isparta
429	mg	O	Çerçin	Burdur
430	rc	I	Keçiborlu	Isparta
431	ol	A	Gelendost	Isparta
432	bx	I	Yalvaç-Çarıksaraylar	Isparta
433	ba	I	Akşehir	Konya
434	rc	A	Kapaklı	Konya
435	fc	O	Gavurdağ-Sivritepe	Konya
436	fd	A	Ilgin	Konya
437	rc	A	Kadınhanı	Konya
438	rc	I	Sarayönü	Konya
439	wc	A	Doğanhisar	Konya
440	ba	A	Baskoyak-Kuyuçak-Kipça	Isparta
441	ba	A	Hüyük	Konya
442	rc	A	Hüyük	Konya
443	rc	A	Kıyakdede	Isparta
444	rc	I	Çukurkent	Konya
445	be	O	Doğanbey	Konya
446	ka	I	Sağlık	Konya
447	mg	A	Koyakçi Tepe-Çayırbagı	Konya
448	al	A	Seydişehir	Konya
449	ol	A	Kızıldağ	Antalya
450	bx	A	Doğankuzu-Mortaş	Konya
451	rc	A	Islihisar	Karaman
452	mg	I	Kazımkarabekir	Karaman
453	ba	I	Başkışla	Karaman
454	bx	I	Karamanlar-Orhan	Antalya
455	bx	I	Maşatdağ	Antalya
456	ba	A	Demirtaş	Antalya

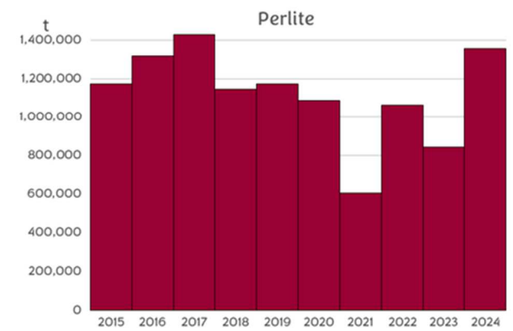

Map TR-9
20 km
Bagarasi
372
373
374
376
375
377
Kapıkırı
Bafa Gölü
Sakarkaya
Günlük
Bafa
Kandak
Hacıahmetler
Akbük
Bozbük
D525
D550
378
379
Karpuzlu
Tekeler
Seferler
387-425
Bahçeburun
Kırcağız
426
Milas
Yusufça
D330
Eskihisar
Çine
Kuruköy
Eskiçine
380
381
382
386
385
384
383
Yazıkent
Bozdoğan
Başaran
Çayboyu
Kavaklıdere
Yatağan
Bozarmut
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)
425
AYDIN
MUĞLA
405
406
407
408
409
411
410
412
404
424
423
422
413
414
415
416
417
418
419
420
421
Çomakdağ
Epçe
Kargıcak
Ortaköy
Çamlıyurt
Olukbaşı
Akkovanlık
Çallı
Katrancı
Turgutlar
397
403
398
399
400
401
402
396
AYDIN
MUĞLA
Altınabat
Seferler
395
394
393
392
391
Hisarardı
387
388
389
390
Söğütçük
Yava
Nebikö
active
inactive
bx
fd
qz
tc

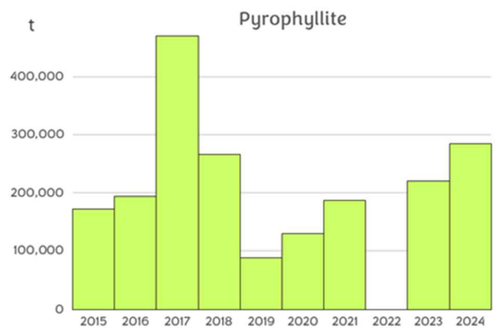


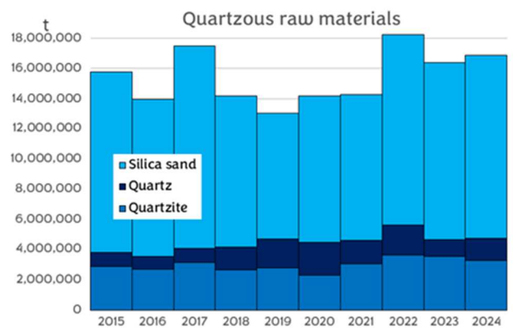


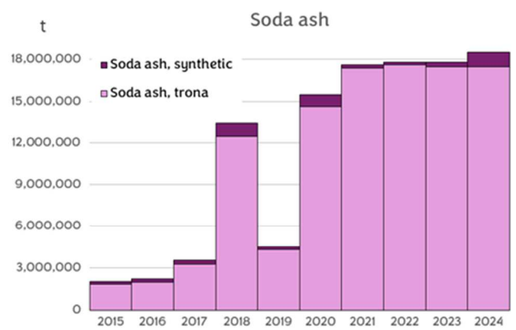
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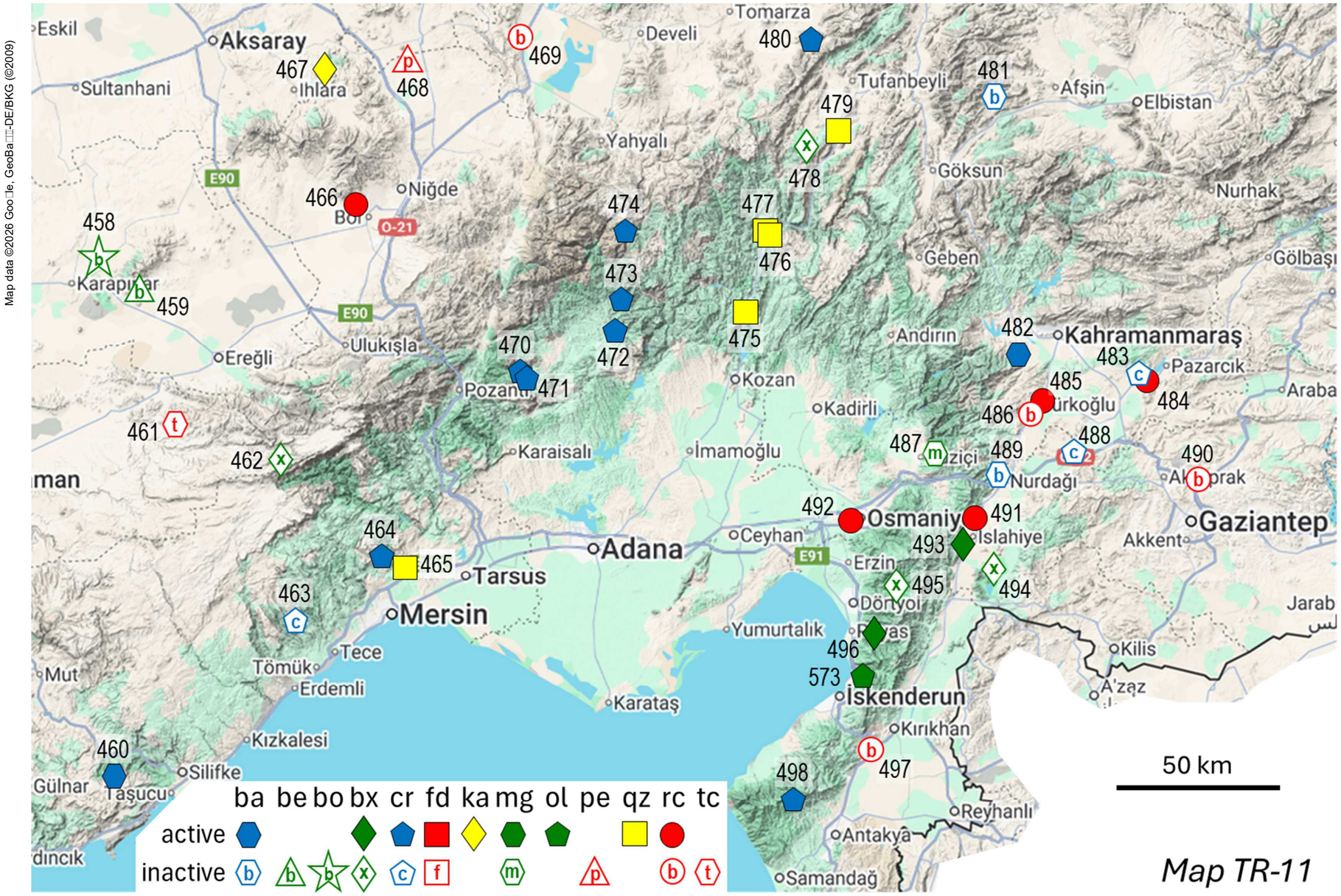
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al		
ba	b	
be	b	
bx	x	
cr	c	
fc		f
fd		f
mg	m	
ol		
rc		b



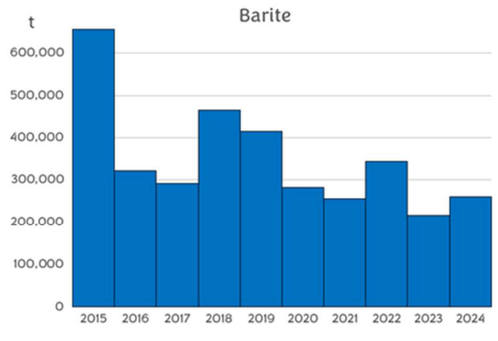


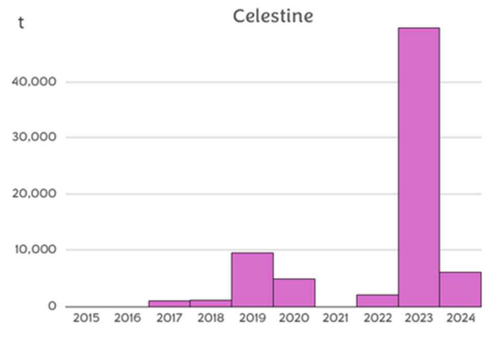


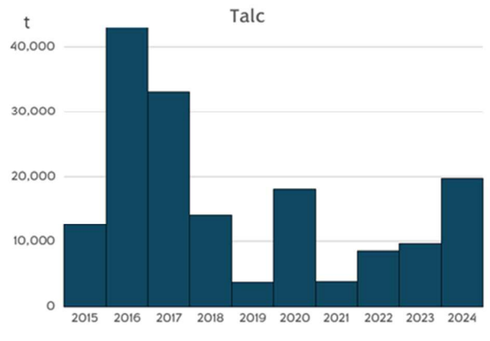



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Eskil
Aksaray
Sultanhani
Ihlara
Develi
Tomarza
Tufanbeyli
Afşin
Elbistan
Yahyalı
Göksun
Nurhak
Niğde
Bor
O-21
E90
Geben
Gölbaşı
Karapınar
Ereğli
Ulukışla
Andırın
Kahramanmaraş
Pazarcık
Araban
Kozan
Kadirli
Pozantı
Karaisalı
İmamoğlu
Nurdağı
Gaziantep
Osmaniye
Islahiye
Akkent
Adana
Ceyhan
Erzin
E91
Tarsus
Mersin
Dörtyol
Yumurtalık
Kilis
Tömük
Tece
Mut
Erdemli
Karataş
İskenderun
A'zaz
Kırıkhan
Kızkalesi
Silifke
Gülnar
Taşucu
Reyhanlı
Antakya
Samandağ
Jarablus
50 km
ba be bo bx cr fd ka mg ol pe qz rc tc
active
inactive

Map TR-11


Barite
t
600,000
500,000
400,000
300,000
200,000
100,000
0
2015 2016 2017 2018 2019 2020 2021 2022 2023 2024


Celestine
t
40,000
30,000
20,000
10,000
0
2015 2016 2017 2018 2019 2020 2021 2022 2023 2024


Talc
t
40,000
30,000
20,000
10,000
0
2015 2016 2017 2018 2019 2020 2021 2022 2023 2024

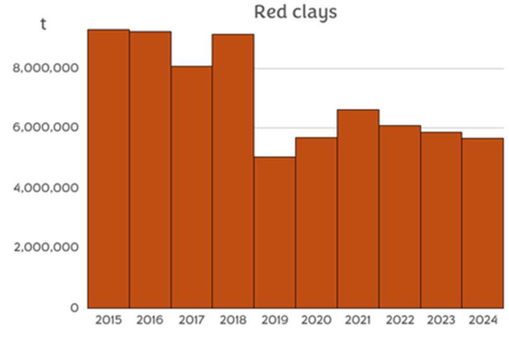
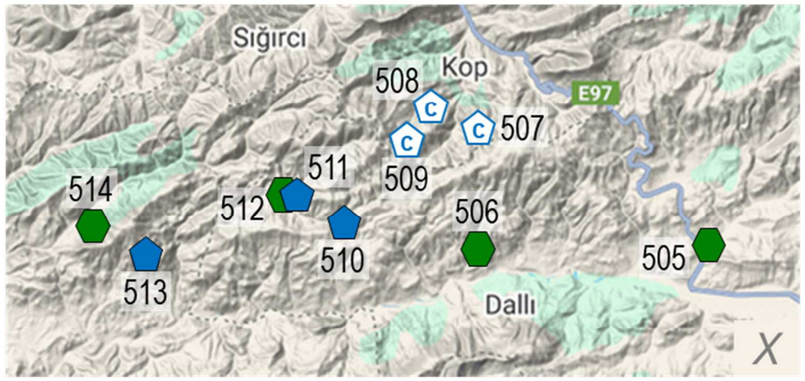
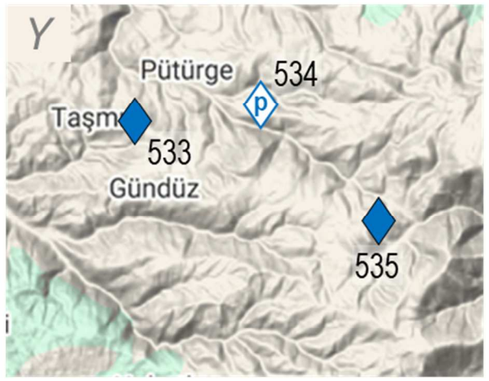
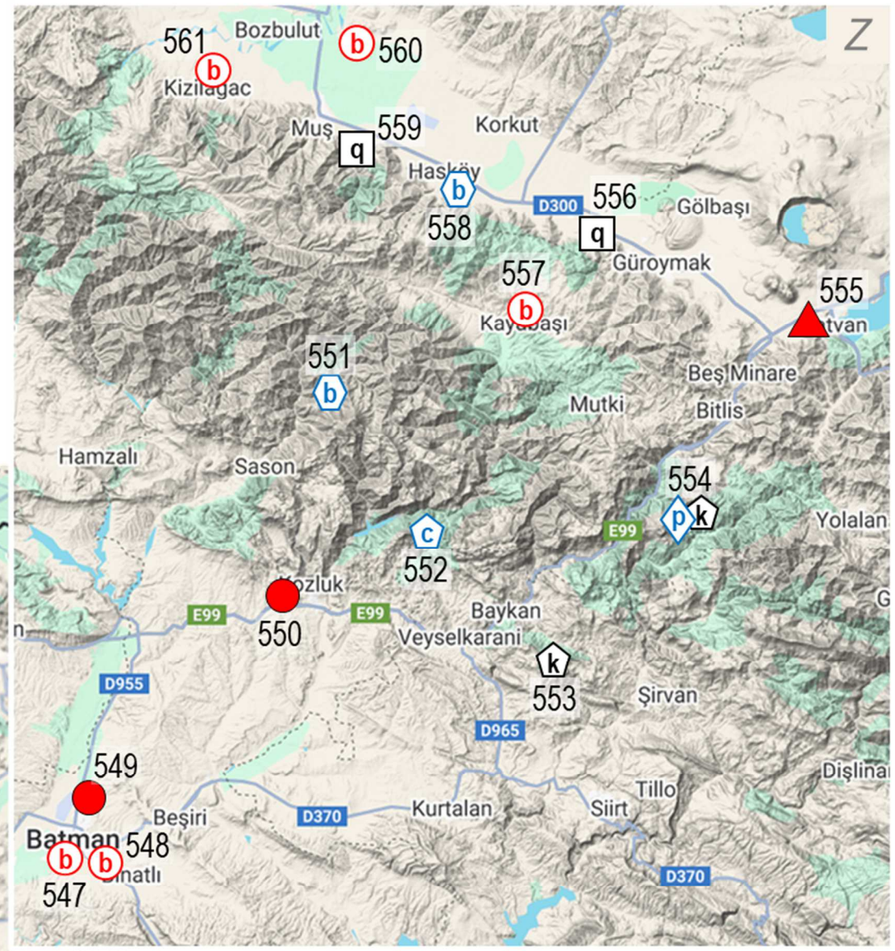

Red clays
t
8,000,000
6,000,000
4,000,000
2,000,000
0
2015 2016 2017 2018 2019 2020 2021 2022 2023 2024

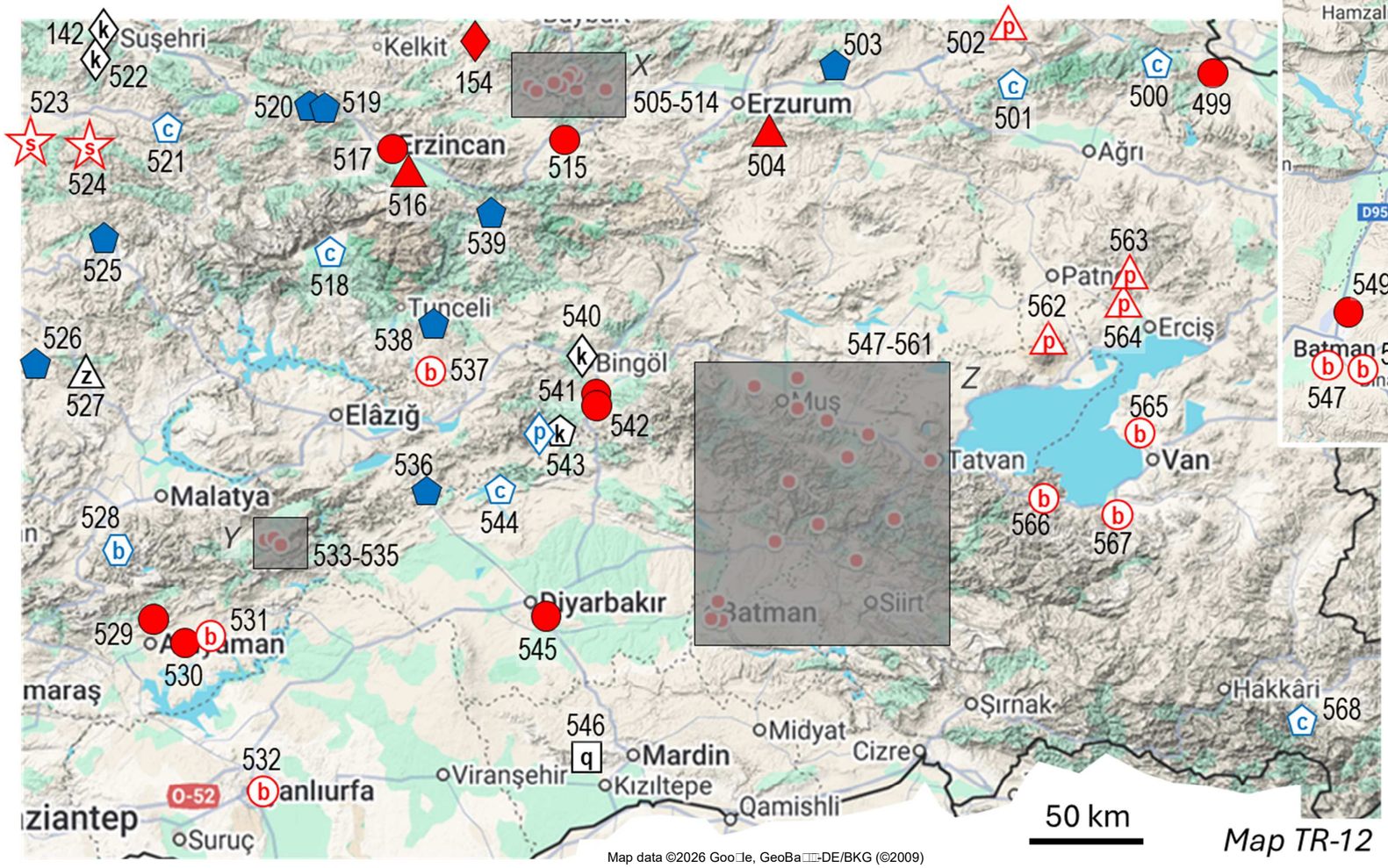
Table TR-e: deposits of raw materials for the ceramic and glass industries in Türkiye (*cluster of deposits).

#	r. m.	st	deposit	province
457	ba	I	Karalar	Antalya
458	bo	O	Karapınar	Konya
459	be	I	Çamaklar	Konya
460	ba	A	Çilbayır	Mersin
461	tc	O	Kıraman	Karaman
462	bx	O	Bolkar Mountains	Karaman-Konya
463	cr	I	Erdemli*	Mersin
464	cr	A	Musalı	Mersin
465	qz	A	Puğkaracadağ	Mersin
466	rc	A	Bor	Niğde
467	ka	A	Güzelyurt	Aksaray
468	pe	O	Kiledere	Niğde
469	rc	I	Yeşilhisar	Kayseri
470	cr	A	Çamlıbel*	Adana
471	cr	A	Karaisalı*	Adana
472	cr	A	Bozluk*	Adana
473	cr	A	Kızılyüksek*	Adana
474	cr	A	Yahyalı*	Kayseri
475	qz	A	Horzum	Adana
476	qz	A	Köleli	Adana
477	qz	A	Kızılyer	Adana
478	bx	I	Tufanbeyli-Saimbeyli	Adana
479	qz	A	Doğanbeyli	Adana
480	cr	A	Tomarza*	Kayseri
481	ba	O	Buyukkizilcik	Kahramanmaraş
482	ba	A	Dadağlı	Kahramanmaraş
483	cr	I	Bölükçam	Kahramanmaraş
484	rc	A	Pazarcık	Kahramanmaraş
485	rc	A	Türkoğlu N	Kahramanmaraş
486	rc	I	Türkoğlu S	Kahramanmaraş
487	mg	O	Haruniye	Osmaniye
488	cr	I	Incirli	Gaziantep
489	ba	I	Kurudere	Gaziantep
490	rc	I	Karahüyük	Gaziantep
491	rc	A	Göltepe	Gaziantep
492	rc	A	Şirinevler	Osmaniye
493	bx	A	Koçcağız	Gaziantep
494	bx	I	Kurudağ	Gaziantep
495	bx	I	Dörtyol	Hatay
496	bx	A	Payas	Hatay
497	rc	I	Çakallı	Hatay
498	cr	A	Kızıldağ*	Hatay
499	rc	A	Yeni	Iğdır
500	cr	I	Bostanlı	Iğdır
501	cr	I	Koçoğlu	Kars
502	pe	I	Mescitli	Kars
503	pe	A	Timar	Erzurum
504	cr	A	Tekman*	Erzurum
505	mg	A	Pırnakapan	Erzurum
506	mg	A	Dumanoglu	Erzurum
507	cr	I	Kopdağı E*	Bayburt
508	cr	I	Kopdağı N*	Bayburt
509	cr	I	Kopdağı W*	Bayburt
510	cr	A	Kop Krom E*	Erzurum
511	cr	A	Kop Krom W*	Erzurum
512	mg	A	Aşkale	Erzurum
513	cr	A	Doluca*	Erzincan
514	mg	A	Çataksu	Erzincan
515	rc	I	Tercan	Erzincan
516	pe	A	Mollaköy	Erzincan
517	rc	A	Çarşı	Erzincan
518	cr	I	Çakmaklı	Tunceli
519	cr	A	Koçyatağı*	Erzincan
520	cr	A	Kızılenis*	Erzincan
521	cr	I	Imranlı-Akıncılar*	Sivas
522	ka	O	Kösedağ	Sivas
523	sr	I	Ahmetuşağı	Sivas
524	sr	I	Dipsizgöl	Sivas
525	cr	A	Dumluca*	Sivas
526	cr	A	Kuluncak*	Malatya
527	ze	O	Bağyolu	Malatya
528	ba	I	Eskiköy	Malatya
529	rc	A	Rezip	Adiyaman
530	rc	A	Hasancık	Adiyaman
531	rc	O	Kâhta	Adiyaman
532	rc	I	Karsıyaka	Şanlıurfa
533	py	A	Taşmış	Malatya
534	py	I	Taşbaşı	Malatya
535	py	A	Karataş	Malatya
536	cr	A	Alicakaya*	Elazığ
537	rc	I	Akpazar	Tunceli
538	cr	A	Oymadal	Tunceli
539	cr	A	Göcenek	Tunceli
540	ka	O	Kurudere	Bingöl
541	rc	A	Genç	Bingöl
542	rc	A	Hem	Bingöl
543	ky-py	O	Halveliyan	Bingöl
544	cr	I	Dicle	Diyarbakir
545	rc	A	Tanoğlu-Bağıvar*	Diyarbakır
546	qs	O	Çimenli	Mardin
547	rc	I	Bozooğulları	Batman
548	rc	I	Akça	Batman
549	rc	A	Gültepe	Batman
550	rc	A	Kozluk	Batman
551	ba	O	Örenağıl	Batman
552	cr	I	Çamtaşı	Siirt
553	ky	O	Ünlüce	Siirt
554	ky-py	O	Hürmüz	Bitlis
555	pe	A	Tatvan	Bitlis
556	qs	I	Büvetli	Muş
557	rc	O	Kavakbaşi	Bitlis
558	ba	I	Bilir-Kasar-Kızılkilise	Muş
559	qs	I	Kepenek	Muş
560	rc	I	Alican	Muş
561	rc	I	Karakuyu	Muş
562	pe	O	Kucak	Ağri
563	pe	I	Evbeyli	Van
564	pe	I	Kocapınar	Van
565	rc	O	Bardakçı	Van
566	rc	O	Kutki-Kuşluk	Van
567	rc	I	Aladüz	Van
568	cr	I	Kışlacık	Hakkâri
569	ze	A	Tepeköy	Çanakkale
570	ze	O	Karain	Neuşehir
571	ze	A	Çaltılıdere	Izmir
572	ba	A	Kızılcaören	Eskisehir
573	ol	A	Orhangazi	Hatay









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Map data ©2026 Goo□le, GeoBa□□-DE/BKG (©2009)

	ba	cr	ka	ky	mg	pe	py	qz	rc	sr
active	⬢	⬟			⬢	▲	◆		●	
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Ukraine

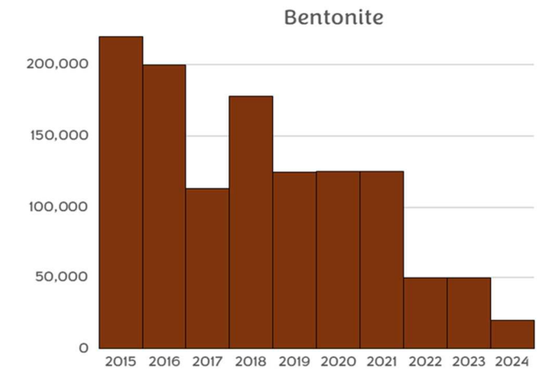
The Russian aggression has disrupted the supply chain of ceramic and glass raw materials from all over Ukraine and especially from Donbass and the areas invaded by Russia, where mining activity has ceased. These notes describe Ukrainian deposits regardless of who currently holds military control of the territory. The Ukrainian mining industry has become a key global player for ball clays, as well as leading producer of zircon and major player for kaolin and alumina in the Euro-Mediterranean zone. In addition, bentonite, feldspar, perlite, zeolites, kyanite-sillimanite, silica sands and red clays are mined, while deposits of lithium minerals, talc and magnesite are being developed. Occurrences of chromite, celestine, and bauxite have been also reported [1-7].

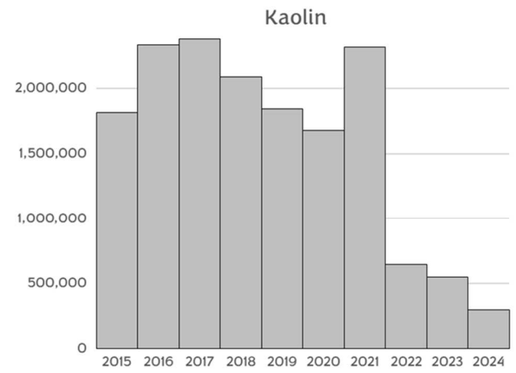
Zircon is found in placers, weathering crusts, and bedrock over the Ukrainian Shield and in the Dnieper-Donetsk depression [8-10]. Most of reserves are in coastal-marine and continental placers of the Beretska and Novi Petrivtsy formations (Oligo-Miocene) with zircon concentrations in the 4-10 kg/m^3 range [10]. Zircon is recovered (20,000 tpa, mean 2015-2024) as byproduct of titanium minerals processing (together some **kyanite-sillimanite**) in the Malyshevske e Motronivka-Annivka deposits (Dnipropetrovsk). Reserves are around 2 million tonnes of zircon [10].
Lithium minerals occurrences (spodumene, petalite) are reported in rare-metal granitoids and pegmatites of the Ukrainian shield, under a sedimentary cover 100 metres thick or so [11,12]. The most prominent deposits are explored in the Kirovohrad (Polokhov and Dobra), Donec'k (Shevchenkivke) and Zaporižžja (Kruta Balka) oblasts [11]. Reserves are estimated to be between 1 and 2 million tonnes of Li_2O [5,11].
White clays: Miocene fluvio-lacustrine sediments of Donbass host both ball clays and refractory clays, with around twenty mines operating in an area of approximately 40x40 km^2 between Druzhkivka and Dobropilya (*Map UA-7D*). Clays occur in lenses with a total thickness of 2-3 metres, but with coverages 10 to 50 metres thick [13-15]. Ukrainian **ball clays** have become an international benchmark [16,17], in force of their superior technological properties [18-21], reaching a production of 6 million tpa before the conflict (3,800,000 tpa average 2015-2024). Types with higher alumina content, employed as **refractory clays**, are extracted in the same area [22-25].
Kaolin resources are about 477 million tonnes [4], mostly as weathering products on the Precambrian Ukrainian Shield [26,27]. Deposits are distinguished between primary kaolin, e.g. weathered granites and gneisses at Prosyana and Hlukhivtsi [27,28], and sedimentary kaolin, e.g. Neogene Novopetrivska Formation at Polohy [29]. Moreover, a distinct class of "alkali kaolins" (i.e. containing 5-7% alkali oxides) is defined, e.g. Dubrivka [27,30,31]. Ukrainian production is of 1,600,000 tpa of raw kaolin (mean 2015-2024) peaking to 2.4 million tpa before Russian aggression [2]. There are five major kaolin districts with a dozen operational mines: Žytomyr (main deposits: Dubrivka, Velyki Hadomtsi); Vinnycja (Hlukhivtsi); Kirovograd-Čerkasy (Murzin, Obozniivka); Dnipropetrovsk-Zaporižžja (Polohi, Prosyana); Donec'k (Katerynivka, Trudove).
Alumina is produced (1,200,000 tpa, mean 2015-2024, reaching 1,700,000 tpa before Russian aggression) in a plant near Mikolaiv [1]. **Bauxite** occurrences are reported south of Kryvyi Rih, with 19 million tonnes of reserves at 38% Al_2O_3 [5]. **Perlite** is mined, on average 14,000 tpa [2], from the Ardov-Zatyshnyan [32] and Fohosh deposits [33,34] in Zakarpatska (*Map UA-3C*), which exploit Miocene rhyolites [35]. Reserves of perlite are estimated up to 100 million m^3 [33]. **Zeolites** are extracted from Miocene tuffs (~70% clinoptilolite) in the Sokyrnytsia deposit in Zakarpatska [36,37].
Feldspar: large reserves of feldspathic fluxes, about 232 million tonnes [6], are located in the Precambrian Shield, which are exploited (40,000 tpa, mean 2015-2024, reaching 60,000 tpa before the conflict) from different sources [11,38-47]: pegmatites and aplites in the Rivne and Žytomyr oblasts (*Map UA-2*); albitite and granite in the Kirovograd oblast (*Map UA-5*); porphyry and nepheline syenite (mariupolite) in the Donec'k oblast (*Map UA-7*); anorthosite from the Korosten' pluton (*Map UA-2B*).
Bentonite is mined (120,000 tpa, mean 2015-2024, peaking to 200,000 tpa before the war) at the Dashukivka deposit (Čerkasy) from Miocene lacustrine sediments, where it occurs associated with palygorskite [48,49]. A peculiar saponite deposit is reported in the Khmel'nyc'kyj oblast [50]. Total reserves are about 50 million tonnes [51].
Red clays are extracted from at least thirty quarries to feed the Ukrainian brick and expanded clay industry. Deposits are mostly Neogene-Quaternary in age, spanning from marine to continental environments, including fluvio-glacial loams and loess [52-55]. **Silica sands** are quarried from Neogene sediments, mainly in the Charkiv (*Map UA-3*), L'vov (*Map UA-4*), Zaporižžja (*Map UA-6*) and Donec'k (*Map UA-7*) oblasts.
Talc and **magnesite** mineralizations are known as alteration of ultrabasic rocks of the Precambrian basement [56]. In particular, a deposit is being developed within the Pravdinsky massif, consisting of talc-magnesite-chlorite assemblages within serpentinites [57]. **Chromite** ores are located within partly serpentinized ultramafic rocks in Eoarchean parts of the Ukrainian Shield [58]. Reserves are estimated to be 1 million tonnes at 26% Cr_2O_3 [5].
Strontium minerals: a large deposit is reported in Novopoltavske, Zaporižžja [6].
Soda ash: a plant is operating (400,000 tpa, mean 2015-2024) in Krasnoperekopsk, Crimea [1].

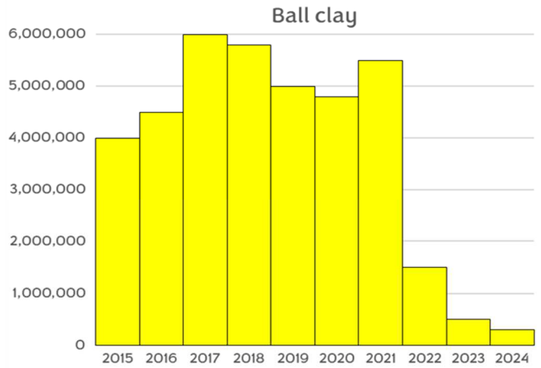
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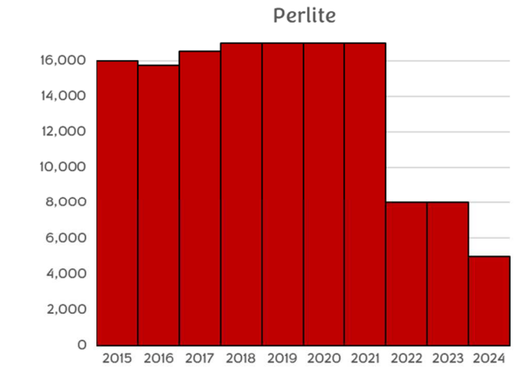
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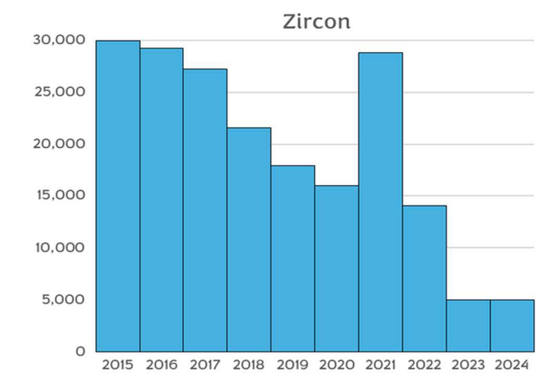
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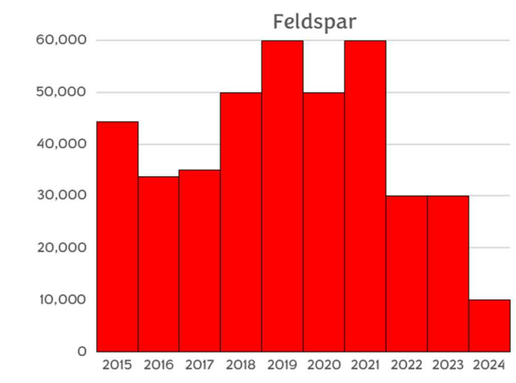


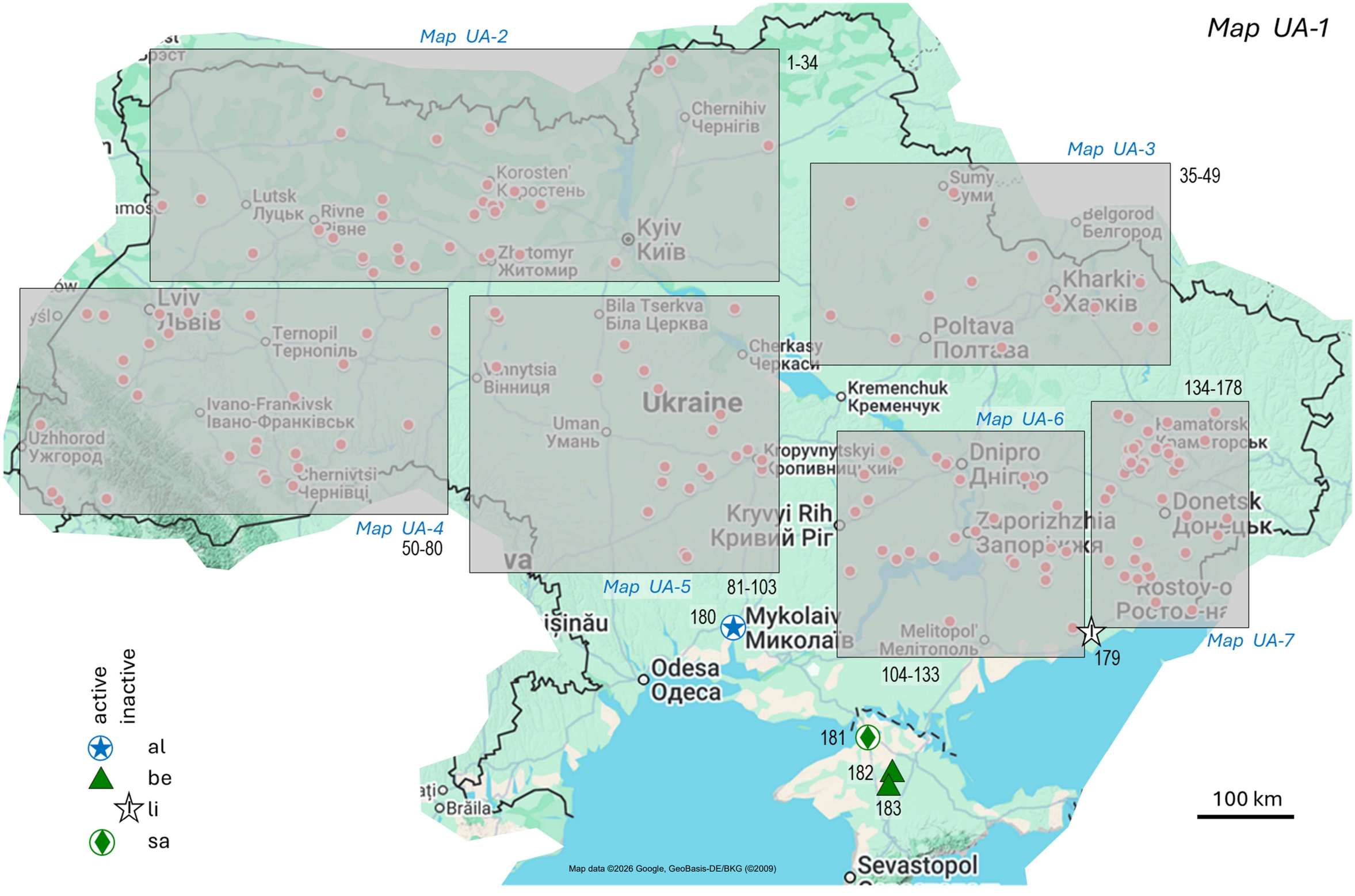




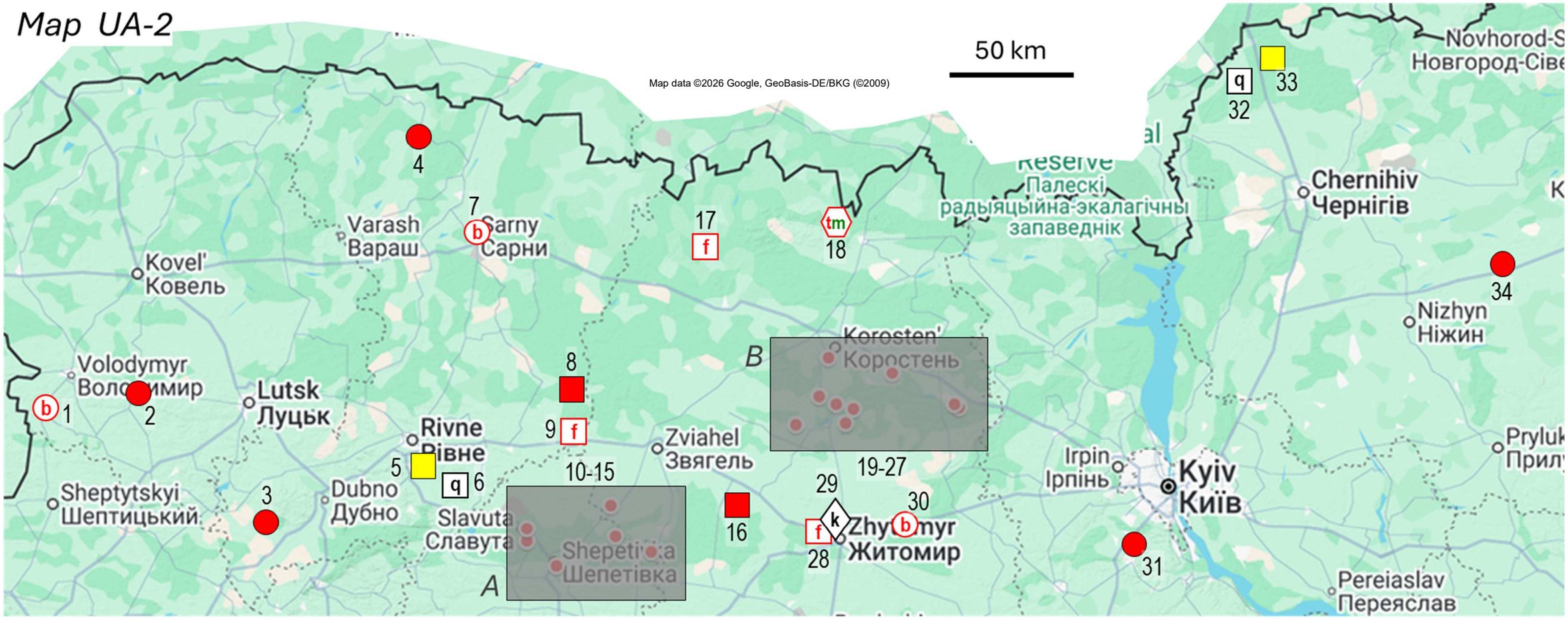


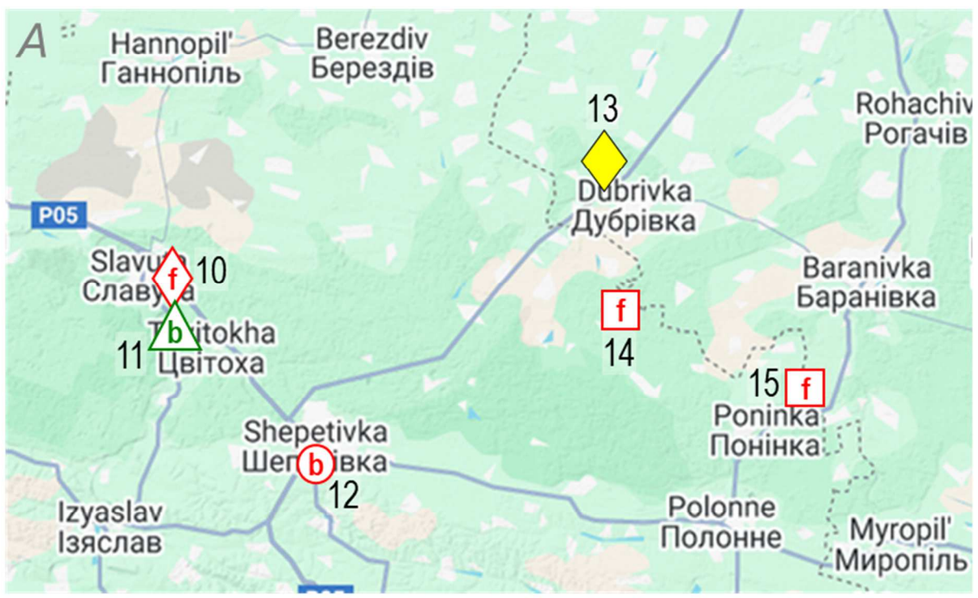





Map UA-1
Map UA-2
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Map UA-3
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Map UA-4
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Map UA-5
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Map UA-6
104-133
134-178
Map UA-7
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183
Chernihiv
Чернігів
Korosten'
Lutsk
Луцьк
Rivne
Kyiv
Київ
Zhytomyr
Житомир
Sumy
Belgorod
Белгород
Kharkiv
Харків
Poltava
Полтава
Lviv
Львів
Ternopil
Тернопіль
Ivano-Frankivsk
Івано-Франківськ
Uzhhorod
Ужгород
Chernivtsi
Чернівці
Bila Tserkva
Біла Церква
Cherkasy
Черкаси
Vinnytsia
Вінниця
Ukraine
Uman
Умань
Kremenchuk
Кременчук
Kryvyi Rih
Кривий Ріг
Dnipro
Дніпро
Zaporizhzhia
Запоріжжя
Donetsk
Донецьк
Mykolaiv
Миколаїв
Melitopol'
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Map UA-2





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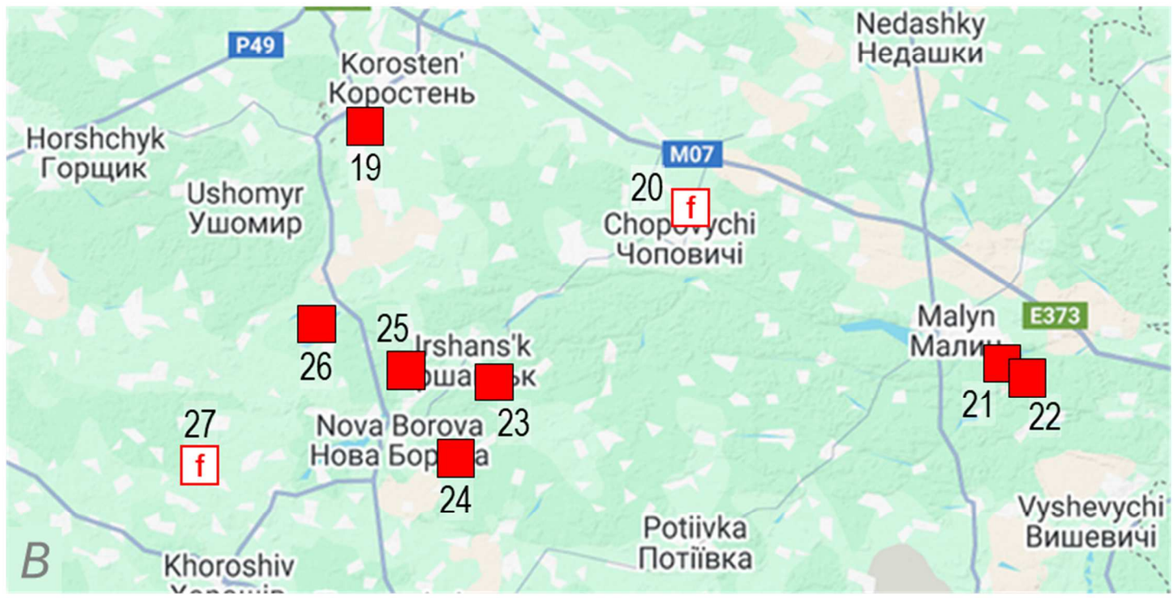


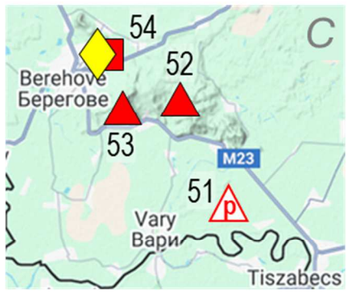
Table UA-a: deposits of raw materials for the ceramic and glass industries in Ukraine.

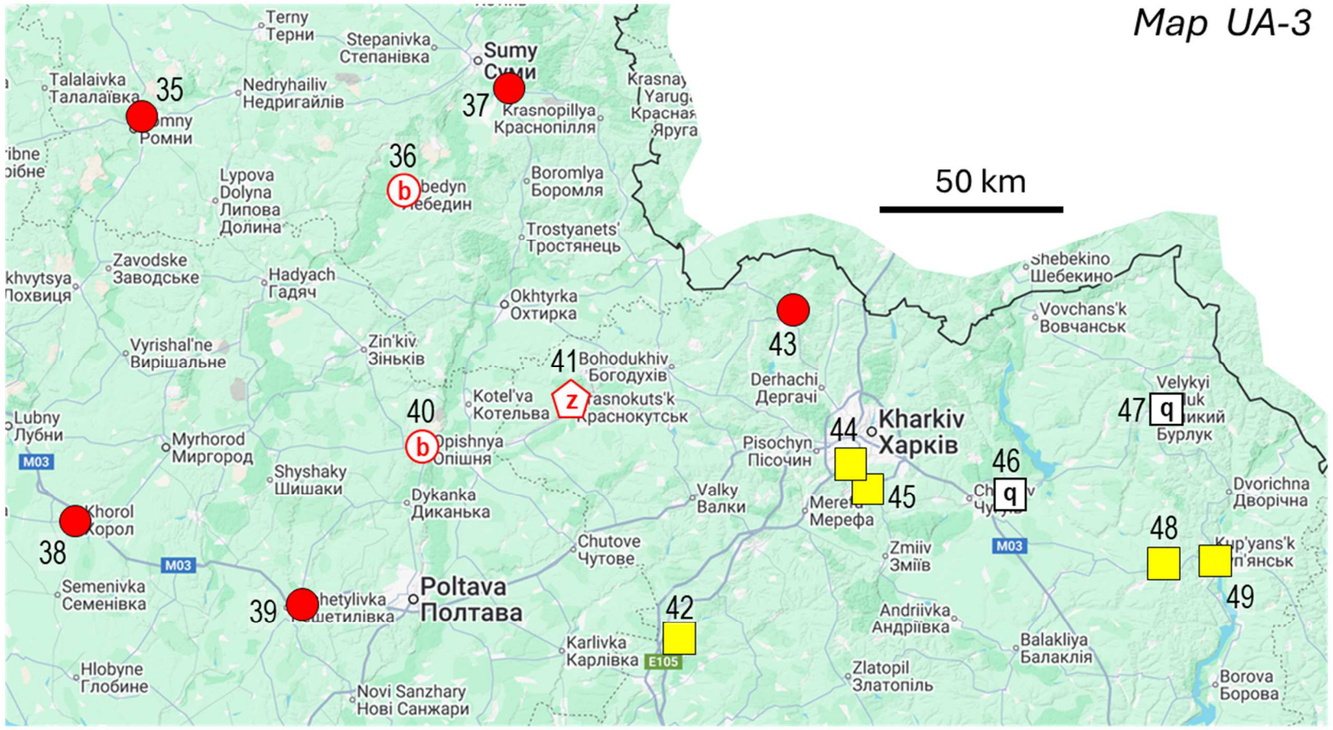
#	raw material	st	deposit	oblast
1	rc	I	Novovolyns'k	Volyn
2	rc	A	Pavlovychi	Volyn
3	rc	A	Pidvysoke	Rivne
4	rc	A	Svarycevyči	Rivne
5	qs	A	Kolodenka	Rivne
6	qs	I	Novokraiv	Rivne
7	rc	I	Sarny	Rivne
8	fd	A	Bil'chaky	Rivne
9	fd	I	Korets	Rivne
10	fc	I	Maldan-Vil'skoe	Khmel'nyc'kyj
11	be	O	Tashky	Khmel'nyc'kyj
12	rc	I	Shepetivka	Khmel'nyc'kyj
13	ka	A	Dubrivka	Žytomyr
14	fd	I	Horodnyavka-Novaky	Khmel'nyc'kyj
15	fd	O	Polonne-Baranivka	Žytomyr-Khmel'nyc'kyj
16	fd	A	Hruzlyvets	Žytomyr
17	fd	I	Perha	Žytomyr
18	tc-mg	O	Kurianivske-Nahorianske	Žytomyr
19	an	A	Korosten'	Žytomyr
20	an	I	Chopovyci	Žytomyr
21	an	A	Malyn W	Žytomyr
22	an	A	Malyn E	Žytomyr
23	an	A	Irshansk	Žytomyr
24	an	A	Yemylyvka	Žytomyr
25	an	A	Turchynka	Žytomyr
26	an	A	Lisobuda	Žytomyr
27	fd	I	Volyn field	Žytomyr
28	fd	I	Barašivka	Žytomyr
29	ka	I	Novoselytsya	Žytomyr
30	rc	I	Korostyšiv	Žytomyr
31	rc	A	Hlevakha	Kyiv
32	qs	I	Ripky	Chernihiv
33	qs	A	Hrybova Rudnya	Chernihiv
34	rc	A	Borzna	Chernihiv
35	rc	A	Plavnyšče	Sumy
36	rc	I	Lebedyn	Sumy
37	rc	A	Novoselytsya	Sumy
38	rc	A	Khorol	Poltava
39	rc	A	Shkurupiivka	Poltava
40	rc	I	Opishnia	Poltava
41	zr	O	Krasnokutsk	Charkiv
42	qs	A	Berestovenka	Charkiv
43	rc	A	Zolochiv	Charkiv
44	qs	A	Pokotylivka	Charkiv
45	qs	A	Khorosheve	Charkiv
46	qs	I	Malynivka	Charkiv
47	qs	I	Veliky Burluk	Charkiv
48	qs	A	Blahodativka-Starovirivka	Charkiv
49	qs	A	Vyshnivka-Kup'ja'nsk	Charkiv
50	ze	A	Sokyrnytsia	Zakarpatska
51	pe	I	Shynoy-Varna	Zakarpatska
52	pe	A	Fohosh	Zakarpatska
53	pe	A	Ardov-Zatyshnyan	Zakarpatska
54	ka-fd	A	Beregovo	Zakarpatska
55	fd	O	Dubrynych	Zakarpatska
56	rc	A	Bolechiv	Ivano-Frankivs'k
57	rc	A	Ulychne	L'viv
58	rc	A	Solons'ke	L'viv
59	rc	A	Mostys'ka	L'viv
60	rc	I	Sudova Vyshnia	L'viv
61	qs	A	Voloshchynske	L'viv
62	qs	A	Velyki Hlibovychi	L'viv
63	be	O	Berezhany	L'viv
64	rc	A	Hlynjany	L'viv
65	rc	I	Zolochiv	L'viv
66	rc	I	Zalitsi	Ternopil'
67	rc	A	Slobidka-Krasylivska	Khmel'nyc'kyj
68	rc	A	Kachanivka	Vinnycja
69	qf	I	Bakhtin	Vinnycja
70	rc	A	Dobrohoršča	Khmel'nyc'kyj
71	rc	A	Kam'yanets'-Podil's'kyi	Khmel'nyc'kyj
72	rc	A	Kotsyubyntsi	Ternopil'
73	rc	A	Vikno	Černivci
74	rc	A	Chornivka	Černivci
75	rc	A	Černivci	Černivci
76	rc	A	Kalnivtsi	Černivci
77	rc	A	Chortoryia	Černivci
78	rc	A	Torhovytsia	Ivano-Frankivs'k
79	rc	A	Horodenka	Ivano-Frankivs'k
80	rc	A	Kolomyia	Ivano-Frankivs'k
81	ka	A	Hlukhivtsi 1	Vinnycja
82	ka	A	Velyki Hadomtsi	Žytomyr
83	ka	A	Hlukhivtsi 2	Vinnycja
84	ka	A	Turbiv	Vinnycja
85	rc	A	Žaškiv	Čerkasy
86	zr	O	Tarašča	Kyiv
87	be	A	Dashukivka	Čerkasy
88	ka	I	Murzyntsi-Vatutin	Čerkasy
89	rc	I	Kovrai	Čerkasy
90	cr	O	Kapitanivka	Kirovohrad
91	fd	O	Novomirgorod	Kirovohrad
92	fc	I	Pervozvanivka	Kirovohrad

Map UA-3

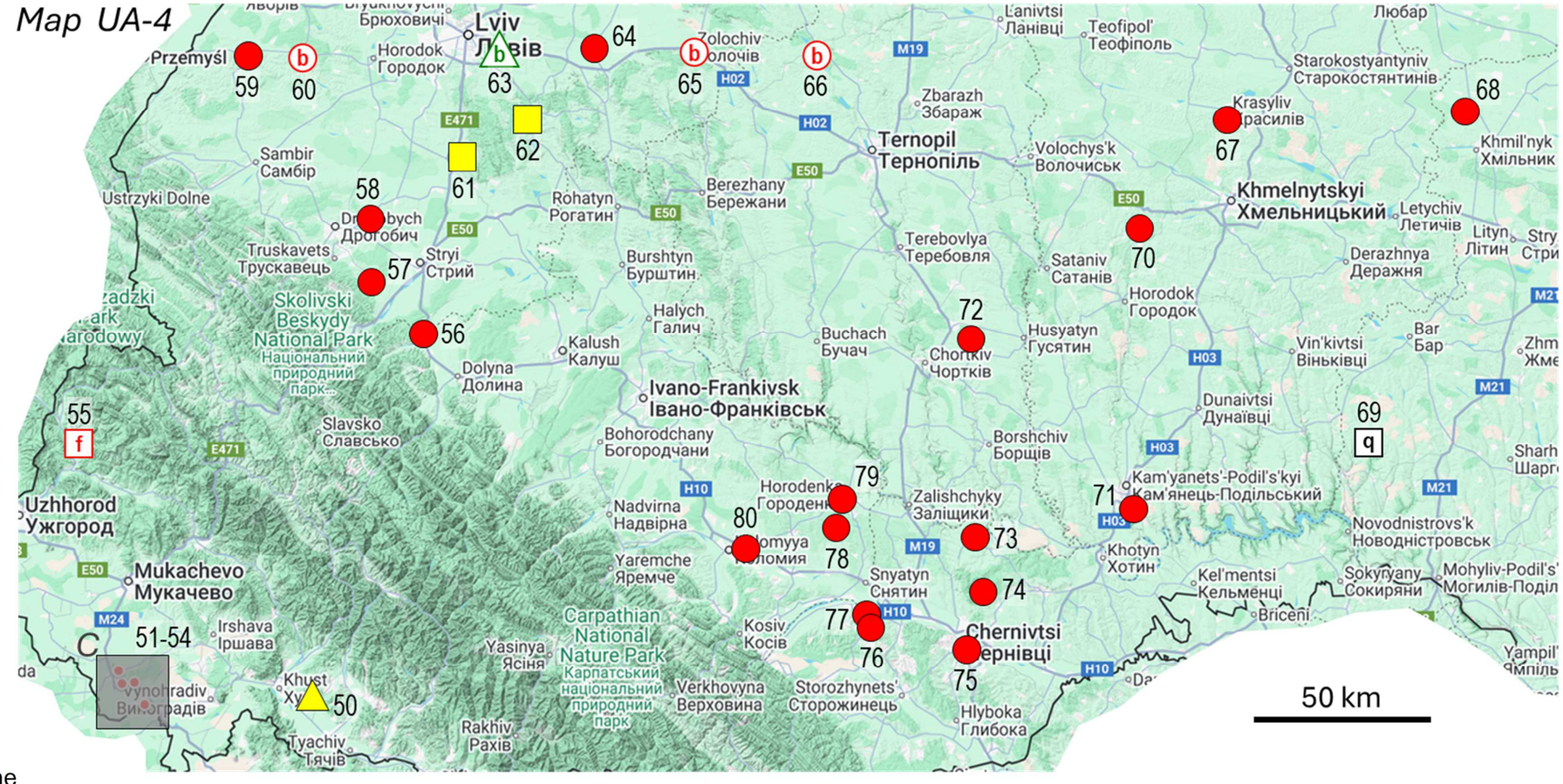
active / inactive

- be (b)
- ka
- pe (p)
- qs (q)
- rc (b)
- ze
- zr (z)





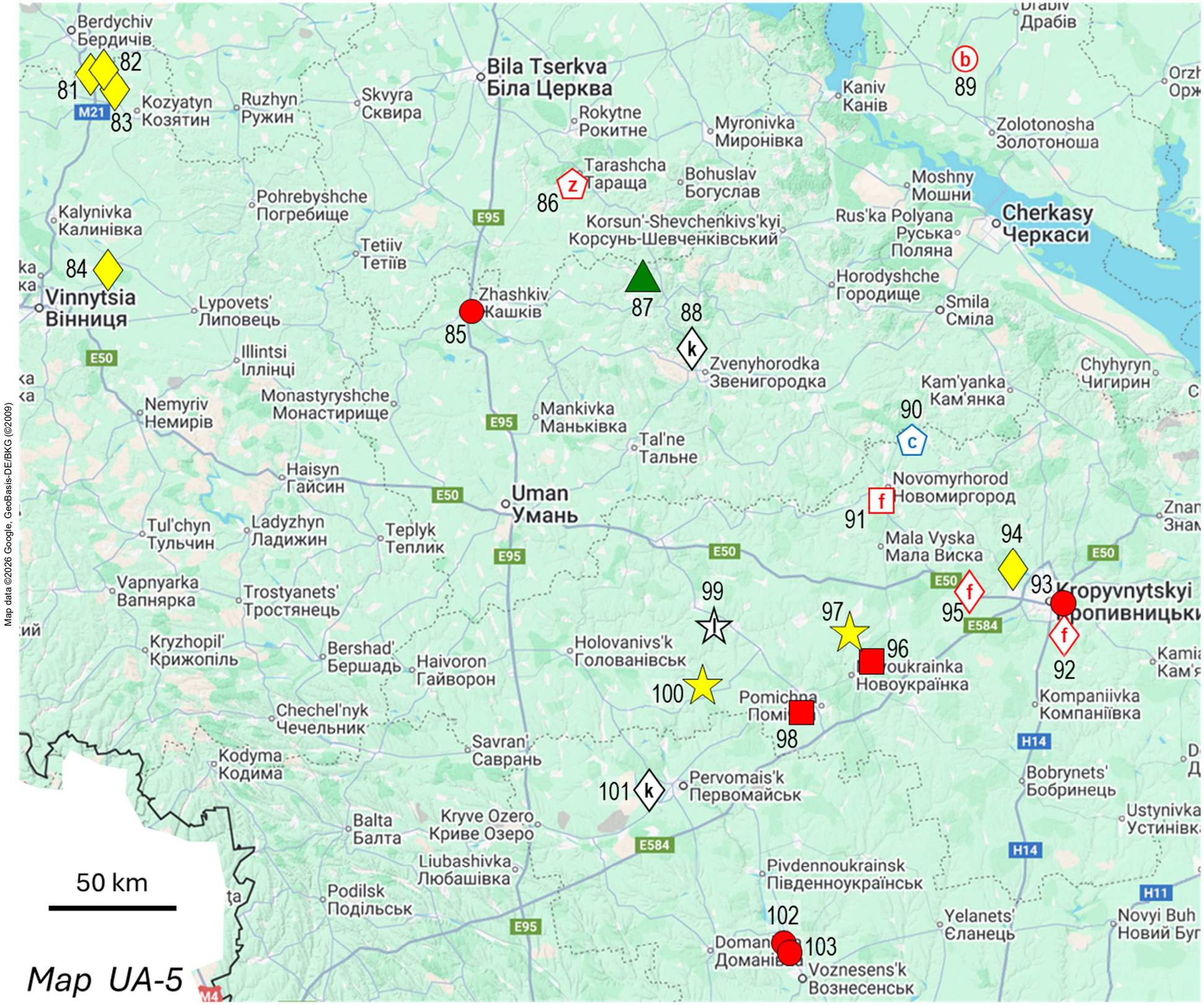
Map UA-4



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Table UA-b: deposits of raw materials for the ceramic and glass industries in Ukraine.

#	raw material	st	deposit	oblast
93	rc	A	Kropyvnytskyi	Kirovohrad
94	ka	A	Oboznivka	Kirovograd
95	fc	I	Shostakivka	Kirovograd
96	fd	A	Novoukraïnka	Kirovohrad
97	li	A	Polokhov	Kirovohrad
98	fd	A	Novooleksiivka	Kirovohrad
99	li	O	Stankuvatske	Kirovohrad
100	li	A	Dobra	Kirovohrad
101	ka	I	Kinets'pil'	Mykolaïv
102	rc	A	Oleksandrivka	Mykolaïv
103	rc	A	Voznesens'k	Mykolaïv
104	fc	I	Saksahan	Kryvyi Rih
105	fc	I	Derladove	Dnipropetrovsk
106	qs	I	Krasnoivanivka	Dnipropetrovsk
107	fc	I	Piatykhatky	Dnipropetrovsk
108	zr	A	Motronivka-Annivka	Dnipropetrovsk
109	zr-ky-qs	A	Malyshevske	Dnipropetrovsk
110	qs	A	Konoplianske	Dnipropetrovsk
111	qs	I	Tarom	Dnipropetrovsk
112	qs	I	Sukhachivka	Dnipropetrovsk
113	rc	A	Novooleksandrivka	Dnipropetrovsk
114	zr	O	Voskresenivka	Dnipropetrovsk
115	tc-mg	A	Pravdinske	Dnipropetrovsk
116	ka	A	Prosiana	Dnepropetrovsk
117	ka	A	Biliaiivka	Zaporižžja
118	rc	I	Zaporižžja	Zaporižžja
119	fd	O	Dolyns'ke	Zaporižžja
120	rc	I	Marganec'	Dnipropetrovsk
121	bx	O	Južnonikopole	Dnipropetrovsk
122	fd	I	Bazavluk River	Dnepropetrovsk
123	fd	I	Tokivs'ke	Dnipropetrovsk
124	bx	O	Vysokopillia	Cherson
125	qs	A	Novoselivska	Zaporižžja
126	qs-ec	A	Orikhiv	Zaporižžja
127	fd	O	Huljaipole	Zaporižžja
128	sr	O	Novopoltavske	Zaporižžja
129	ka-qs	A	Polohy 1	Zaporižžja
130	wc	A	Polohy 2	Zaporižžja
131	rc	I	Tarasivka	Zaporižžja
132	tc-mg	O	Veselivska	Zaporižžja
133	fd	O	Balka Glubokaya	Zaporižžja
134	qs	A	Husarivka	Charkiv
135	qs	A	Bantysheve	Donec'k
136	qs	A	Shabel'kivka	Donec'k
137	qf	O	Mykolaïvka	Donec'k
138	rc	I	Sjevjerodonec'k	Luhans'k
139	fc	I	Popasnyanska	Donec'k
140	wc-qs	A	Časiv Jar	Donec'k
141	qs-fc	A	Artemiv'ska	Donec'k
142	wc	A	Kostiantynivka	Donec'k
143	qs	A	Zelenopyllia	Donec'k
144	fd	I	Andriivka-Mykolaivka Druha	Donec'k
145	fc	I	Pivnichne	Donec'k
146	wc	A	Virolyubivka	Donec'k
147	fc	A	Druzhkivka	Donec'k
148	wc	A	Novorayske	Donec'k
149	wc	A	Novoandriivka	Donec'k
150	wc	A	Zapadodonska	Donec'k
151	wc	A	Andriivka	Donec'k
152	wc	A	Toret'sk	Donec'k
153	wc	A	Kucheriv Yar	Donec'k
154	wc-qs	A	Oktyabr'skoe	Donec'k
155	wc-qs	A	Pivdenno-Oktiabrsk	Donec'k
156	wc	A	Vil'ne	Donec'k
157	wc	A	Dobropilske	Donec'k
158	wc	A	Briuchske	Donec'k
159	wc	I	Centralne	Donec'k
160	wc	A	Poltavka	Donec'k
161	wc	A	Popiv Yar	Donec'k
162	fc	I	Zatyshok	Donetsk
163	fc	A	Pokrovs'k	Donec'k
164	zr	O	Vovchansk	Donec'k
165	qs	A	Pysochnyy	Donec'k
166	li	A	Shevchenkivke	Donec'k
167	zr	O	Manuilivka	Donec'k
168	fc	A	Amvrosiivka	Donec'k
169	fd	A	Kal'mius'ke	Donec'k
170	ka	I	Volodymyrivka	Donec'k
171	ka	A	Trudove (Belaya Balka)	Donec'k
172	fd	I	Dmytrivka	Donec'k
173	ns	A	Donskoye-Shevchenko	Donec'k
174	qs	A	Nova Karakuba	Donec'k
175	ka	A	Kateryniv ka	Donec'k
176	fd	O	Krasnivka	Donec'k
177	fd	I	Anadol'	Donec'k
178	qf	O	Azov	Donec'k
179	li	A	Kruta Balka	Zaporižžja
180	al	A	Mikolaiv	Mikolaiv
181	sa	A	Krasnoperekops'k	Crimea
182	be	A	Kudrinskoe	Crimea
183	be	A	Hryhorivka	Crimea



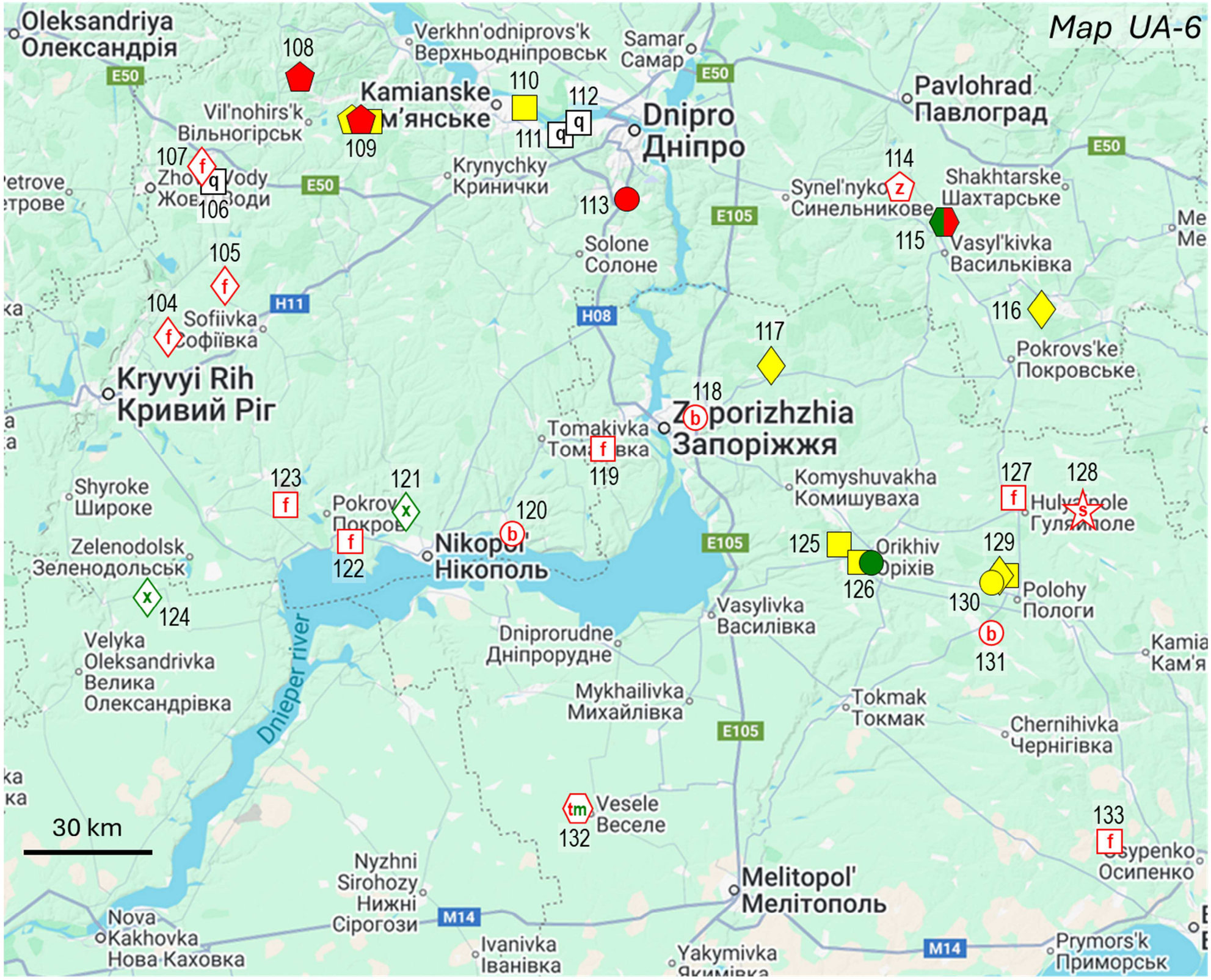
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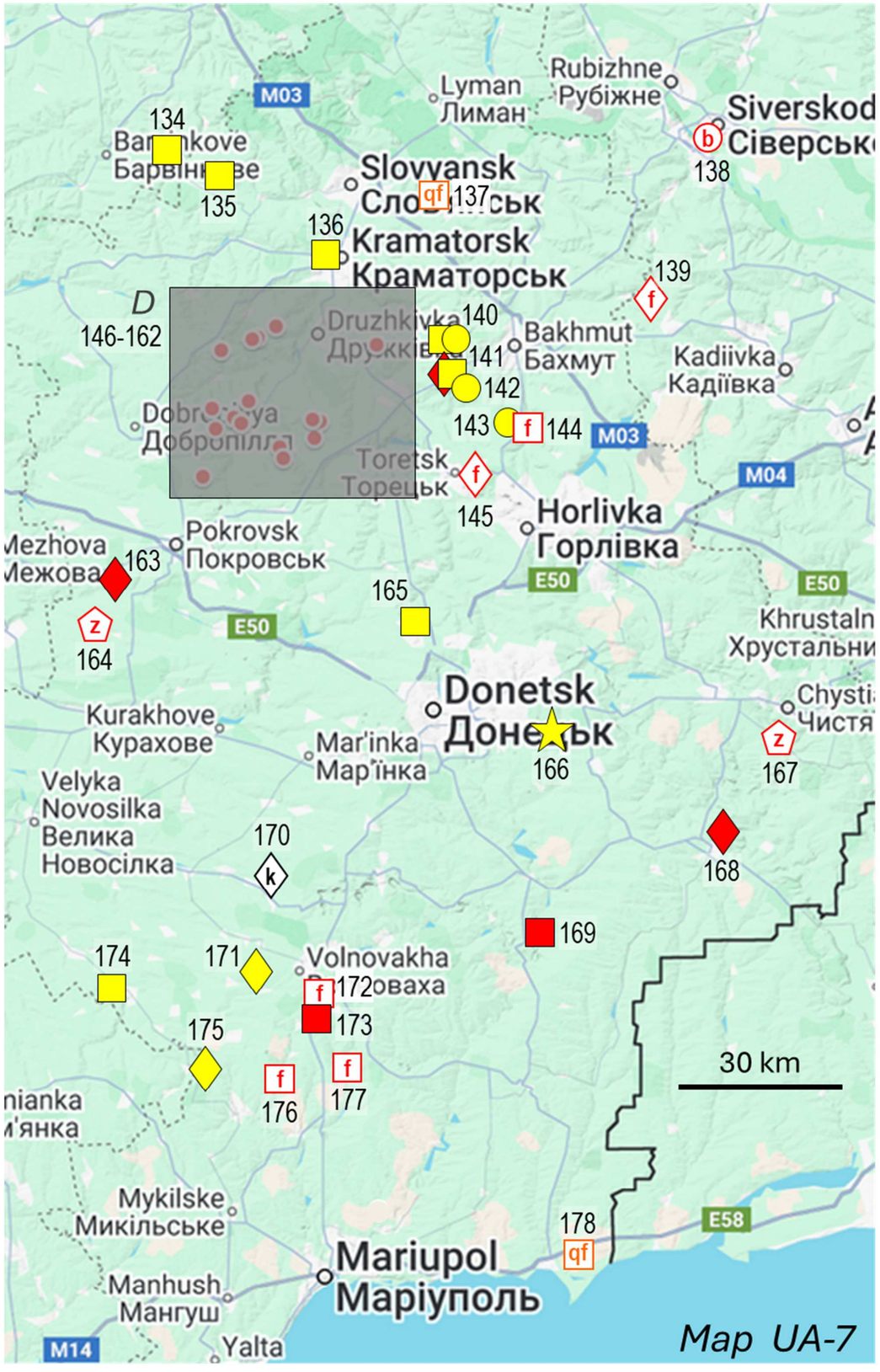
Raw material

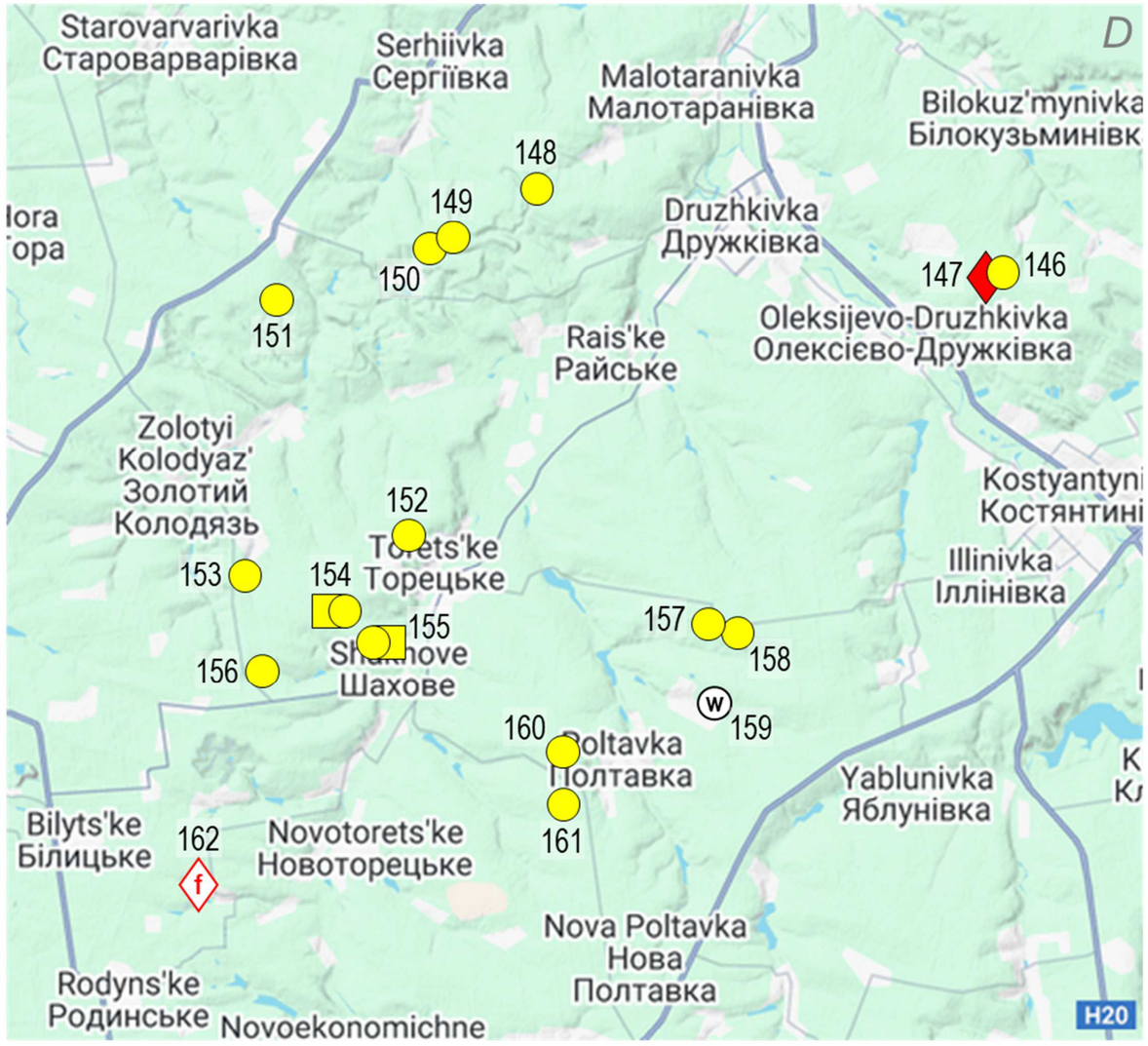
al	alumina (artificial)
an	anorthosite
be	bentonite
bx	bauxite
ec	expanded clay
fc	refractory clay
fd	feldspar
ka	kaolin
ky	kyanite-sillimanite
li	lithium minerals
mg	magnesite
ns	nepheline syenite
pe	perlite
qs	silica sand
qz	quartz
rc	red clays
sa	soda ash
sr	celestine
tc	talc
wc	white clays
ze	zeolites
zr	zirconium minerals

Status of deposit

A	active mine
I	inactive mine
O	occurrence


Map UA-6
Oleksandriya
Олександрія
Verkhn'odniprovs'k
Верхньодніпровськ
Samar
Самар
Pavlohrad
Павлоград
Kamianske
м'янське
Dnipro
Дніпро
Vil'nohirs'k
Вільногірськ
Krynychky
Кринички
Synel'nykove
Синельникове
Shakhtarske
Шахтарське
Vasyl'kivka
Васильківка
Solone
Солоне
Sofiivka
Софіївка
Kryvyi Rih
Кривий Ріг
Pokrovs'ke
Покровське
Zaporizhzhia
Запоріжжя
Tomakivka
Komyshuvakha
Комишуваха
Shyroke
Широке
Pokrov
Покров
Nikopol'
Нікополь
Zelenodolsk
Зеленодольськ
Orikhiv
Оріхів
Polohy
Пологи
Vasylivka
Василівка
Velyka
Oleksandrivka
Велика
Олександрівка
Dnieper river
Dniprorudne
Дніпрорудне
Mykhailivka
Михайлівка
Tokmak
Токмак
Chernihivka
Чернігівка
Vesele
Веселе
Melitopol'
Мелітополь
Nova
Kakhovka
Нова Каховка
Nyzhni
Sirohozy
Нижні
Сірогози
Ivanivka
Іванівка
Yakymivka
Якимівка
Prymors'k
Приморськ
30 km
E50
E105
H11
H08
M14
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)
active
inactive
bx
ec
fc
fd
ka
ky
mg
qs
rc
sr
tc
zr





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active	inactive		active	inactive	
◆	◇	fc	■	□	qs
■	□	fd		ⓑ	rc
◆	◇	ka	●	ⓦ	wc
★		li		ⓩ	zr
	qf	qf			

United Kingdom

Southwest England is a traditional benchmark for whiteware clay materials. Great Britain is the fourth largest producer of kaolin and barite in the Euro-Mediterranean area, and the sixth largest of ball clay, silica sand, and red clay (including fireclay). Additionally, there is a minor production of alumina, talc, and raw materials for stone wool. Finally, there are deposits, currently unexploited, of lithium minerals, andalusite, and feldspar [1-5].

Kaolin: Variscan granite massifs, more or less intensely kaolinized, outcrop in Cornwall and Devon. These are primary deposits with a complex origin, due to various hydrothermal stages and a strong weathering overprint [6-10]. There are around twenty active mining sites getting 825,000 tpa of finished product, 2015-2024 mean [1]. Most are in the Saint-Austell district [11,12] (*Map UK-2A*); to a lesser extent, plutons from Dartmoor [13] (*Map UK-2B*) and Land's End [14] are mined, while any activity on Bodmin Moor has been suspended since 2001. The amount of permitted reserves is more than 40 million tonnes [10].

Barite: the main deposits are in Perth and Kinross county (central Scotland, *Map UK-5*) and in the Northern Pennine and Yorkshire Dales ore-fields [15]. Three of them are actually mined, for an average production of 43,000 tpa and reserves for approximately 13 million tonnes [1,2]. In Scotland, stratabound deposits are intercalated in Proterozoic metasedimentary rocks, while in England barite occurs mainly as vein infillings in faults [15,16].

Ball clays are extracted in about twenty mines belonging to three distinct sedimentary basins of Eocene age [17-19]. Most of the production comes from Devon, where lacustrine clays are exploited in the Bovey Basin (*Map UK-2C*) and Petrockstow Basin (*Map UK-2D*) [2,19,20]. In Dorset, estuarine and tidal flat deposits of the Wareham Basin (*Map UK-2E*) are mined [19,21]. Average production is 750,000 tpa and permitted reserves are estimated at around 51 million tonnes in total, plus further 60 million tonnes currently unpermitted [1,2].

Fireclay: economically important deposits are almost entirely confined to the Coal Measures of Carboniferous age [22-24]. The close association between coal and fireclay implies that both are usually produced together, either by operating coal mines or, more importantly, by fireclay stocks derived from closed mines [24]. Eight quarries are still in operation in Scotland, the Yorkshire Dales, and the southern Pennines [2]; production is estimated at around 100,000 tpa [24].

Silica sand is mined from two dozen quarries, with average production of 4,500,000 tpa [1,2] and permitted reserves for glass sand of approximately 28 million tonnes [25,26]. Quartz sands resources are distributed mainly between Scotland (where Carboniferous sandstones of the Passage Group are exploited), Cheshire (Pleistocene glacio-fluvial deposits), Bedfordshire and Kent, where the target is constituted by various Lower Cretaceous formations [25].

Red clays and shales are essentially employed in the manufacturing of bricks, roof tiles, vitrified drainage pipes, and lightweight aggregates [27]. British production is around 4,250,000 tpa (2015-2024 mean) from about ninety quarries, mostly spread across England [1,2], with 113 million tonnes of reserves [27]. Major red clay sources include Mercia mudstone (Triassic), Coal Measures and Etruria Formation (Carboniferous), Weald and Wadhurst formations (Cretaceous) and the Jurassic Oxford Formation [27-32]. Quaternary deposits [33] and further sources, e.g. Eocene London clay [34], ensure a negligible contribution.

Soda ash is produced at Winnington (Liverpool): 430,000 tpa on average [35]. **Alumina** production is reported in Scotland: ~89,000 tpa [1]. **Stone wool** is produced in Great Britan at four industrial sites, but data about raw materials consumption are not disclosed.

Talc is exploited in the Shetland Islands (*Map UK-5*) with modest production at the Crossgeo Quarry (3,000 tpa on average) from a deposit resulting from hydrothermal alteration of metamorphics [1,36].

Lithium minerals may be present in pegmatites related to Caledonian and Variscan S-type granites. The former are found in Scotland and the Lake District, while the latter in Devon and Cornwall, where the St-Austell granite is known to contain Li resources, currently being explored [37]. From the same pluton, a **feldspar** (*Cornish stone*) was used for many years as a flux (fluorine-rich, albitized leucogranite) [38,39].

Andalusite occurrences are reported in north-east Scotland, generally within Dalradian pelitic schists containing between 2 and 10% andalusite in a quartz-mica matrix [40].

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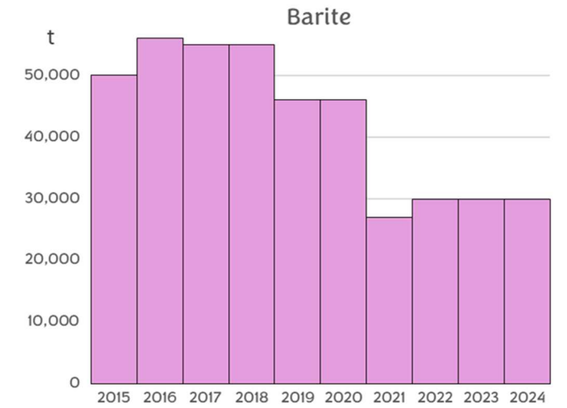
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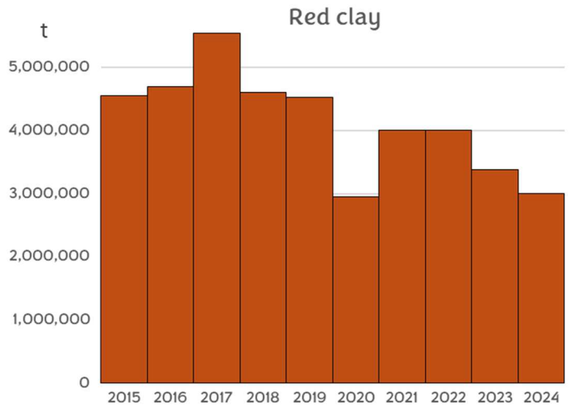
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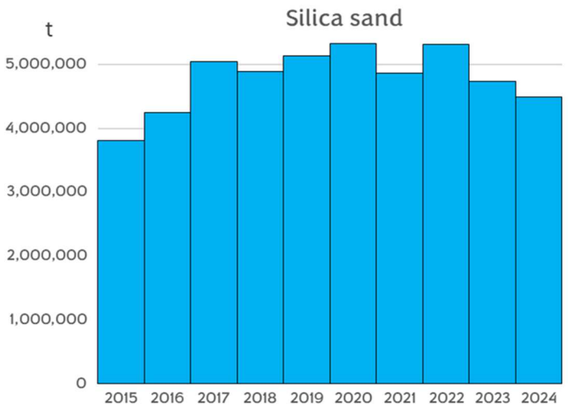
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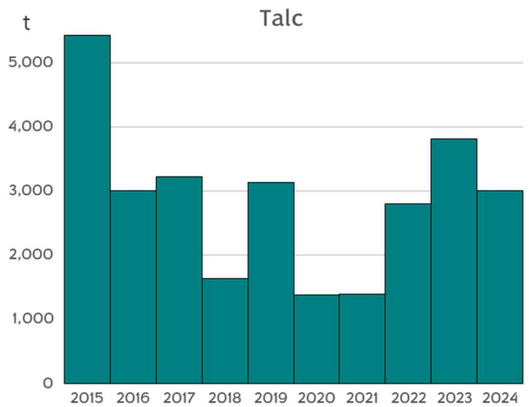
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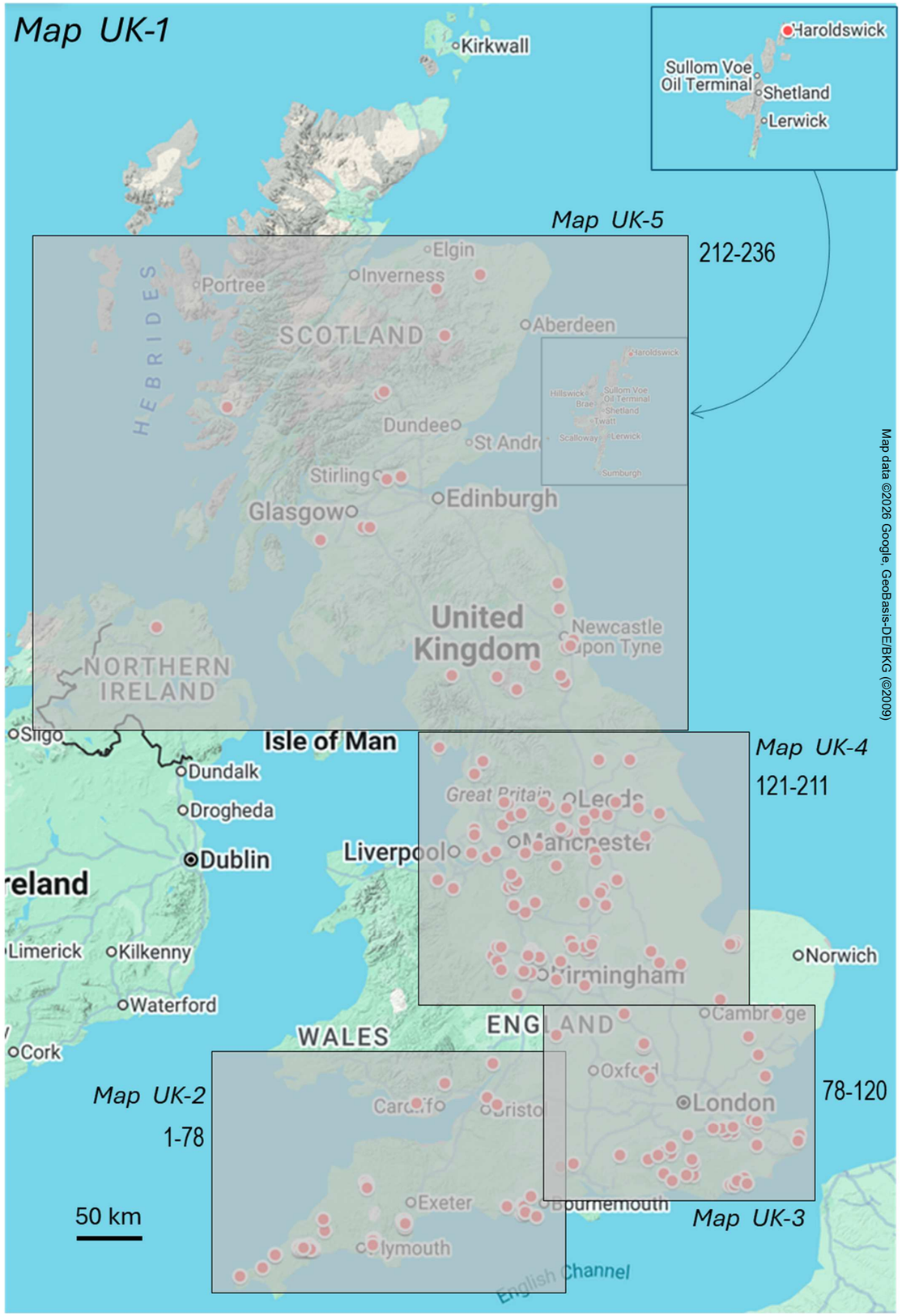
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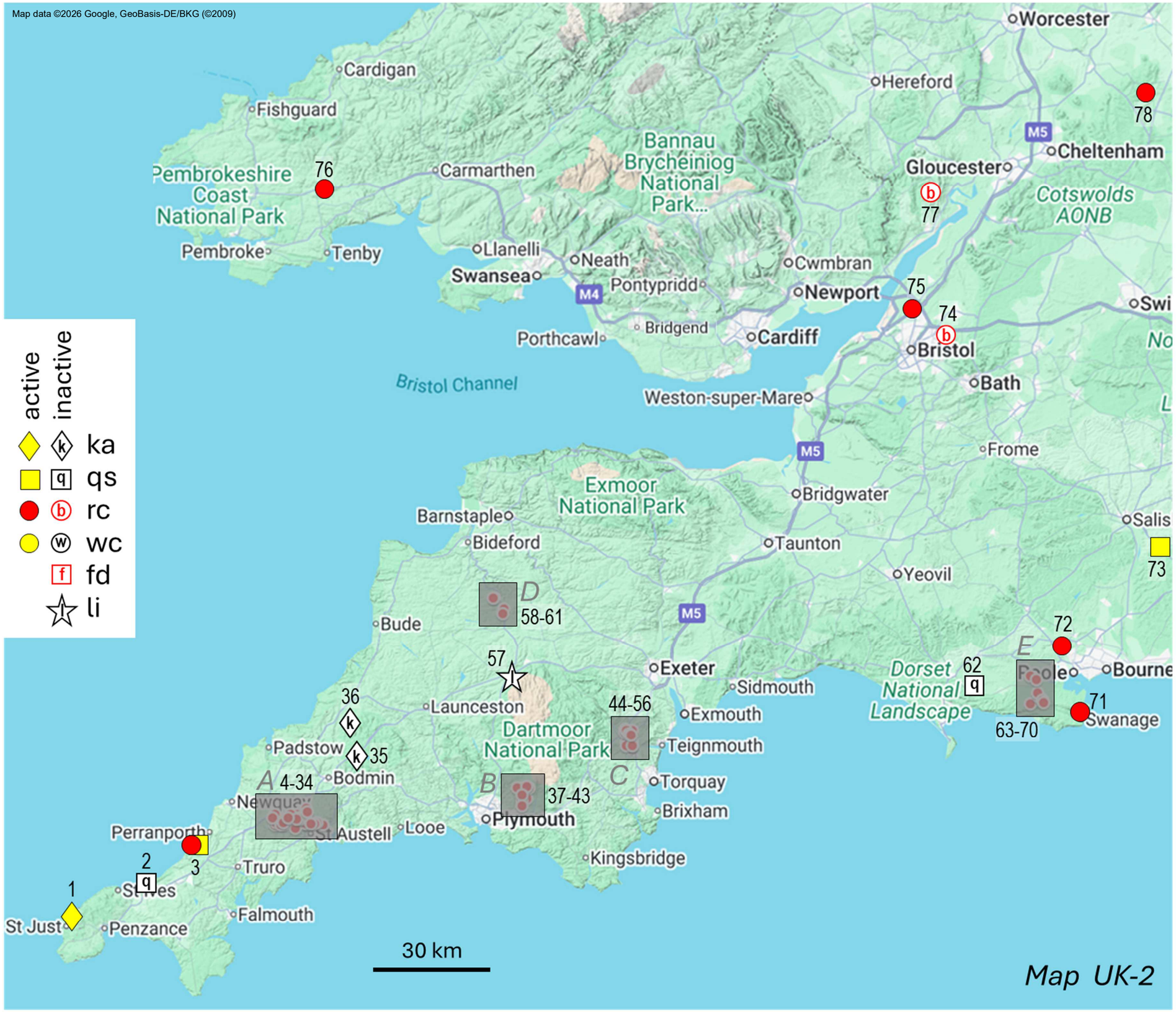










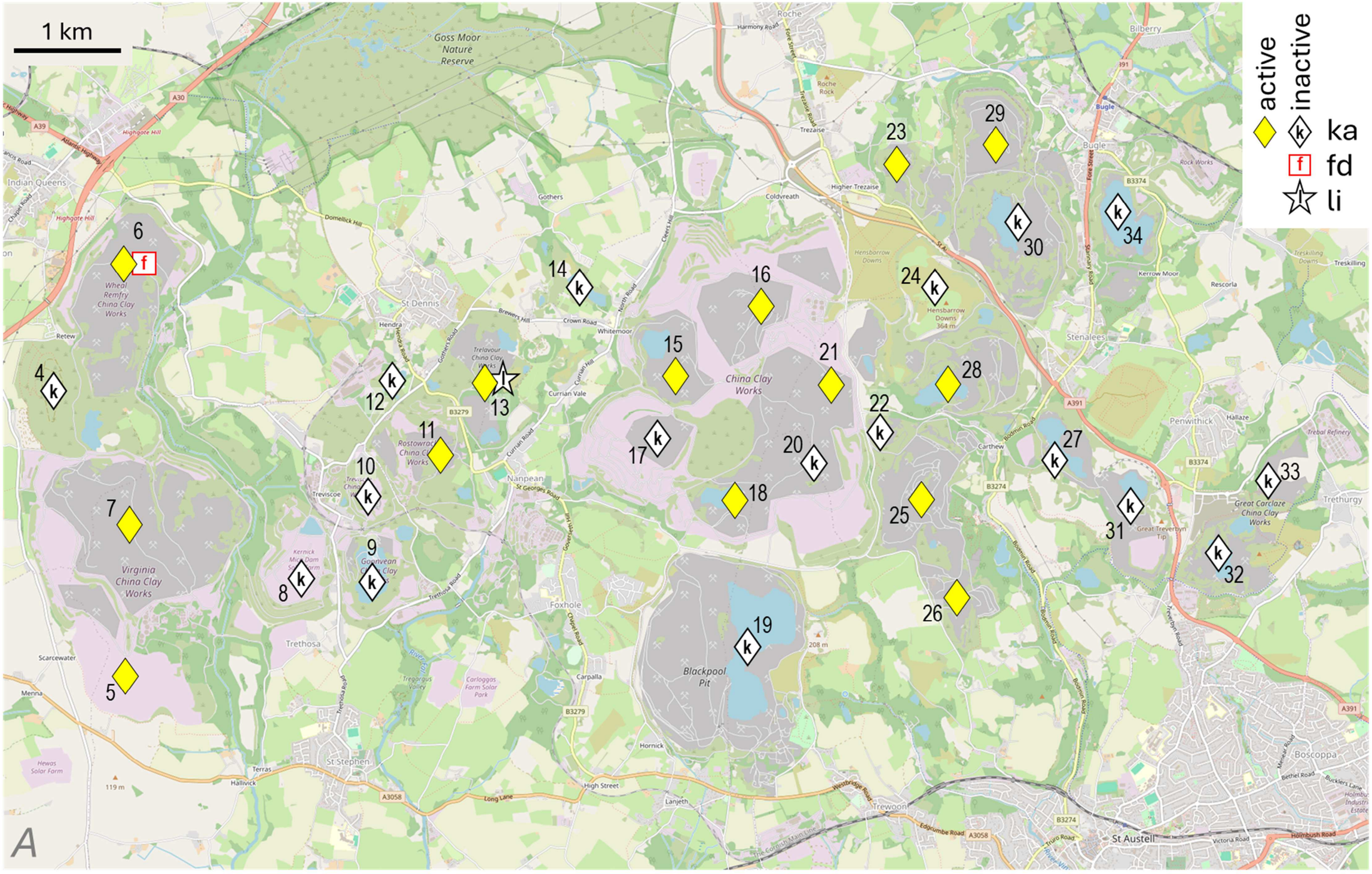


Raw material

ba	barite
ec	expanded clay
fc	fireclay
fd	feldspar
ka	kaolin
ky	kyanite
li	lithium minerals
na	soda ash
qs	silica sand
rc	red clays
sw	stone wool
tc	talc
wc	white clays

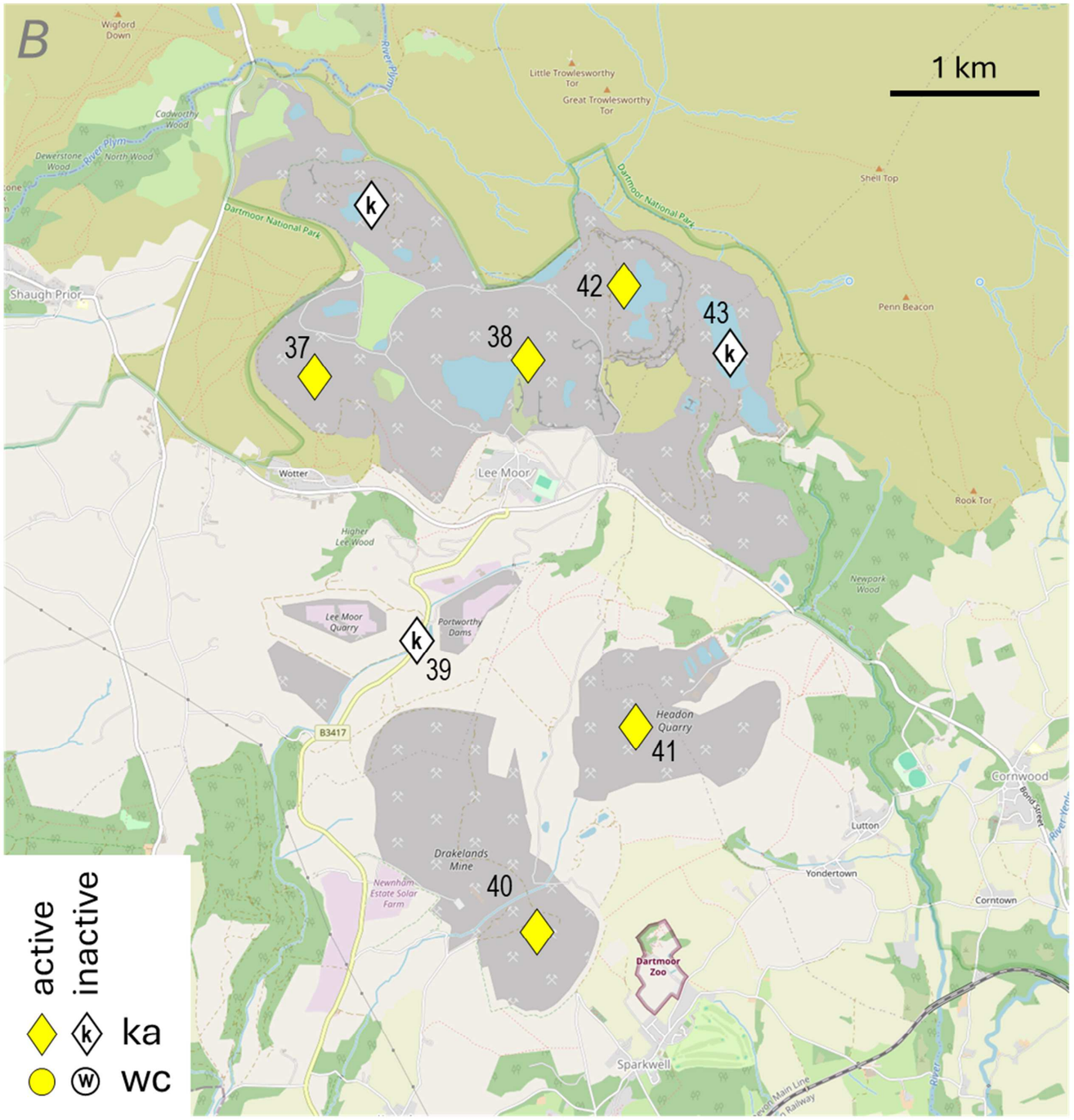
Status of deposit

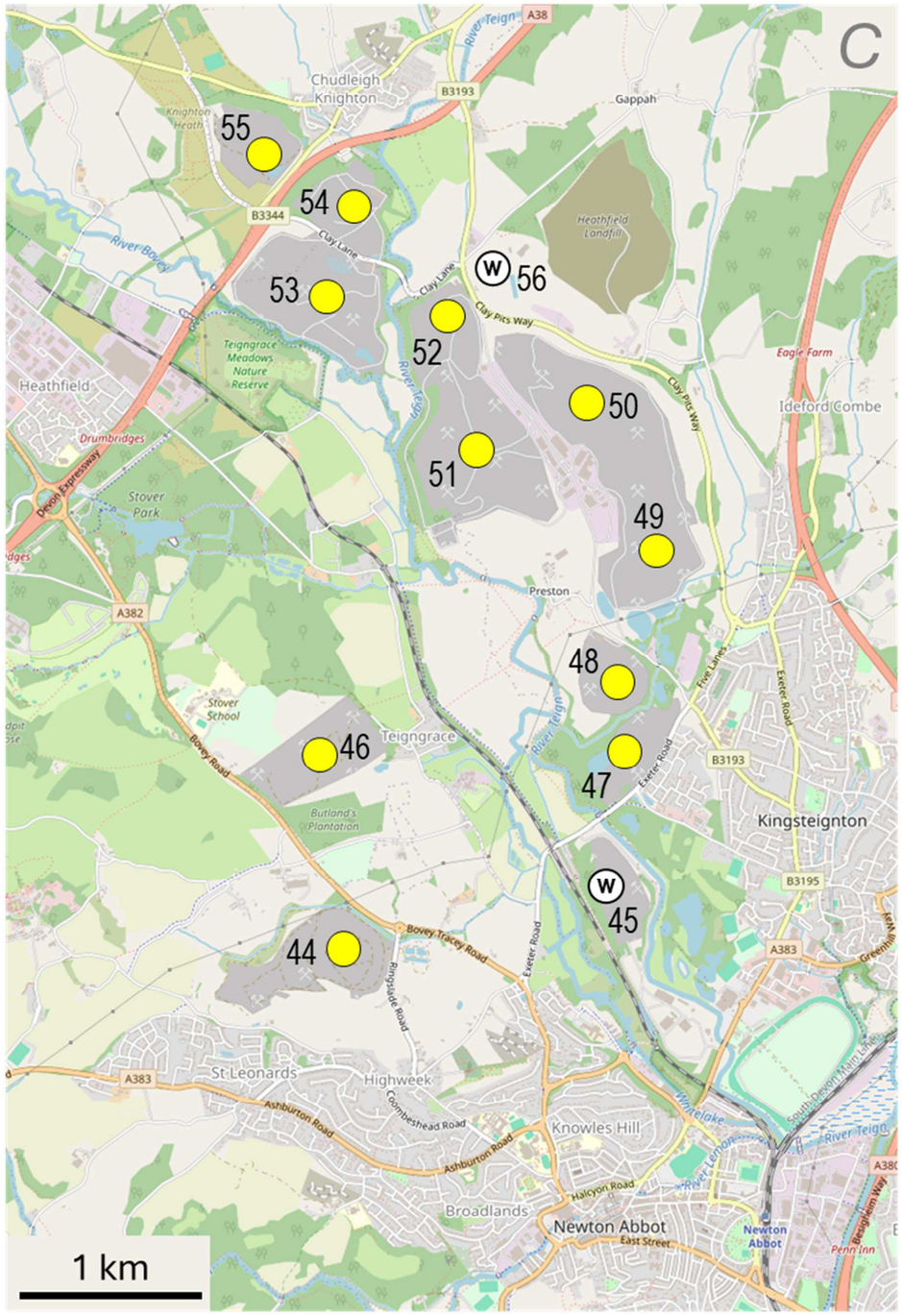
A	active mine
I	inactive mine
O	occurrence



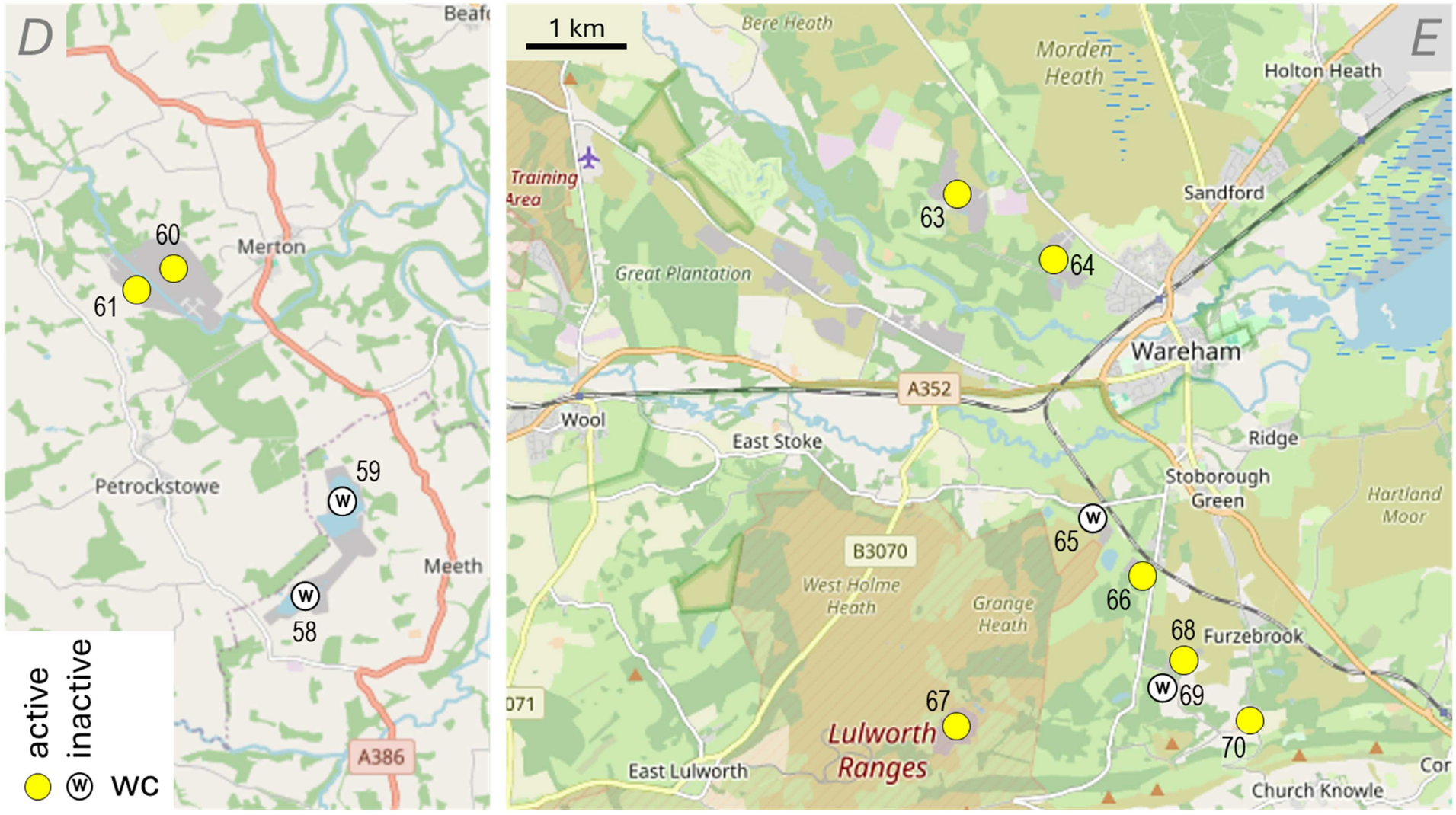
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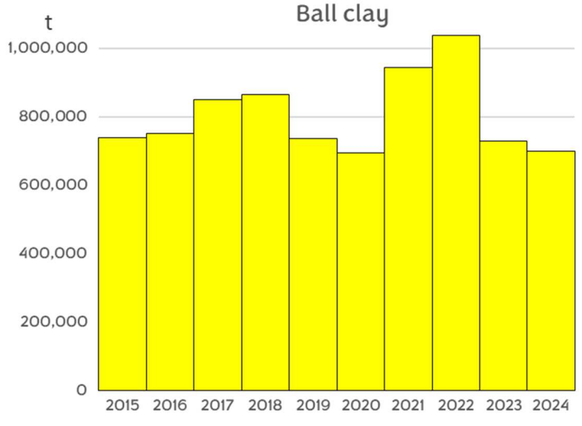




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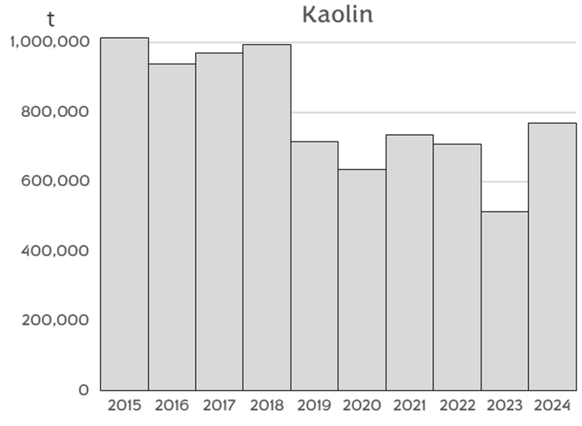


Table UK-a: deposits of raw materials for the ceramic and glass industries in the United Kingdom.

#	r.m.	st	deposit	county
1	ka	A	Bostraze-Balleswidden	Cornwall
2	qs	I	Gwythian	Cornwall
3	qs-rc	A	Beacon quarry	Cornwall
4	ka	I	South Fraddon-New Halwyn	Cornwall
5	ka	A	Melbur-Meledor	Cornwall
6	ka-fd	A	Wheal Remfry	Cornwall
7	ka	A	Virgina	Cornwall
8	ka	I	Kernick	Cornwall
9	ka	I	Goonvean-Trethosa	Cornwall
10	ka	I	Treviscoe	Cornwall
11	ka	A	Rostowrack	Cornwall
12	ka	I	Hendra-Fanfire	Cornwall
13	ka-li	A	Trelavour-Hallew	Cornwall
14	ka	I	Wheal Frederick-Gothers	Cornwall
15	ka	A	Dorothy	Cornwall
16	ka	A	Littlejohns	Cornwall
17	ka	I	Old Pound	Cornwall
18	ka	A	Longstone	Cornwall
19	ka	I	Blackpool	Cornwall
20	ka	I	Great Longstone	Cornwall
21	ka	A	West Gunheath-Cocksbarrow	Cornwall
22	ka	I	Carbean	Cornwall
23	ka	A	Wheal Prosper	Cornwall
24	ka	I	Shilton	Cornwall
25	ka	A	Wheal Martyn	Cornwall
26	ka	A	Greensplat	Cornwall
27	ka	I	Penhale	Cornwall
28	ka	A	Gunheath	Cornwall
29	ka	A	Goonbarrow North	Cornwall
30	ka	I	Goonbarrow	Cornwall
31	ka	I	West Carclaze-Treverbyn	Cornwall
32	ka	I	Great Carclaze	Cornwall
33	ka	I	Norman-Alseveor	Cornwall
34	ka	I	Rocks-Kerrow Moor	Cornwall
35	ka	I	Glynn Valley-Park	Cornwall
36	ka	I	Stannon	Cornwall
37	ka	A	Shaugh Moor Quarry	Devon
38	ka	A	Lee Moor	Devon
39	ka	I	Portworthy Dams	Devon
40	ka	A	Drakelands	Devon
41	ka	A	Headon	Devon
42	ka	I	Lee Moor East	Devon
43	ka	I	Lee Moor North-East	Devon
44	wc	A	Ringslade Pit	Devon
45	wc	A	Pinsent	Devon
46	wc	I	Stover	Devon
47	wc	A	Broadway	Devon
48	wc	A	Denistone Pit	Devon
49	wc	A	John Acres Lane Pit	Devon
50	wc	A	White pit	Devon
51	wc	A	Southacre Pit	Devon
52	wc	A	Longmarsh	Devon
53	wc	A	Newbridge Pit	Devon
54	wc	A	Clay Lane	Devon
55	wc	A	Chudleigh Knighton	Devon
56	wc	I	Rixey Park	Devon
57	li	O	Meldon quarry	Devon
58	wc	I	Wolladon-Courtmoor Pit	Devon
59	wc	I	Meeth	Devon
60	wc	A	Marland	Devon
61	wc	A	Westbeare Quarry	Devon
62	qs	I	Warmwell	Dorset
63	wc	A	Trigon Hill Pit	Dorset
64	wc	A	Dorey's	Dorset
65	wc	I	Holme	Dorset
66	wc	A	Arne	Dorset
67	wc	A	Povington Heath	Dorset
68	wc	A	Furzeyground	Dorset
69	wc	A	Creech Meadow	Dorset
70	wc	A	Hawkpost	Dorset
71	rc	A	Swanage quarry	Dorset
72	rc	A	Knoll Manor quarry	Dorset
73	qs	A	Brickworth quarry	Wiltshire
74	rc	I	Shortwood quarry	Gloucestershire
75	rc	A	Cattybrook quarry	Gloucestershire
76	rc	A	Rushacre Farm Quarry	Pembrokeshire
77	rc	I	Hawkwell Green Quarry	Gloucestershire
78	rc	A	Wellacre quarry	Gloucestershire
79	rc	A	Michelmersh quarry	Hampshire
80	rc	I	Selborne quarry	Hampshire
81	rc	A	Lambs Pitsham	West Sussex
82	rc	I	Ashpark quarry	West Sussex
83	rc	I	Hobbs Copse quarry	West Sussex
84	rc	A	Ewhurst quarry	Surrey
85	rc	A	South Holmwood quarry	Surrey
86	rc	A	Brookhurst Wood quarry	West Sussex
87	rc	A	Laybrook quarry	West Sussex
88	rc	I	Small Dole	West Sussex
89	rc	I	Keymer	West Sussex
90	rc	A	West Hoathly quarry	West Sussex
91	rc	A	Freshfield Lane quarry	West Sussex
92	rc	A	Chailey quarry	East Sussex
93	rc	A	Ashdown quarry	East Sussex
94	rc	I	Crowborough quarry	East Sussex
95	rc	A	Lane Wood quarry	East Sussex
96	rc	A	Fourteen Acres quarry	East Sussex
97	rc	I	Warren Glen quarry	East Sussex
98	rc	I	Puckley quarry	Kent
99	rc	I	Elvington	Kent
100	rc	I	Eastry	Kent
101	rc	A	Hempstead House quarry	Kent
102	rc	I	Smeed Dean quarry	Kent
103	rc	I	Orchard Farm quarry	Kent
104	rc	I	Aylesford quarry	Kent
105	qs	A	Hermitage quarry	Kent
106	qs	A	Blaise Farm quarry	Kent
107	qs	A	Addington quarry	Kent
108	qs	A	Nepicar Farm quarry	Kent
109	rc	A	Bore Place	Kent
110	qs	A	North Park Extension	Surrey
111	rc	I	Meadham Farm quarry	Hertfordshire
112	rc	A	Bellingdon quarry	Buckinghamshire
113	rc	A	Curry quarry	Essex
114	rc	I	Marks Tey quarry	Essex
115	rc	A	Bulmer quarry	Essex
116	qs	A	Mundays Hill quarry*	Bedfordshire
117	qs	A	Reach Lane quarry*	Bedfordshire
118	qs	A	Bryant's Lane quarry*	Bedfordshire
119	qs	A	Churchways quarry*	Bedfordshire
120	rc	I	Wootton quarry	Northamptonshire

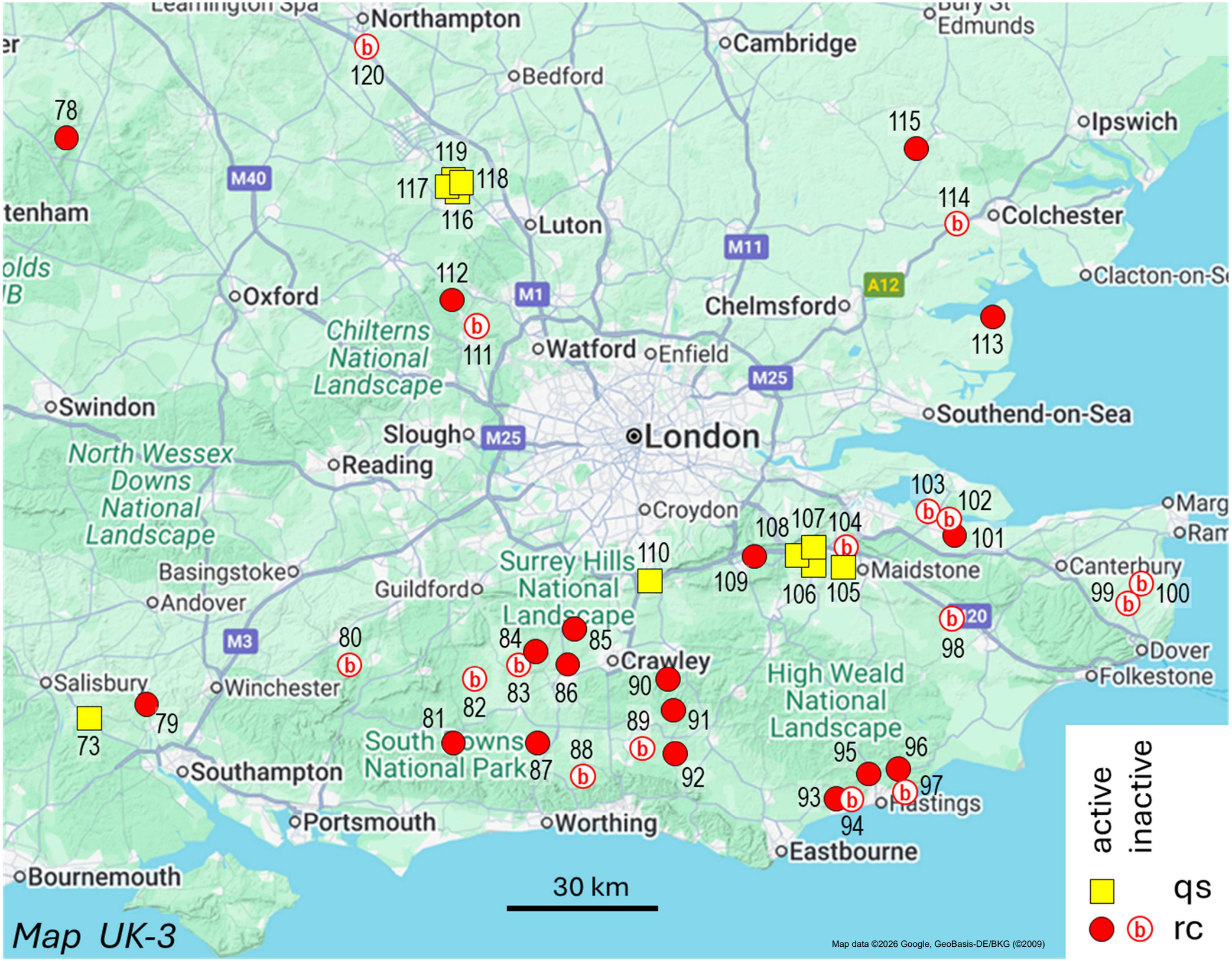
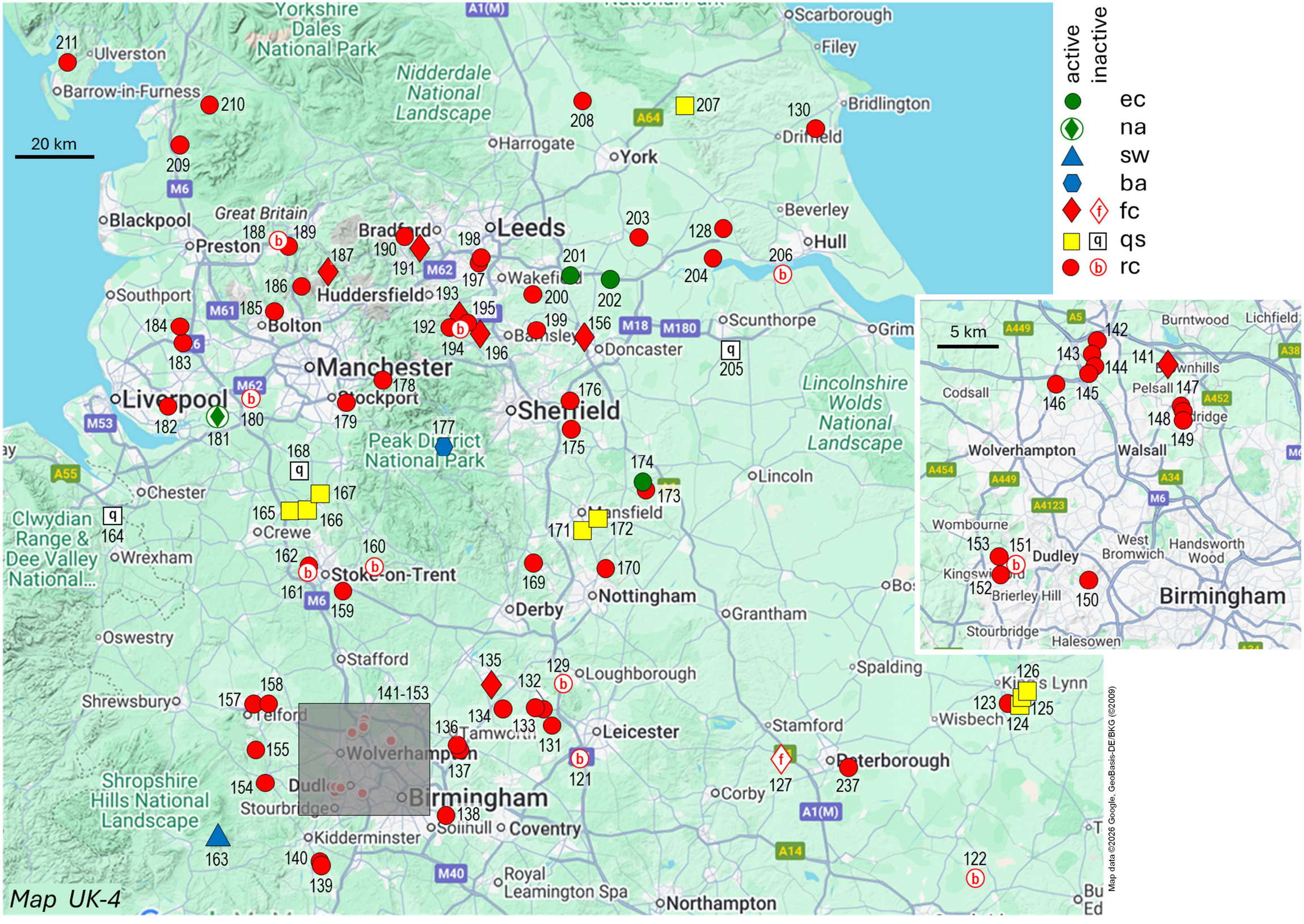
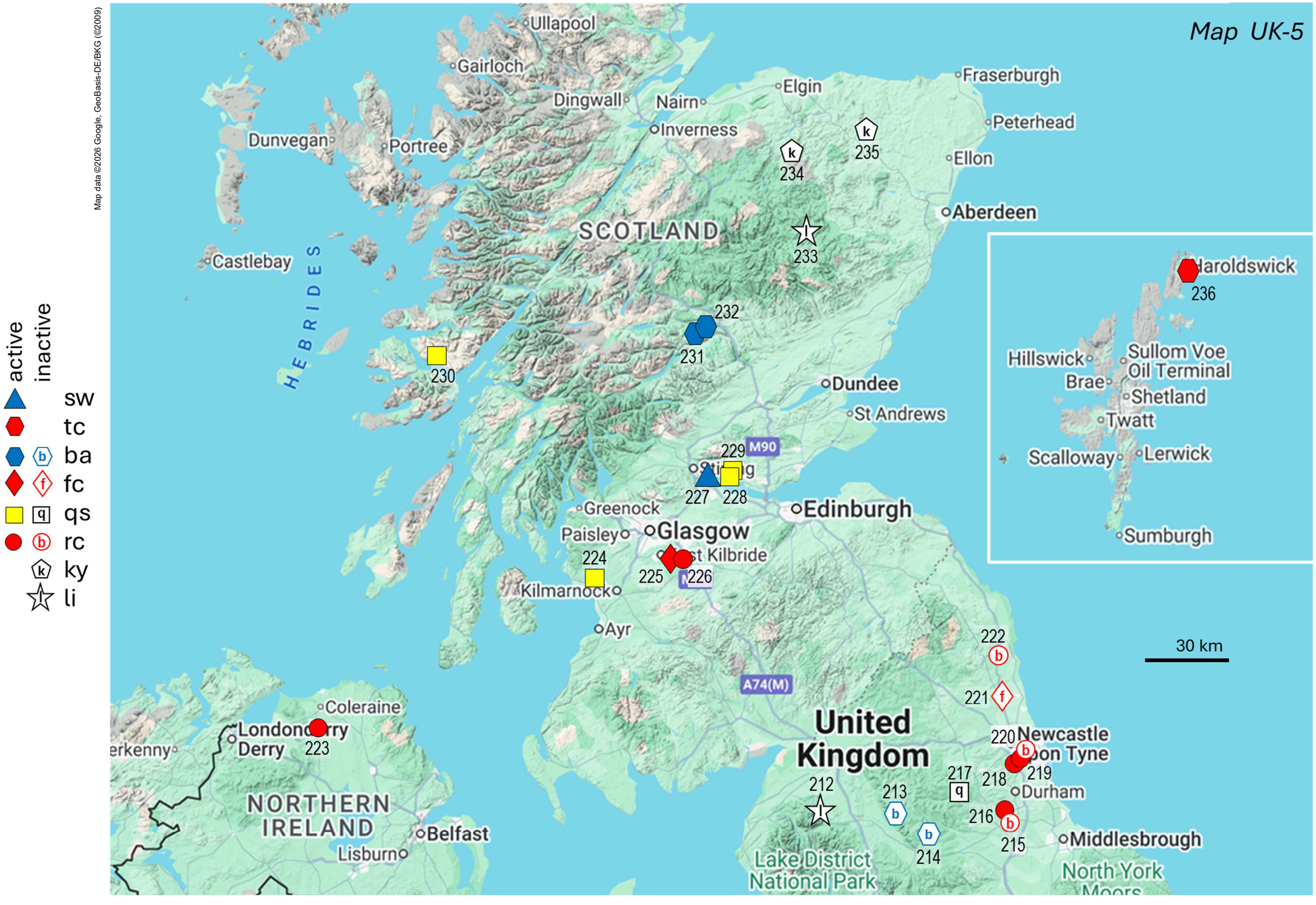

Northampton
Cambridge
Bedford
Ipswich
Luton
Colchester
Oxford
Chelmsford
Watford
Enfield
Swindon
Slough
London
Reading
Southend-on-Sea
Croydon
Maidstone
Canterbury
Basingstoke
Andover
Guildford
Crawley
Dover
Folkestone
Salisbury
Winchester
Southampton
Portsmouth
Worthing
Eastbourne
Bournemouth
Hastings
M40
M1
M11
A12
M25
M3
A20
Chilterns National Landscape
North Wessex Downs National Landscape
Surrey Hills National Landscape
South Downs National Park
High Weald National Landscape
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30 km
Map UK-3
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)
active
inactive
qs
rc

Table UK-b: deposits of raw materials for the ceramic and glass industries in the United Kingdom.

#	r.m.	st	deposit	county
121	rc	I	Littlethorpe	Leicestershire
122	rc	I	Burwell quarry	Cambridgeshire
123	rc	A	Setch road quarry	Norfolk
124	qs	A	Grandcourt	Norfolk
125	qs	A	East Winch quarry	Norfolk
126	qs	A	Leziate quarry	Norfolk
127	fc	I	Nassington	Northamptonshire
128	rc	A	North Cave	Hull and East Yorkshire
129	rc	I	Charnwood quarry	Leicestershire
130	rc	A	Gransmoor quarry	Hull and East Yorkshire
131	rc	A	Desford quarry	Leicestershire
132	rc	A	Ellistown quarry	Leicestershire
133	rc	A	Ibstock quarry	Leicestershire
134	rc	A	Measham quarry	Leicestershire
135	fc	A	Donington Island	Leicestershire
136	rc	A	Kingsbury quarry	Warwickshire
137	rc	A	Wilnecote quarry	Staffordshire
138	rc	A	Packington quarry	West Midlands
139	rc	A	Waresley quarry	Worcestershire
140	rc	A	New House Farm quarry	Worcestershire
141	fc	A	Birch Coppice stockpile	West Midlands
142	rc	A	Campians quarry	Staffordshire
143	rc	A	Campions Wood quarry	Staffordshire
144	rc	A	Redhurst quarry	Staffordshire
145	rc	A	Hollybank quarry	Staffordshire
146	rc	I	Windmill quarry	Staffordshire
147	rc	A	Highfield South quarry	West Midlands
148	rc	A	Sandown quarry	West Midlands
149	rc	A	Atlas quarry	West Midlands
150	rc	A	Edwin Richards quarry	West Midlands
151	rc	I	Tansey Green quarry	West Midlands
152	rc	A	Ketley quarry	West Midlands
153	rc	A	Stallings Lane quarry	West Midlands
154	rc	A	Knowlesands quarry	Shropshire
155	rc	A	Caughley	Shropshire
156	fc	A	Hazel Lane quarry	South Yorkshire
157	rc	A	Blockleys quarry	Shropshire
158	rc	A	Donnington quarry	Shropshire
159	rc	A	Cophurst quarry	Staffordshire
160	rc	I	Kingsley quarry	Staffordshire
161	rc	I	Keele quarry	Staffordshire
162	rc	A	Knutton quarry	Staffordshire
163	sw	A	Clee Hill quarry	Shropshire
164	qs	I	Sandy Lane Farm quarry	Flintshire
165	qs	A	Arclid quarry	Cheshire
166	qs	A	Bent Farm quarry	Cheshire
167	qs	A	Eaton Hall quarry	Cheshire
168	qs	I	Dingle Bank quarry	Cheshire
169	rc	A	Waingroves quarry	Derbyshire
170	rc	A	Dorkett quarry	Nottinghamshire
171	qs	A	Two Oaks quarry	Nottinghamshire
172	qs	A	Ratcher Hill	Nottinghamshire
173	rc	A	Kirton quarry	Nottinghamshire
174	ec	A	Boughton	Nottinghamshire
175	rc	A	South Anston	South Yorkshire
176	rc	A	Maltby quarry	South Yorkshire
177	ba	A	Milldam Mine	Derbyshire
178	rc	A	Mouselow quarry	Derbyshire
179	rc	A	Offerton quarry	Greater Manchester
180	rc	I	Rixton quarry	Liverpool
181	na	A	Winnington	Liverpool
182	rc	A	Cronton quarry	Liverpool
183	rc	A	Ravenhead quarry	Lancashire
184	rc	A	Dalton quarry	Lancashire
185	rc	A	Harwood quarry	Greater Manchester
186	rc	A	Scout Moor quarry	Lancashire
187	fc	A	Tong Farm quarry	Lancashire
188	rc	I	Whinney Hill quarry	Lancashire
189	rc	A	Huncoat quarry	Lancashire
190	rc	A	Far Shay Clay Pit	West Yorkshire
191	fc	A	Spaniard Hall quarry	West Yorkshire
192	rc	A	Appleton quarry	West Yorkshire
193	fc-rc	A	Peace Wood quarry	West Yorkshire
194	fc-rc	I	Bromleys quarry	West Yorkshire
195	rc	A	Henperch quarry	West Yorkshire
196	fc-rc	A	Bankswood Quarry	South Yorkshire
197	rc	A	Britannia quarry	West Yorkshire
198	rc	A	Howley Park quarry	West Yorkshire
199	rc	A	Carlton Main quarry	South Yorkshire
200	rc	A	Nostell quarry	West Yorkshire
201	ec	A	Knottingley	West Yorkshire
202	ec	A	Goole	North Yorkshire
203	rc	A	Hemingbrough quarry	North Yorkshire
204	rc	A	Bloomfleet	East Yorkshire
205	qs	I	Messingham quarry	Lincolnshire
206	rc	I	Pasture Road North quarry	Lincolnshire
207	qs	A	Burythorpe quarry	North Yorkshire
208	rc	A	Alne quarry	North Yorkshire
209	rc	A	Ellel Crag quarry	Lancashire
210	rc	A	Claughton Moor quarry	Lancashire
211	rc	A	High Greenscow quarry	Cumbria
212	Li	O	Carrock Fell	Cumbria
213	ba	I	Silverband	Westmoreland-Furness
214	ba	I	Closehouse	Durham
215	rc	I	Eldon quarry	Durham
216	rc	A	Todhills quarry	Durham
217	qs	I	Wheatherhill	Durham
218	rc	A	Birtley quarry	Durham
219	rc	A	Springwell quarry	Tyne and Wear
220	rc	I	Red Barns quarry	Tyne and Wear
221	fc	I	Morpeth	Northumberland
222	rc	I	Former Whittle quarry	Tyne and Wear
223	rc	A	Blackhill	Londonderry
224	qs	A	Hullerhill quarry	North Ayrshire
225	fc	A	Edge Farm stockpile	Lanarkshire
226	rc	A	Carscallan quarry	Lanarkshire
227	sw	A	Cowie	Stirling
229	qs	A	Devilla quarry	Fife
228	qs	A	Burrowine Moor quarry	Fife
230	qs	A	Lochaline Mine	Highland
231	ba	A	Foss Mine	Perth-Kinross
232	ba	A	Duntanlich Mine	Perth-Kinross
233	li	O	Glen Buchat-Glen Gairn	Scotland
234	ky	I	Moray-Dufftown	Aberdeenshire
235	ky	I	Knightmill-Huntly	Aberdeenshire
236	tc	A	Crossgeo quarry	Shetland
237	rc	A	Whittlesey quarry	Cambridgeshire


active
inactive
ec
na
sw
ba
fc
qs
rc
20 km
5 km
Map UK-4
Yorkshire Dales National Park
Nidderdale National Landscape
Lincolnshire Wolds National Landscape
Peak District National Park
Clwydian Range & Dee Valley National...
Shropshire Hills National Landscape
Great Britain
Scarborough
Filey
Bridlington
Driffield
Harrogate
York
Beverley
Hull
Leeds
Bradford
Huddersfield
Wakefield
Barnsley
Doncaster
Scunthorpe
Grimsby
Manchester
Liverpool
Stockport
Sheffield
Chesterfield
Mansfield
Lincoln
Nottingham
Derby
Grantham
Chester
Wrexham
Crewe
Stoke-on-Trent
Oswestry
Stafford
Shrewsbury
Telford
Wolverhampton
Dudley
Stourbridge
Kidderminster
Birmingham
Solihull
Coventry
Leicester
Loughborough
Tamworth
Spalding
Stamford
Peterborough
Corby
Kings Lynn
Wisbech
Lichfield
Burntwood
Pelsall
Codsall
Wolverhampton
Walsall
Wombourne
Dudley
Brierley Hill
West Bromwich
Handsworth Wood
Birmingham
Stourbridge
Halesowen
Royal Leamington Spa
Northampton
Ulverston
Barrow-in-Furness
Preston
Blackpool
Southport
Bolton
Warrington
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A14
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Map UK-5
Map data ©2026 Google, GeoBasis-DE/BKG (©2009)
active
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Ullapool
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Dingwall
Nairn
Elgin
Fraserburgh
Peterhead
Inverness
Dunvegan
Portree
Ellon
Aberdeen
SCOTLAND
HEBRIDES
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Haroldswick
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Hillswick
Sullom Voe
Oil Terminal
Brae
Shetland
Twatt
Scalloway
Lerwick
Sumburgh
Dundee
St Andrews
Edinburgh
Greenock
Paisley
Glasgow
Kilmarnock
Ayr
Coleraine
Londonderry
Derry
NORTHERN
IRELAND
Belfast
Lisburn
United
Kingdom
Newcastle
upon Tyne
Durham
Middlesbrough
Lake District
National Park
North York
Moors
M90
A74(M)
30 km
230
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Raw Materials Profiles

Barite
Celestine
Borates
Lithium minerals
Bauxite and alumina
Bentonite
Chromite
Olivine
Pyrophyllite
Wollastonite
Feldspar and nepheline syenite
Kaolin
Magnesite and huntite
Perlite
Quartzous materials
Red clays
Soda ash
Talc
White clays
Zeolites
Zirconium minerals
Kyanite-andalusite-sillimanite



Barite (Barium minerals)

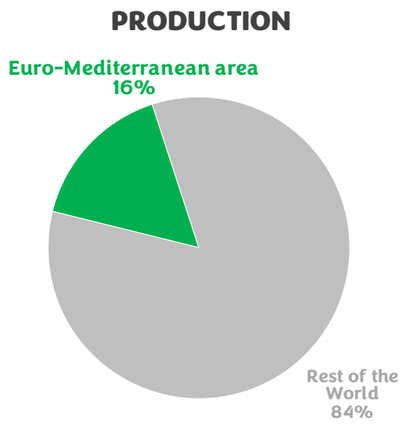
Barite is not directly used by the glass and ceramic industries, which employ $BaCO_3$ as raw material. Barium carbonate is primarily utilized in glazes and frits for ceramic tiles and whiteware, and secondarily in special glasses and as additive in technical ceramics and to prevent efflorescence in heavy-clay products. Ceramic end-users need globally around 110,000 tpa of $BaCO_3$ [1]. All these uses account for approximately 2% of the barium minerals mined worldwide and constitute a significant portion of barite processed for chemicals. This implies that the ceramics and glass industries do not directly depend on the barite supply chain, but rather on companies that transform $BaSO_4$ into $BaCO_3$ [2].

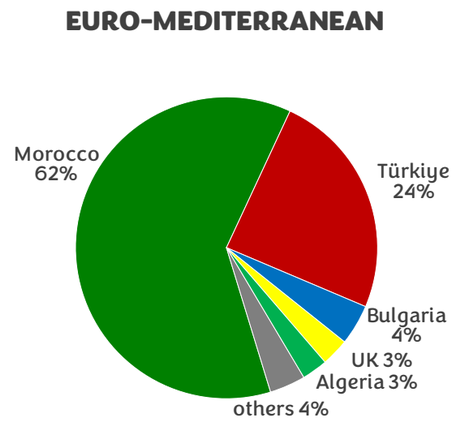
Barite production is on average 1.4 million tpa in the Euro-Mediterranean area and is realized in a dozen countries, with a slowly declining trend over the last decade. This corresponds to approximately 16% of global barite production [3]. The major suppliers are Morocco and Türkiye, ensuring together 86% of the Euro-Mediterranean output, with minor contributions from Bulgaria, the United Kingdom, Algeria, Germany, Tunisia, Slovakia and Egypt.

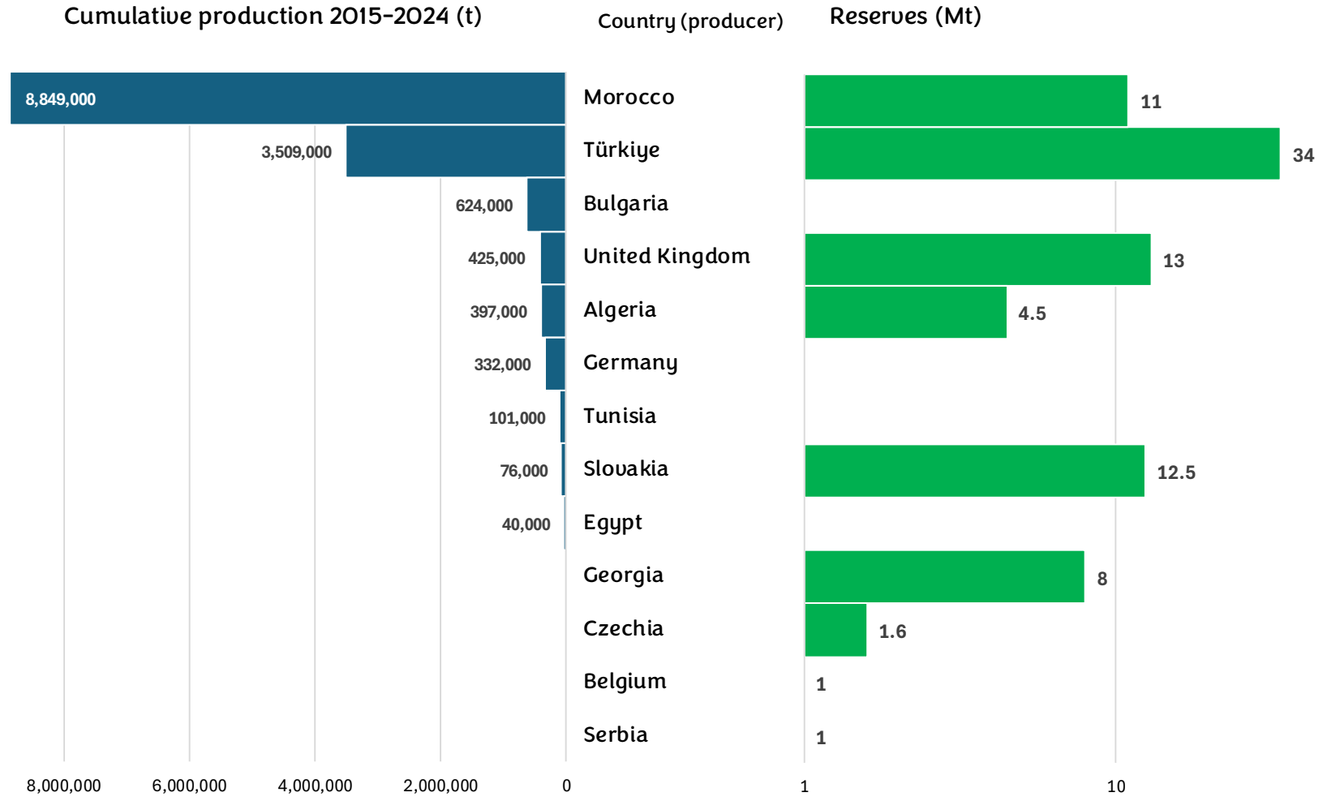
Apart from Morocco, whose estimates date back to 2002 [4], the barite reserves in the remaining Euro-Mediterranean countries can assure the current level of production for several decades.

Barite deposits are reported in many Euro-Mediterranean countries and can be related to a wide range of model deposits [5-7], such as those related to carbonatites (33a E) in Türkiye; residual and karst-related barite (Pb-Zn) deposits (33a H) in Morocco and Italy; stratabound deposits in siliceous rocks (33ab J) in Scotland and Türkiye; diapir-related barite-celestine deposits in Tunisia (33f KL); carbonate-hosted Ba-polymetallic mineralizations (33abc K) in Bulgaria, Germany, Slovakia, Serbia and Ireland; thrustbound veins and replacement deposits (33e G) in England and Algeria.









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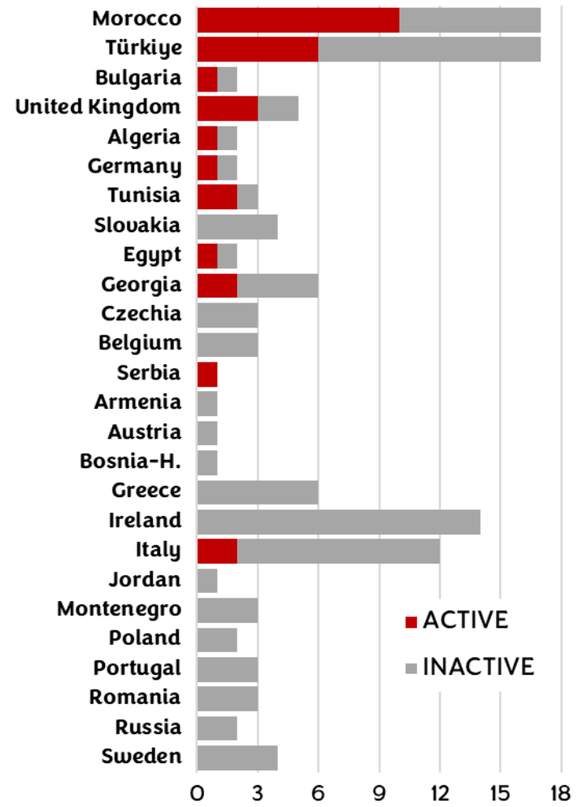
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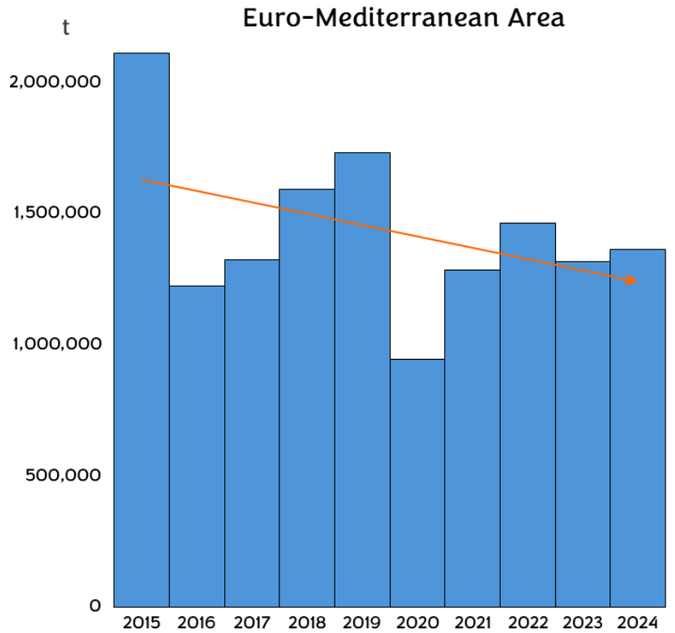
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Number of deposits



Euro-Mediterranean Area



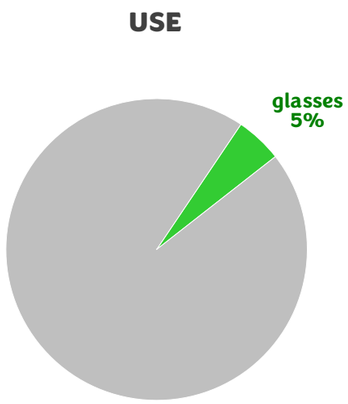
Celestine (Strontium minerals)

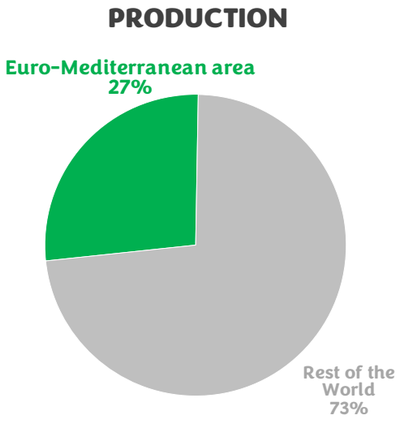
Strontium minerals are utilized by the glass and ceramics industry, essentially in the form of carbonate, to manufacture frits, glazes and glassy coatings for ceramic tiles, with minor use for technical ceramics and special glasses [1,2]. As for barite, these sectors do not directly depend on the celestine supply chain, but rather on companies converting $SrSO_4$ into $SrCO_3$ [1]. The global demand from the ceramic tile sector has been estimated to be approximately 6,500 tpa of $SrCO_3$ [2]. Overall, strontium carbonate consumption by the glass and ceramics industry is about 5% of the total demand of strontium minerals.

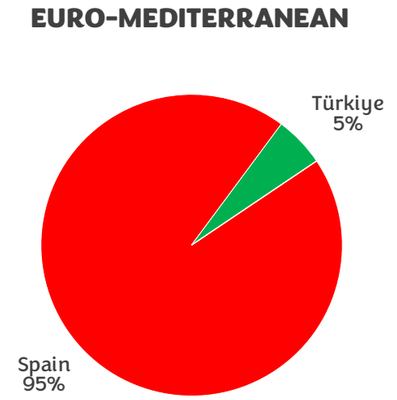
Celestine production in the Euro-Mediterranean area is 137,000 tpa on average, which corresponds to over a quarter of the global output. The trend over the last decade was clearly increasing until 2022, reaching nearly 250,000 tpa, before falling sharply below one hundred thousand tonnes in 2024. In the Euro-Mediterranean area, production of strontium minerals is carried out almost entirely in Spain, with a minor contribution from Turkish (and perhaps Algerian) mines.

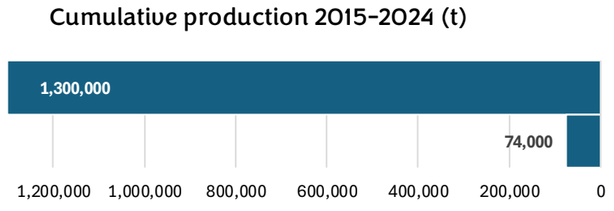
Occurrences of celestine are claimed in several countries, but information on the size of deposits is generally lacking or dates far back in time. The declared reserves of Spanish deposits will last for a dozen years at the most recent rate of extraction, while Turkish reserves are two orders of magnitude greater than current celestine production.

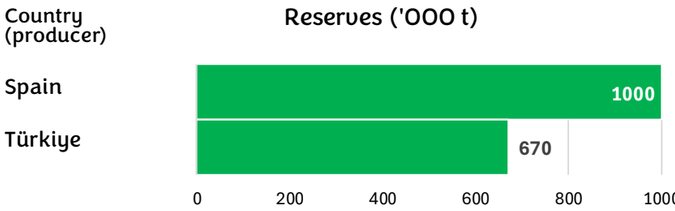
Strontium minerals can form economically significant deposits in a wide range of genetic environments [3-5]. In the Euro-Mediterranean area, the most important are epigenetic celestine replacement deposits in porous (reefal) limestones (type 34c K) occurring in Spain, Türkiye, and Cyprus. Others are diapir-related barite-celestine deposits (34b KL) also associated to Mississippi Valley deposits in platform carbonates (34a K), as those in Tunisia and Egypt. Stratiform celestine-gypsum occurrences in evaporitic calcareous series (34d KL) are reported in Poland, Greece and Romania. Hydrothermal vein-type barite deposit enriched in Sr (34a G) is known in Italy.

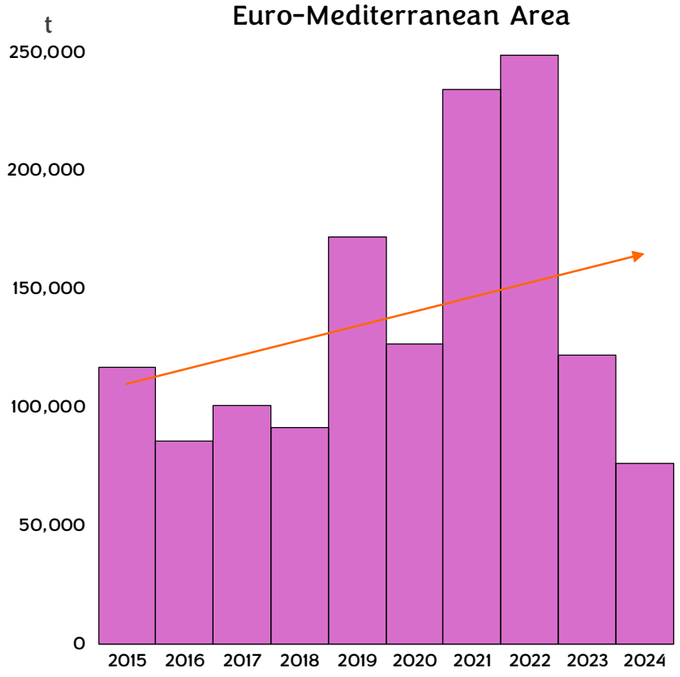


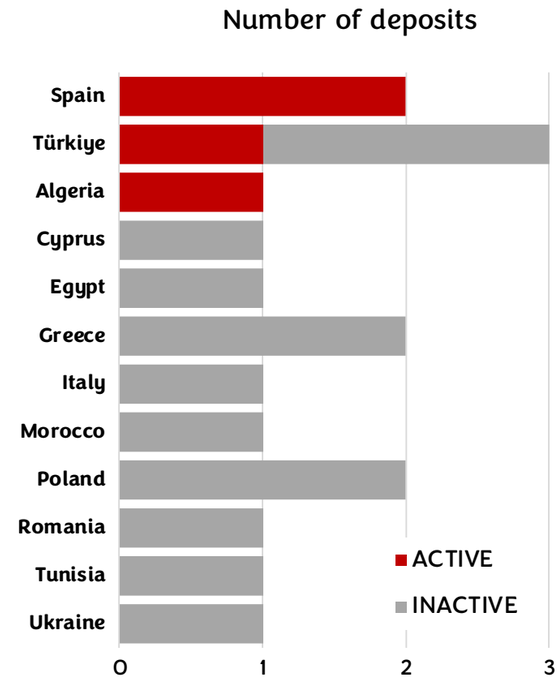












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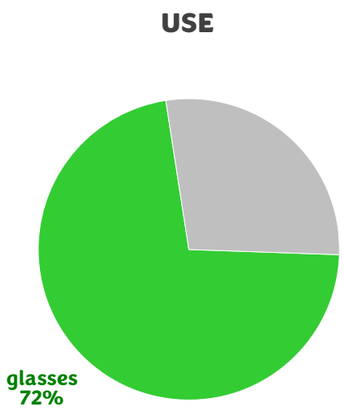
Borates (Boron minerals)

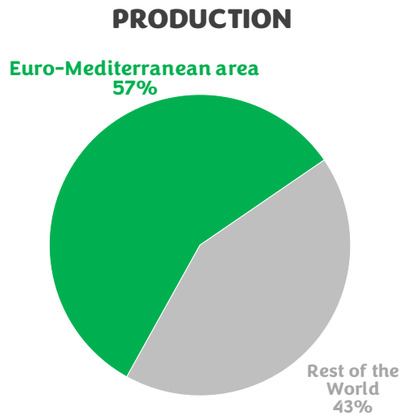
Borates are mainly utilized in the manufacture of special glasses, namely borosilicate glass and ceramic frits, along with glazes and technical ceramics [1,2]. The glass industries absorb about two thirds of the total demand for boron compounds, while approximately 250,000 tpa (6% of global output) are used for glazes and glassy coatings, mostly by the ceramic tile industry [2].

Türkiye is not only the unique country in the Euro-Mediterranean area that currently mine borates, but also the major player at the global level, extracting more than half of the world production [3] and holding the largest reserves (950 million tonnes of refined borates). Over the last decade, Turkish production has progressively increased to over 10 million tpa (2019) before gradually declining (on average 6.6 million tpa).

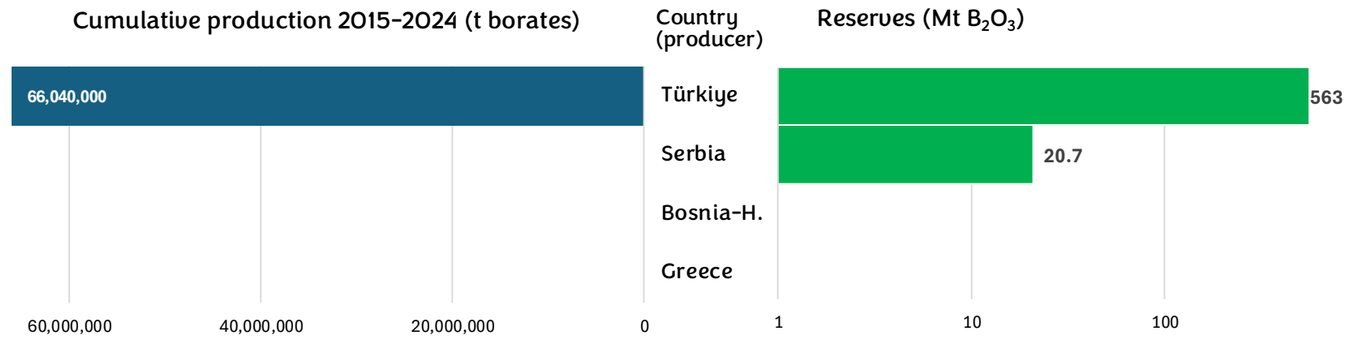
The Turkish borate deposits were formed in Cenozoic lacustrine sediments, intercalated with products of volcanic activity and evaporites. Besides some differences from one deposit to another, levels with borates are interbedded with a range of sediments, such as conglomerate, sandstone, tuff, clay, marl and limestone [3-5]. The environment of formation is represented by playa lakes, under arid or semi-arid climatic conditions [3-6]: borate deposits are mostly of the lacustrine-syn(dia)genetic type (30c J) which sometimes include lithium-bearing minerals (e.g., hectorite). Other borate occurrences, reported in Serbia, Bosnia-Herzegovina, and Greece, pertain to the volcano-sedimentary type (30e J) where boron-bearing minerals (such as jadarite) formed during evaporitic episodes [3,4].

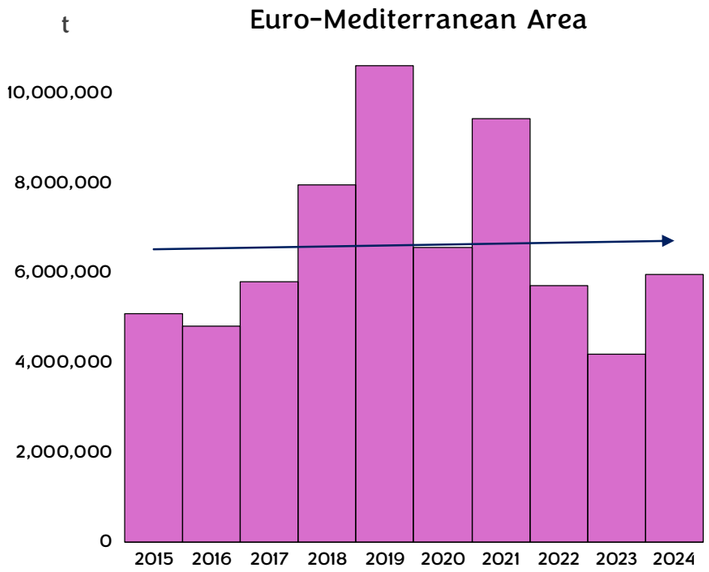
Minerals that are currently the target of mining activity are sodic borates (borax, tincalconite, kernite), calcic borates (colemanite, priceite) and mixed Na-Ca compounds (ulexite, probertite).

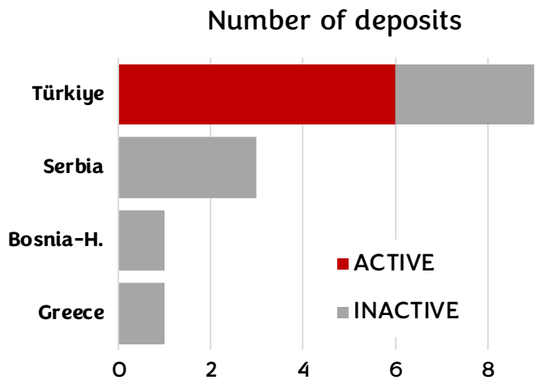












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Lithium minerals

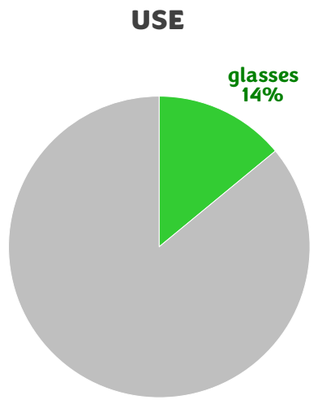
The main use of lithium minerals has been for a long time in the manufacture of glass and ceramics, but the ecological transition is profoundly changing industrial demand, both in quantity and end-users [1]. Lithium compounds are currently utilized mainly in special glasses, with a share around 14% of the total consumption, of which the estimated demand from glass-ceramics and glazes is globally of 12,500 tpa Li [2]. However, in this rapidly changing scenario, percentages can vary even in short times.

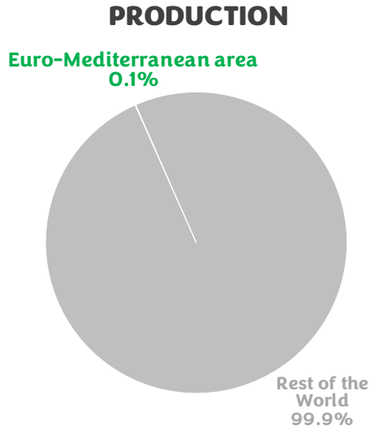
The production in the Euro-Mediterranean area has been fluctuating in the last decade, reaching at maximum 900 tpa Li. This is a tiny fraction of the global output, as the only reported extraction of lithium minerals is in Portugal. Some mines in Ukraine, Sweden and Russia, which are officially in operation, appear to be still non-productive.

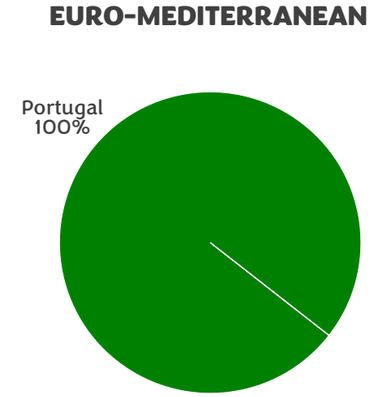
Most lithium occurrences in the Euro-Mediterranean area are related to pegmatitic deposits (type 15a D, according to Dill [3]) as residual melts of granite magmatism, particularly rare-metal granites, both S-type and I-type, or direct products of anatexis [4]. The main target is represented by spodumene and lepidolite, even though individual orebodies can host also petalite, Li-phosphates, and eucryptite in economically significant concentrations [4,5]. These deposits are classified as LCT (Lithium-Cesium-Tantalum) pegmatites [6] or group-1 pegmatites [7] and were put in place in a wide range of time, from Archean to Neogene [4].

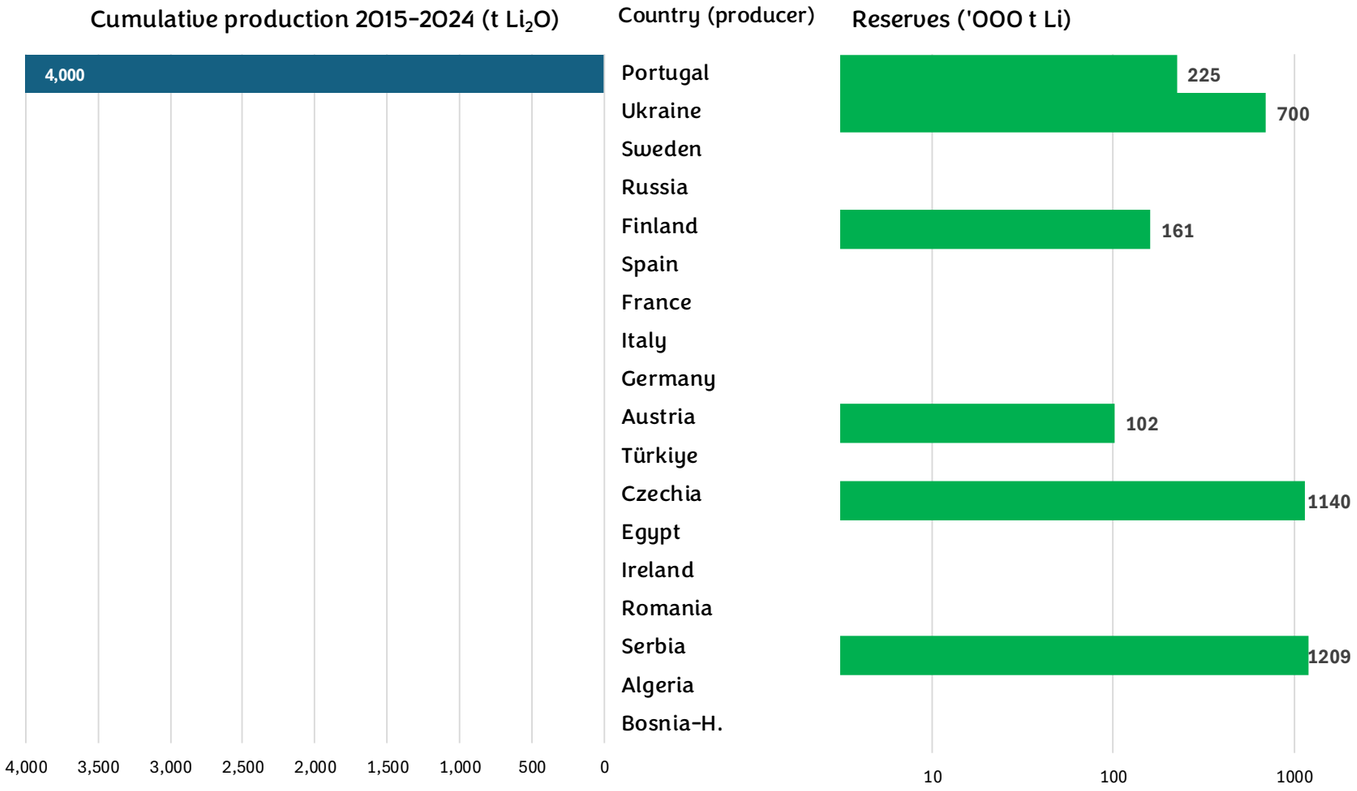
The major source of lithium at the global level – i.e. brine deposits and salars (type 15a L) – has no equivalent in the Euro-Mediterranean area, bur remarkable Li resources have been identified in greisenized granites (Czechia, Germany, France, England, and Spain) and especially in unusual volcano-sedimentary deposits, like the Jadar Neogene basin in Serbia (with known occurrences also in Bosnia, Greece and Türkiye) where lithium-bearing minerals (jadarite and hectorite) formed in evaporitic levels [5,8].

Declared reserves are important in the Czech Republic and Ukraine, and significant in Portugal, Finland and Austria, as are probably those in Germany, Sweden, France and Spain [9,10]. The vast majority of these resources are pegmatites and rare-metal granites, but large reserves have been assessed for volcano-sedimentary deposits in Serbia (and under evaluation in Türkiye).









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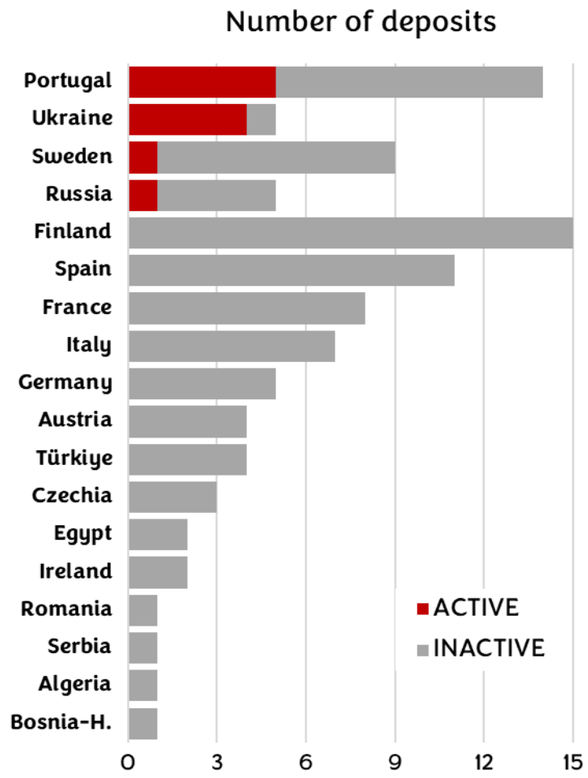
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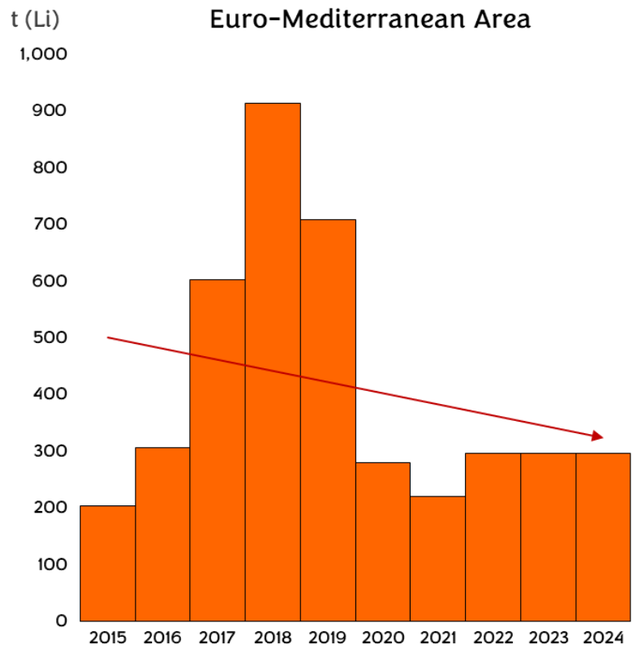
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Lithium minerals
active
inactive
Borates
active
inactive
Sweden
Norway
Finland
Oslo
Stockholm
Baltic Sea
Estonia
St Petersburg
Санкт-Петербург
North Sea
Latvia
Lithuania
Denmark
United Kingdom
Ireland
Moscow
Москва
Netherlands
Berlin
Poland
Warsaw
Belarus
London
Germany
Belgium
Czechia
Paris
Slovakia
Ukraine
Kyiv
Київ
Austria
Hungary
Moldova
France
Romania
Croatia
Serbia
Marseille
Italy
Rome
Black Sea
Georgia
Bulgaria
Barcelona
Istanbul
Azerbaijan
Portugal
Spain
Lisbon
Tyrrhenian Sea
Greece
Ankara
Türkiye
Athens
Αθήνα
Algiers
مدينة الجزائر
Tunis
تونس
Syria
Lebanon
Tunisia
Mediterranean Sea
Iraq
Morocco
Israel
Jordan
Cairo
القاهرة
Algeria
Libya
Egypt
Western Sahara
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Number of deposits
Portugal
Ukraine
Sweden
Russia
Finland
Spain
France
Italy
Germany
Austria
Türkiye
Czechia
Egypt
Ireland
Romania
Serbia
Algeria
Bosnia-H.
ACTIVE
INACTIVE
0
3
6
9
12
15


t (Li)
Euro-Mediterranean Area
1,000
900
800
700
600
500
400
300
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2015
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Bauxite (and alumina)

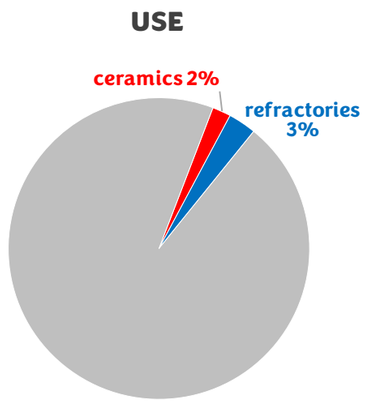
The ceramic industry utilizes bauxite either directly (after calcination) or converted to alumina. Calcined bauxite is predominantly employed in the manufacture of refractories, abrasives, and proppant materials, but these applications only constitute a small portion of its use in the production of aluminium and alumina [1].

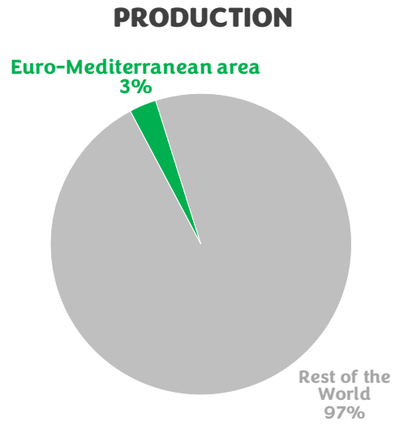
An average of 11.4 million tons of bauxite is extracted annually in the Euro-Mediterranean area, with a steady rise in the trend over the past decade (mean +400,000 tonnes yearly). However, this value corresponds to only a small part of global production. The major players are Russia, Türkiye, Greece, Bosnia-Herzegovina, and Montenegro, which account together for almost the entire Euro-Mediterranean production.

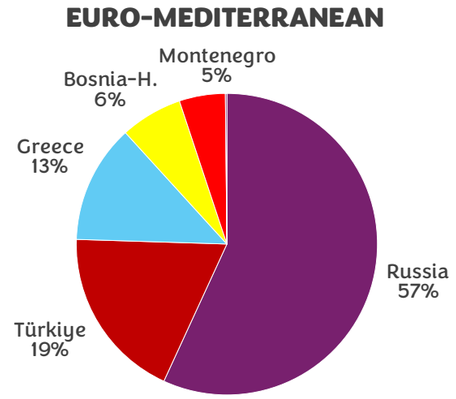
Bauxite reserves appear to ensure the current rate of extraction for several decades, at least for Russia, Türkiye, and Montenegro. Other countries have claimed significant reserves (Belarus, Ukraine) but these deposits are situated at a considerable depth below the surface and the cost-effectiveness of their excavation has yet to be determined.

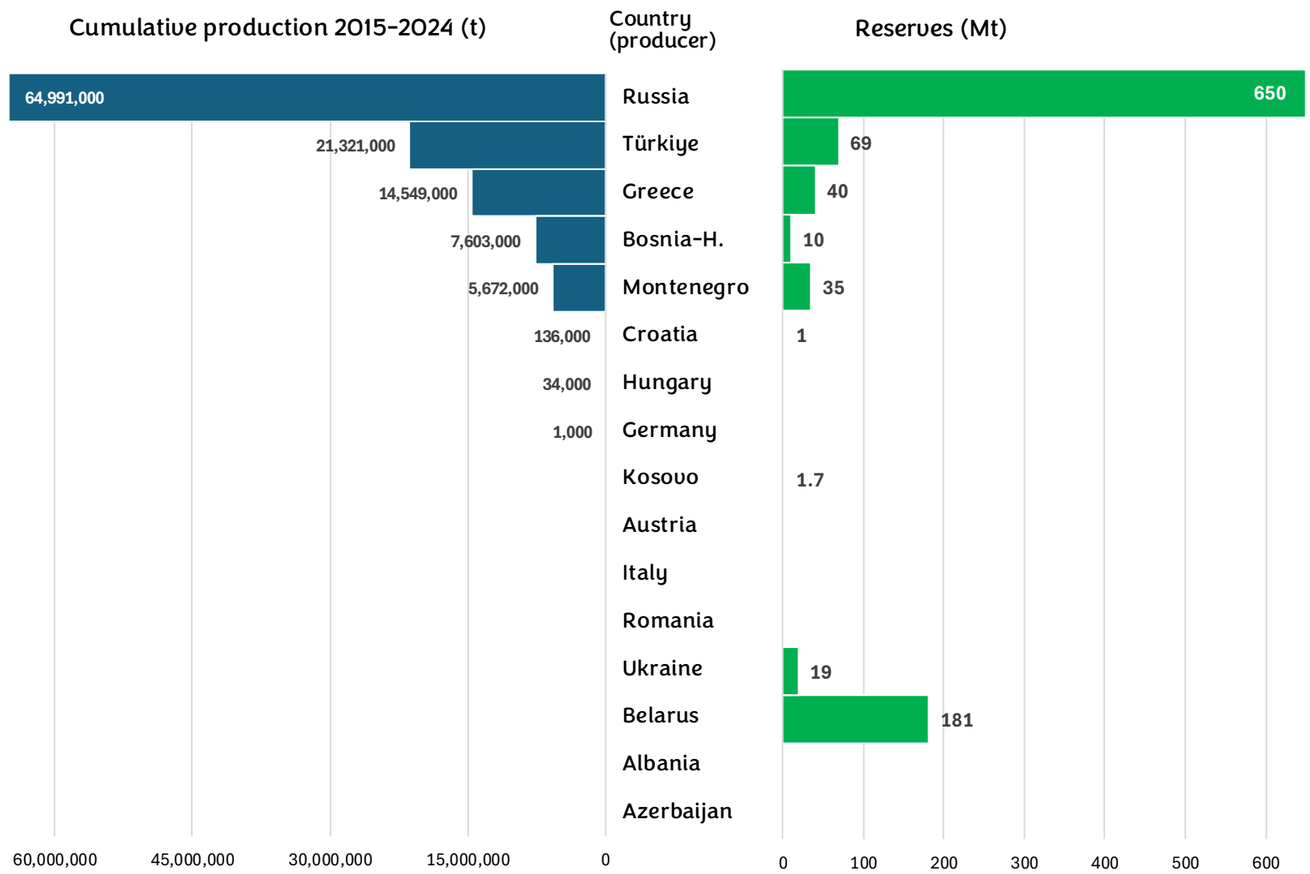
Most deposits in the Euro-Mediterranean area are karst bauxites, i.e. pocket-type, 27a H, according to Dill [2]. A long period of bauxitization has occurred in the Balkan province, extending from Triassic to Oligocene. Almost all bauxite mines in Türkiye, Greece, Bosnia-Herzegovina, Montenegro, Hungary, and Croatia operate on Late Jurassic-Cretaceous deposits, only in few cases on Eocene bauxites [3-5]. Triassic and Early-Middle Jurassic deposits are no longer exploited. On the contrary, karst bauxites in the Uralian province are Paleozoic in age [3-5]. In addition, Paleozoic laterite-type bauxites (type 27b H) are mined in Northern Russia [4,5].

Alumina is 90% destined for the production of aluminium metal and the remainder for technical ceramics and refractories. Production in the Euro-Mediterranean area is carried out in a dozen countries (over 20 plants) and stands at around 10 million tpa on average, which corresponds to about 6% of world output, even though the trend began to decline since 2022. Major producers are Ireland, Spain, Ukraine, Germany, France and Greece, along with Russia. Further contributions come from Azerbaijan, Bosnia-Herzegovina, Hungary, Italy, Romania and Türkiye.









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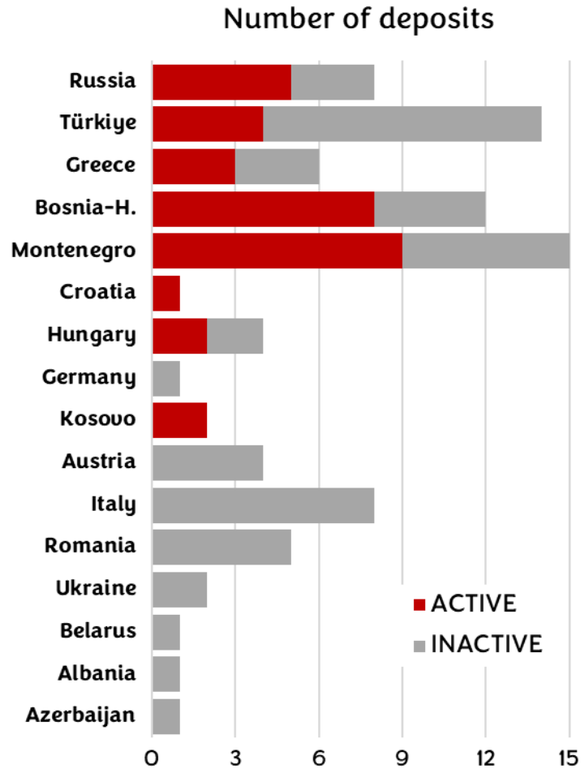
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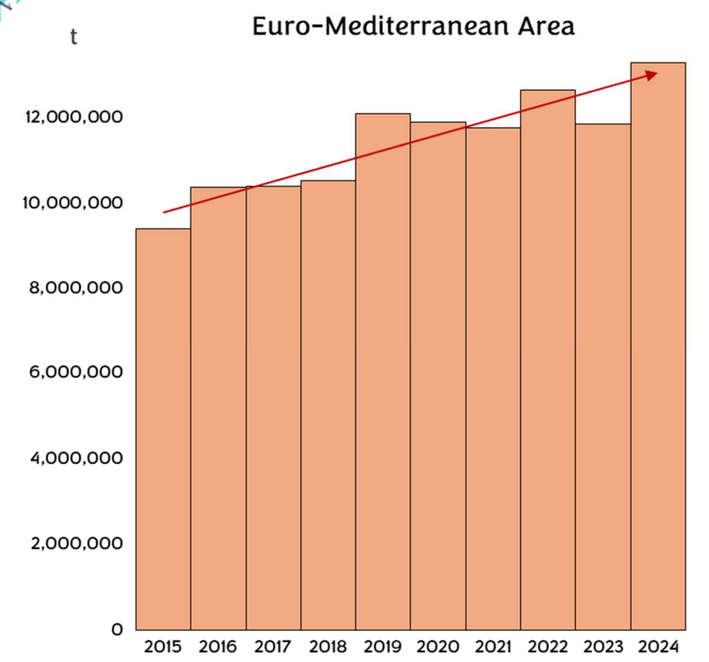
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Bauxite
active
inactive
Alumina
active
Sweden
Norway
Finland
Oslo
Stockholm
Baltic Sea
St Petersburg
Санкт-Петербург
Estonia
Latvia
Lithuania
North Sea
Denmark
United Kingdom
Ireland
Netherlands
Berlin
Poland
Belarus
Warsaw
London
Germany
Belgium
Paris
Czechia
Slovakia
Ukraine
Kyiv
Київ
Moscow
Москва
Kazan
Казань
Yekaterinburg
Екатеринбург
Austria
Hungary
Moldova
France
Romania
Croatia
Serbia
Marseille
Italy
Rome
Black Sea
Bulgaria
Georgia
Azerbaijan
Portugal
Barcelona
Spain
Lisbon
Tyrrhenian Sea
Istanbul
Ankara
Türkiye
Greece
Athens
Αθήνα
Algiers
مدينة الجزائر
Tunis
تونس
Tunisia
Mediterranean Sea
Syria
Lebanon
Iraq
Morocco
Israel
Jordan
Cairo
القاهرة
Algeria
Libya
Egypt
Google My Maps
Map data ©2026 Google, TMap Mobilitų


Number of deposits
Russia
Türkiye
Greece
Bosnia-H.
Montenegro
Croatia
Hungary
Germany
Kosovo
Austria
Italy
Romania
Ukraine
Belarus
Albania
Azerbaijan
ACTIVE
INACTIVE
0
3
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9
12
15


Euro-Mediterranean Area
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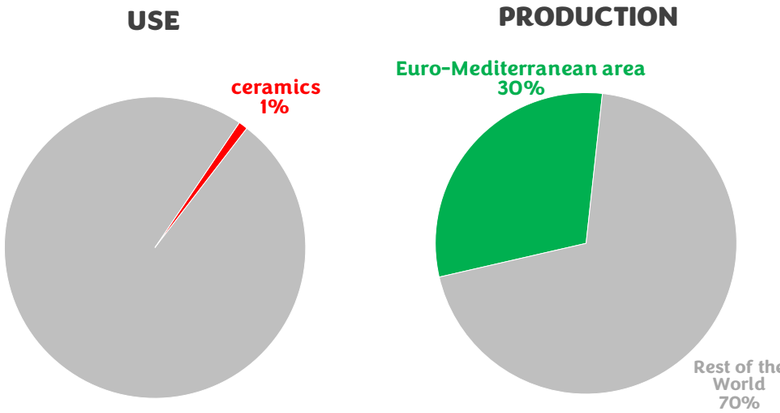
Bentonite

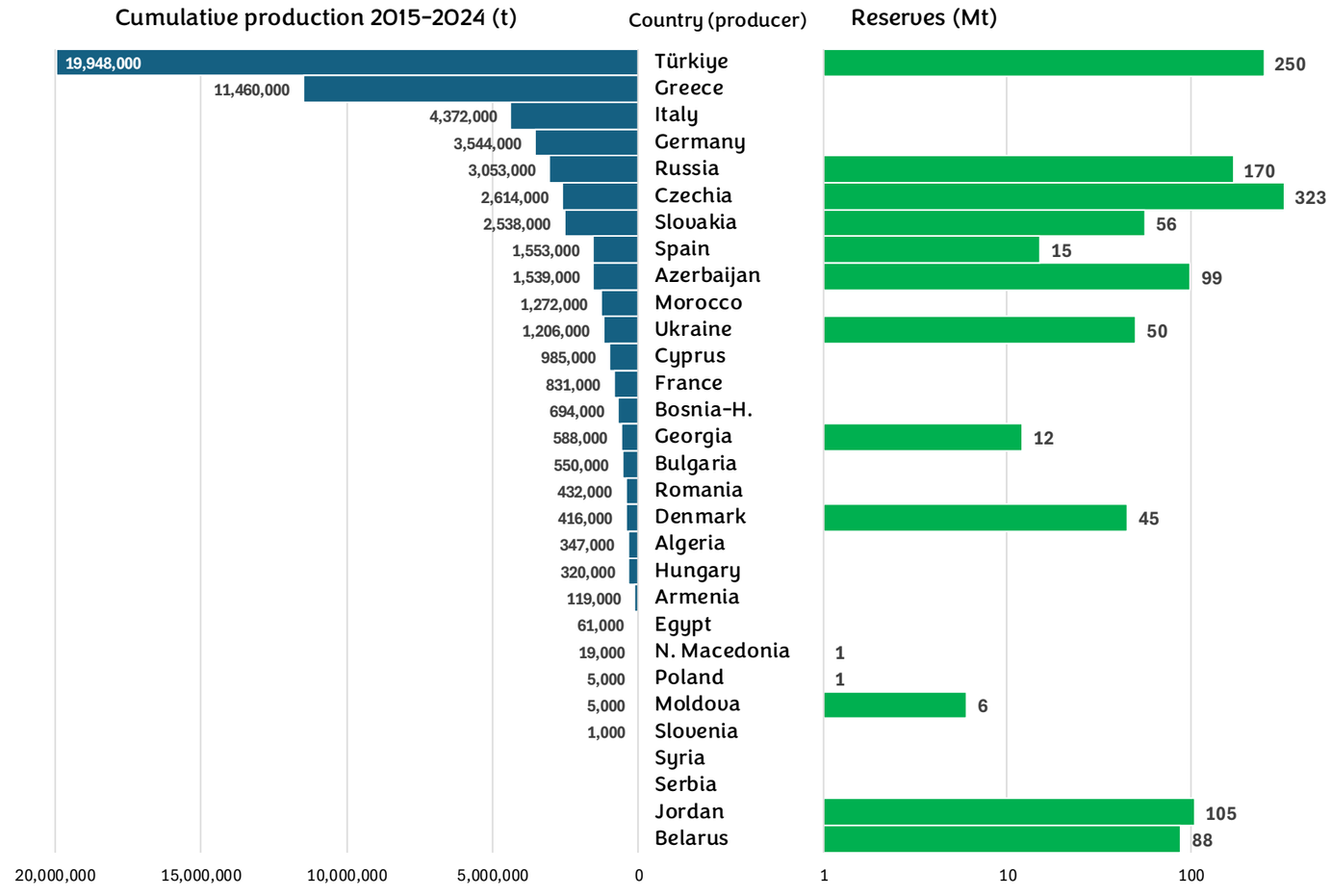
Bentonite has a myriad of uses, including ceramics, which however represent a minimal slice of the applications pie [1,2]. Nevertheless, smectite-rich clays are a sort of “ghost raw material”, which is often used in ceramic formulations for wall and floor tiles, silicate refractories, and heavy-clay products, but rarely declared. The primary function of bentonite is to act as a corrective, compensating for the poor performance of other clays [3]. The bentonite percentages used are generally low, representing a technological compromise between benefits (increased plasticity and mechanical resistance of unfired bodies) and drawbacks (worsening of slip rheology and drying sensitivity). Demand from the ceramic industry has focused in particular on white bentonites, which are able to partially replace kaolin, refractory clay, and ball clay without undesirable effects on the colour after firing.

The production of bentonite in the Euro-Mediterranean area is approximately 5.8 million tpa on average, which corresponds to 30% of the global output. The extraction of bentonite, carried out by over 130 mines in 30 countries, has remained rather constant over the last decade, apart from a peak in 2015 and the 2020 downturn due to the lockdown. Major producers are Türkiye, Greece, Italy, Germany and Russia, which together supply over 70% of the Euro-Mediterranean output.

Declared reserves are enough to assure the current rate of bentonite extraction for at least a century. However, data are missing for some key suppliers, such as Greece, Italy, Germany and Morocco, among others.

Bentonite deposits were formed mainly from alteration of pyroclastic and/or volcaniclastic rocks of Cenozoic to Mesozoic age, but rarely before Jurassic [2,4]. The volcano-sedimentary genetic model, type 57a CD [5], which entails smectite formation from a range of rock compositions (from andesite and trachyandesite to trachyte, dacite and rhyolite) applies to most deposits in the Euro-Mediterranean area. Nonetheless, sedimentary deposits (terrigenous-diagenetic origin) are locally important, as in Denmark, Egypt, Russia and Ukraine.





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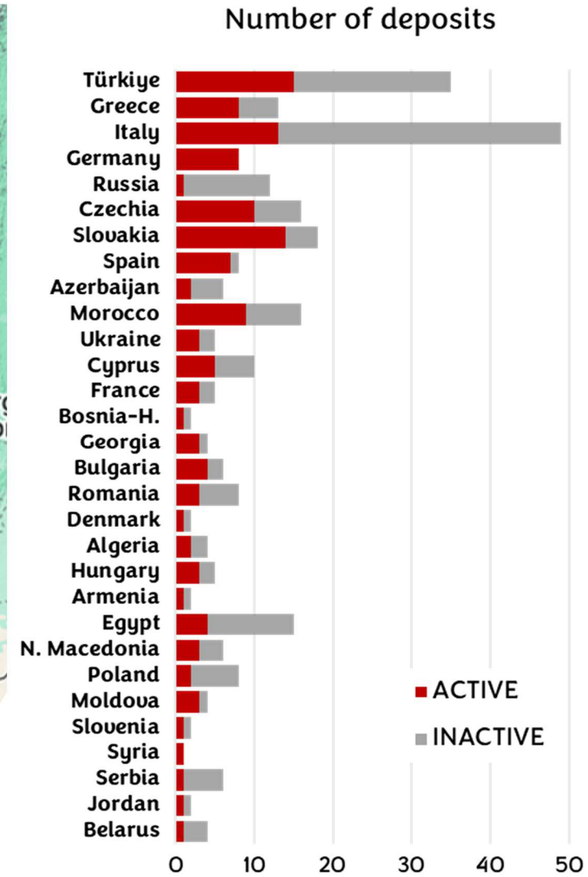
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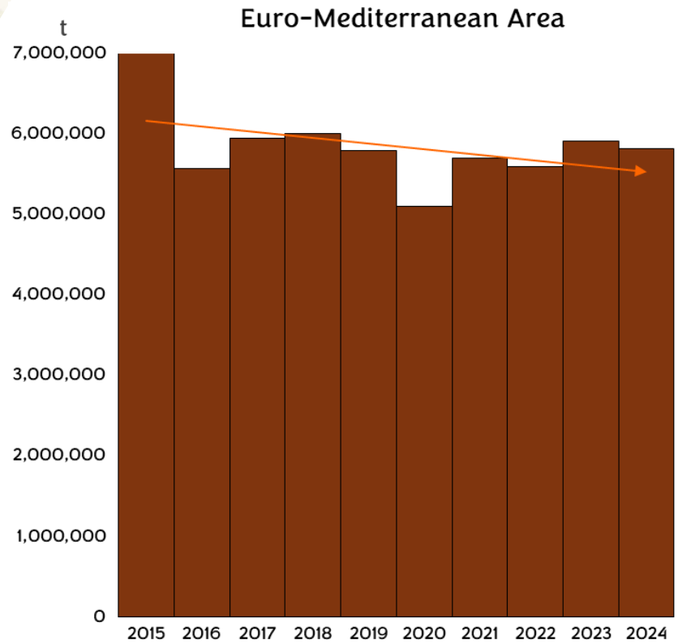
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Bentonite
active
inactive
Sweden
Norway
Finland
Oslo
Stockholm
Baltic Sea
St Petersburg
Санкт-Петербург
Estonia
Latvia
Lithuania
North Sea
United Kingdom
Ireland
Denmark
Moscow
Москва
Yekaterinburg
Екатеринбург
Kazan
Казань
Netherlands
Berlin
Poland
Warsaw
Belarus
London
Germany
Belgium
Paris
Kyiv
Київ
Czechia
Slovakia
Ukraine
Austria
Hungary
Moldova
France
Romania
Croatia
Serbia
Marseille
Italy
Rome
Black Sea
Georgia
Barcelona
Bulgaria
Istanbul
Ankara
Azerbaijan
Portugal
Spain
Lisbon
Greece
Athens
Αθήνα
Türkiye
Algiers
مدينة الجزائر
Tunis
تونس
Mediterranean Sea
Syria
Lebanon
Iraq
Tunisia
Morocco
Israel
Jordan
Cairo
القاهرة
Algeria
Libya
Egypt
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Number of deposits
Türkiye
Greece
Italy
Germany
Russia
Czechia
Slovakia
Spain
Azerbaijan
Morocco
Ukraine
Cyprus
France
Bosnia-H.
Georgia
Bulgaria
Romania
Denmark
Algeria
Hungary
Armenia
Egypt
N. Macedonia
Poland
Moldova
Slovenia
Syria
Serbia
Jordan
Belarus
ACTIVE
INACTIVE
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Euro-Mediterranean Area
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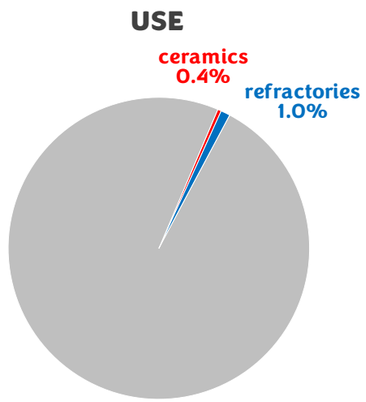
Chromite

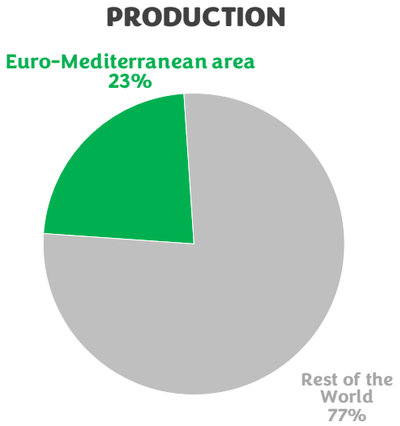
Amongst glass and ceramic applications, chromite is essentially used to manufacture magnesia-chrome and chrome refractories, which are employed in the production of ferrous and nonferrous alloys, glass, and cement. For these applications, chromite is preferable with relatively low Cr_2O_3 but high Al_2O_3 contents [1-3]. Minor quantities are used in foundry (chromite sand) and in the synthesis of Cr-based pigments, which are fundamental in ceramic decoration, once chromite is transformed by the chemical industry into Cr_2O_3 [3,4].

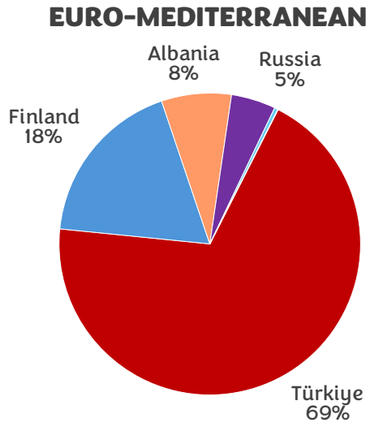
Chromite production in the Euro-Mediterranean area is on average 11.6 million tpa*, which corresponds to approximately 23% of the global output, with an increasing trend, even though fluctuating, over the last decade. The only chromite producers are Türkiye, Finland, Albania, and Russia*, as contributions from Kosovo and Greece are small and that of Egypt undisclosed. Several other countries report chromite occurrences, but the size is generally small or unknown.

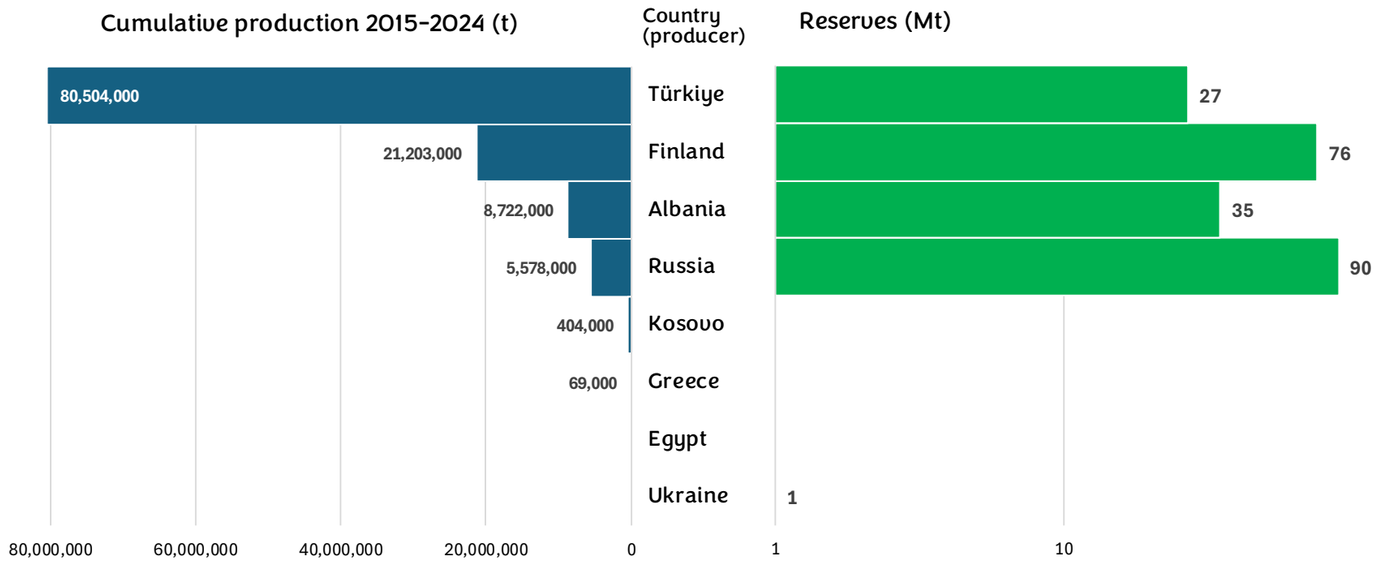
The declared reserves for Russia, Albania and Finland are sufficient to ensure the current extraction rates for several decades. The case of Türkiye seems different as, like other large chromite producers, declared reserves are enough only for a few years. Most chromite deposits in the Mediterranean area pertain to the podiform type – i.e., 1b A [5] – such as those occurring within Mesozoic ophiolitic complexes in Türkiye, Albania, Kosovo and Greece. Since ophiolites characterized by lherzolite mantle are barren, so chromite deposits seem restricted to harzburgite ophiolites [6]. Geological settings of podiform chromitites include ophiolite complexes (lower crustal cumulates) and orebodies in tectonized mantle harzburgite [7,8]. However, other important chromite deposits are of stratiform type (1a A), which are hosted by Proterozoic layered intrusions, where ultramafic and gabbroic parts can be distinguished. This kind of chromitites are currently mined in the Saranovsky massif (Russia) as well as in the Kemi intrusion (Finland).

*The total Euro-Mediterranean chromite output is slightly overestimated, since Russian production is not realized exclusively from deposits in the European part of the country.









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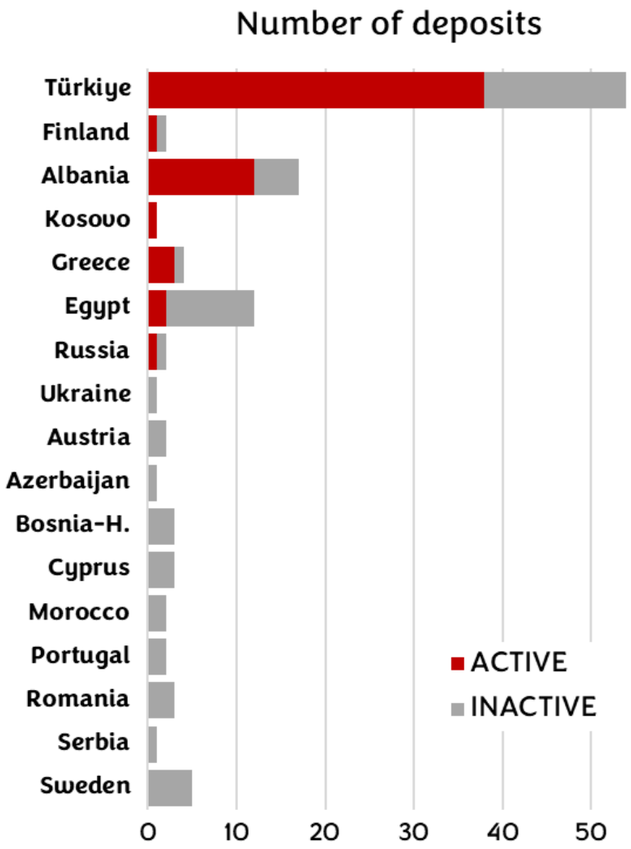
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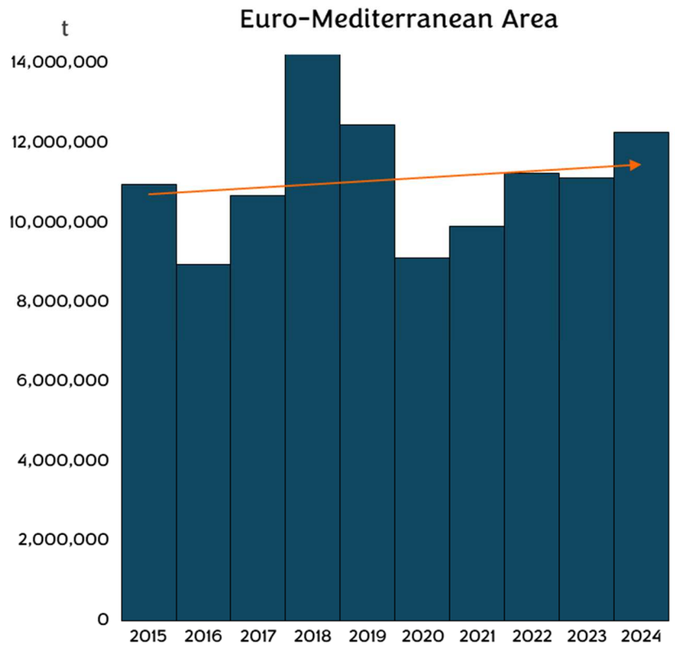
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Chromite
active
inactive
Olivine
active
inactive
Sweden
Norway
Finland
Oslo
Stockholm
St Petersburg
Санкт-Петербург
Baltic Sea
Estonia
Latvia
Lithuania
North Sea
Denmark
United Kingdom
Ireland
Netherlands
Berlin
Poland
Warsaw
Belarus
London
Germany
Belgium
Paris
Czechia
Slovakia
Ukraine
Kyiv
Київ
Austria
Hungary
Moldova
France
Romania
Croatia
Serbia
Marseille
Italy
Rome
Bulgaria
Black Sea
Georgia
Barcelona
Istanbul
Portugal
Spain
Lisbon
Tyrrhenian Sea
Greece
Athens
Αθήνα
Türkiye
Azerbaijan
Algiers
مدينة الجزائر
Tunis
تونس
Tunisia
Mediterranean Sea
Syria
Lebanon
Iraq
Israel
Jordan
Cairo
القاهرة
Morocco
Algeria
Libya
Egypt
Moscow
Москва
Yekaterinburg
Екатеринбург
Kazan
Казань
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Number of deposits
Türkiye
Finland
Albania
Kosovo
Greece
Egypt
Russia
Ukraine
Austria
Azerbaijan
Bosnia-H.
Cyprus
Morocco
Portugal
Romania
Serbia
Sweden
ACTIVE
INACTIVE
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Euro-Mediterranean Area
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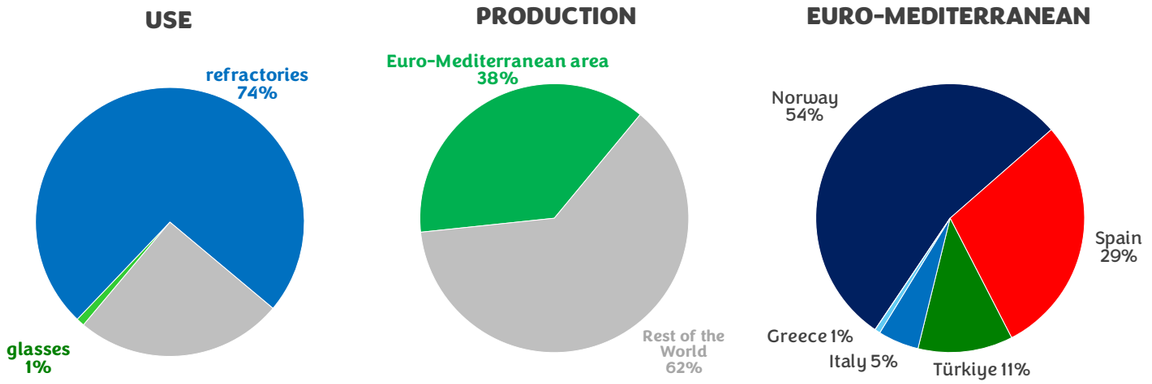
Olivine

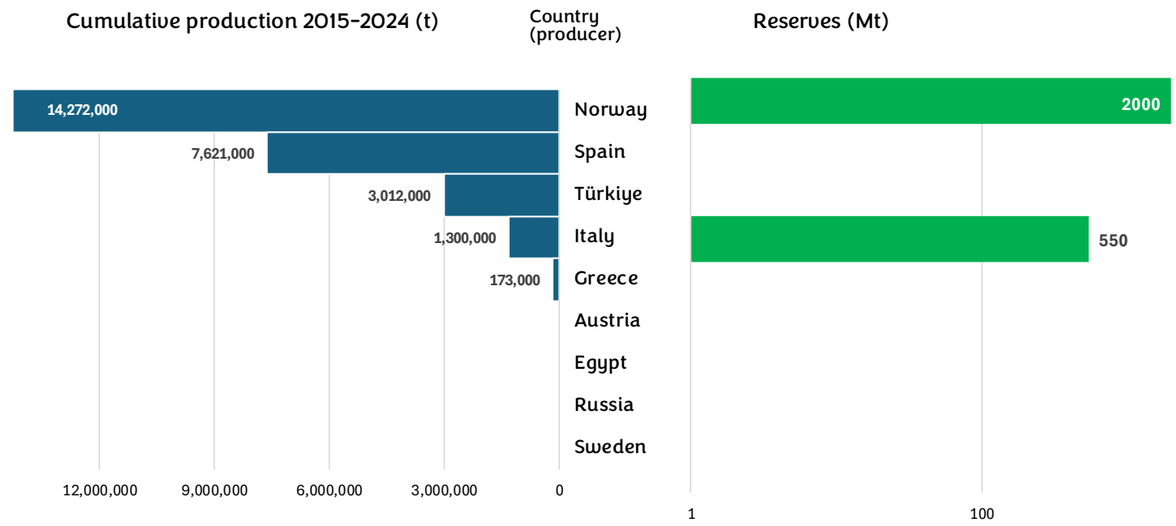
Olivine, the solid solution of forsterite and fayalite, is mainly used by the ceramic industry to manufacture refractories and glass wool, or directly by the abrasives industry. Olivine is a basic ingredient of forsterite refractories, which can replace the costly magnesia refractories, and can be also employed for cordierite refractories and refractory coatings (olivine-graphite and olivine-magnesia in ferrous metallurgy). Olivine is an excellent moulding sand in foundry and tap hole filler in electric arc furnaces. In addition, it can be utilized as abrasive grit-blasting material and component in mineral wool batches [1,2].

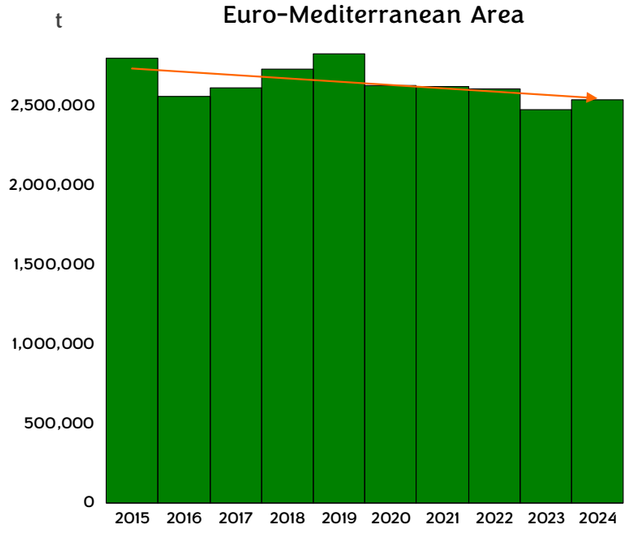
Olivine production in the Euro-Mediterranean area amounts to 2.6 million tpa on average, which corresponds to about 38% of the world output. The trend has remained rather constant over the last decade, with a slight decrease in olivine production from 2020 to present. Major suppliers are Norway, Spain, Türkiye and Italy, which together ensure almost the entire production of the Euro-Mediterranean area, since the Greek contribution is small and those from Austria and Egypt undisclosed. Deposits in Sweden and northwestern Russia are not exploited.

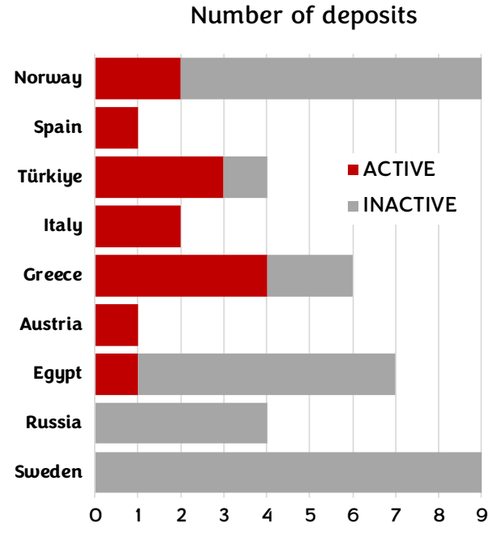
Although the assessment of reserves is available only for few Euro-Mediterranean countries, olivine resources are generally considered large. Norwegian and Italian reserves, for example, can be sufficient for centuries at the current rate of extraction.

The most important source is dunite, i.e., a peridotite rock with 90% or more of olivine, whose deposits are of magmatic type, 45a A according to Dill [3]. Dunite deposits occur in exhumed mantle slabs, e.g., the mafic-ultramafic complex in the Ivrea-Verbano zone in Italy [4], and the Kızıldag massif in Türkiye [5]. Other olivine deposits are of metamorphic type (45d A) where peridotites have been partially serpentinized, as often occurred in ophiolites. Examples are harzburgite and dunite of the Cape Ortegal massif (Spain); the Şarkikaraagaç ophiolitic complex in Türkiye [6]; and the Raudfjellet ophiolite fragment in the Norwegian Caledonides [7].









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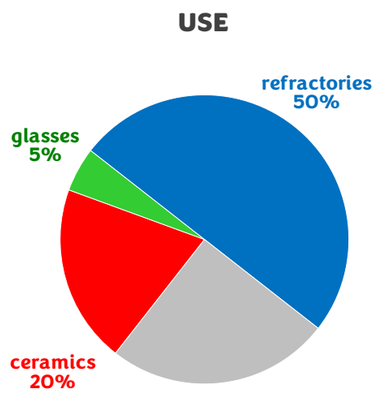
Pyrophyllite

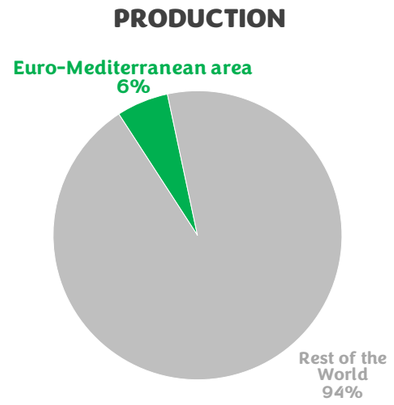
Pyrophyllitic raw materials can be used in various ways by the ceramic and glass industries, such as batch ingredients for silicate refractories, fiberglass, whiteware, wall and floor tiles [1-3]. Despite these opportunities, pyrophyllite has never entered industrial practice in the Euro-Mediterranean area, both due to overwhelming competition from kaolins and refractory clays and the limited availability of suitable pyrophyllitic materials. Exception is the use of pyrophyllite in the manufacture of refractories by industries nearby the active mines in Türkiye, Russia and possibly North Africa.

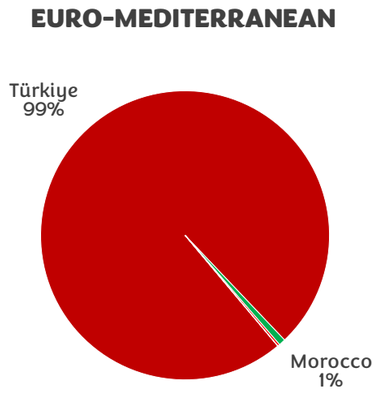
Pyrophyllite production in the Euro-Mediterranean area has averaged around 200,000 tpa, but with strong fluctuations over the last decade. This is a small figure, compared to the output of the "pyrophyllite belt" in the Far East. Moreover, the figure reflects Turkish production, since the quantities extracted in Algeria and Morocco are not disclosed, while Russian extraction appears to have ceased. Resources of pyrophyllitic materials are also reported in Azerbaijan, Belarus, Croatia, North Macedonia, and Spain. Presumably, the absence of a practice with these raw materials and the consequent scarce industrial interest affected the search for pyrophyllite deposits and their development.

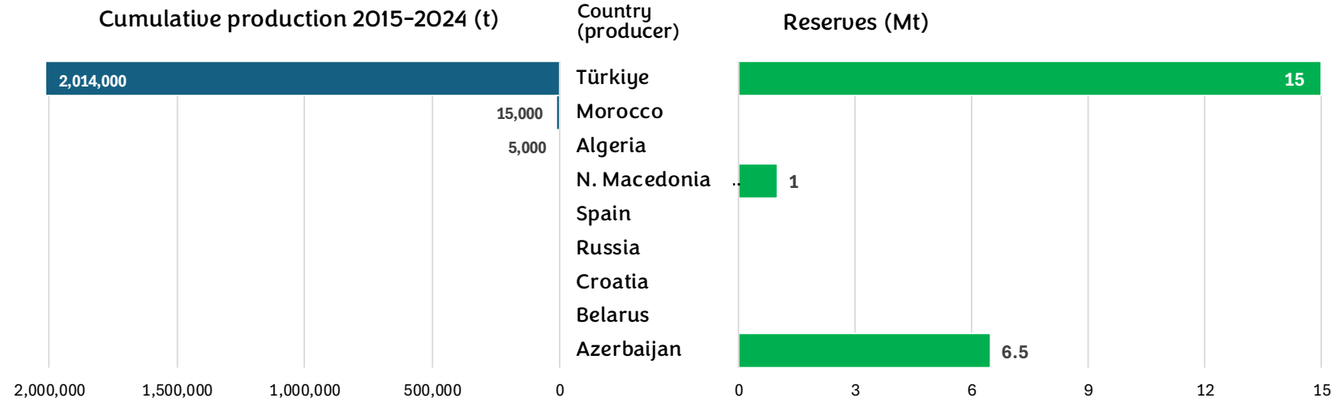
Türkiye's declared reserves allow the current extraction rate to be maintained for several decades. The information available for other countries is insufficient to understand the importance of reserves in relation to raw material characteristics [4].

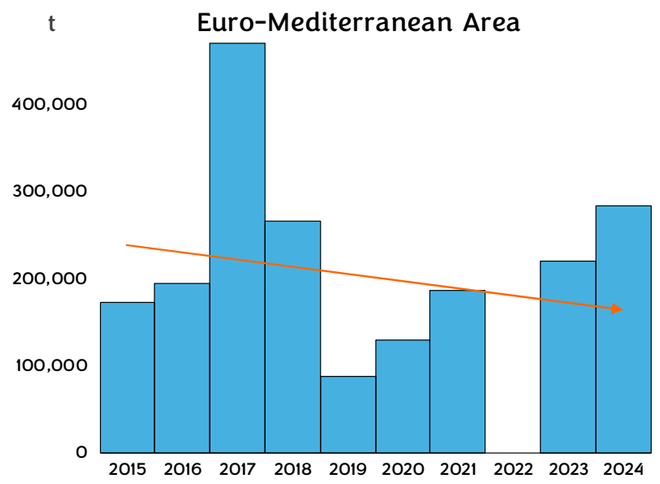
Turkish deposits are of metamorphic genesis, which is caused by transformations of terrigenous sediments with felsic volcanics interbeds under greenschist facies conditions, i.e., pyrophyllite schists, type 56b J [5]. On the other hand, pyrophyllite deposits in Russia, Algeria and Morocco took origin from an interplay between the previous model and epithermal alteration induced by shallow, low sulphidation fluids, type 56b CD [6,7].

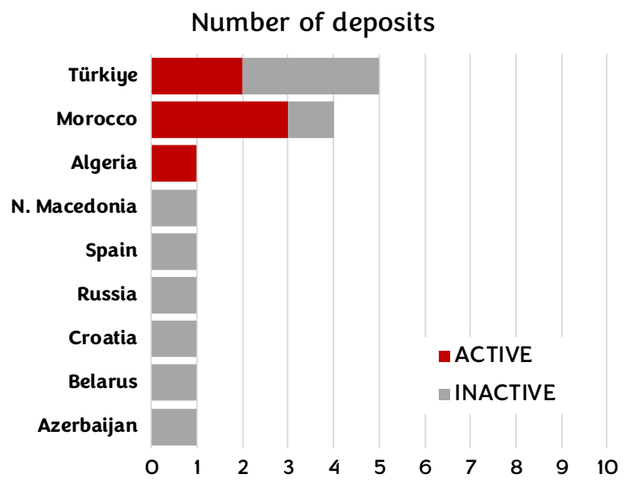












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Wollastonite

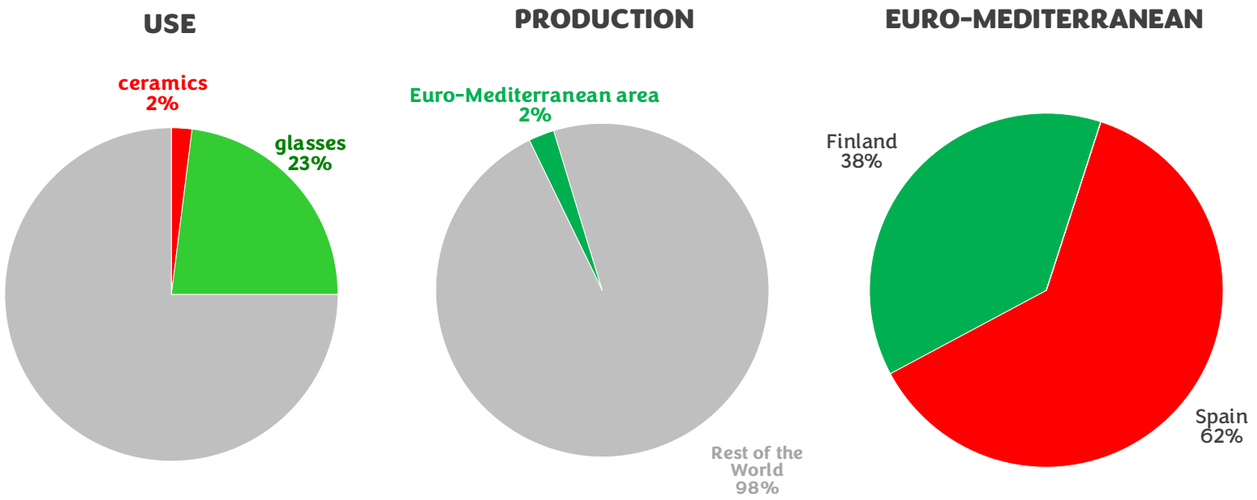
Wollastonite has been used by the glass and ceramic industries essentially in special glasses (glass-ceramics, crystallizing frits) and bodies: ingredient in earthenware and wall tiles; additive in whiteware and floor tiles [1-3]. Wollastonite is also a promising material for refractories and electroceramics [3,4]. However, limited availability and high cost with respect to substitutes restricted the use of wollastonite mainly to fast-fired glazes, especially when high chemical resistance and/or crystallizing effects are required [5].

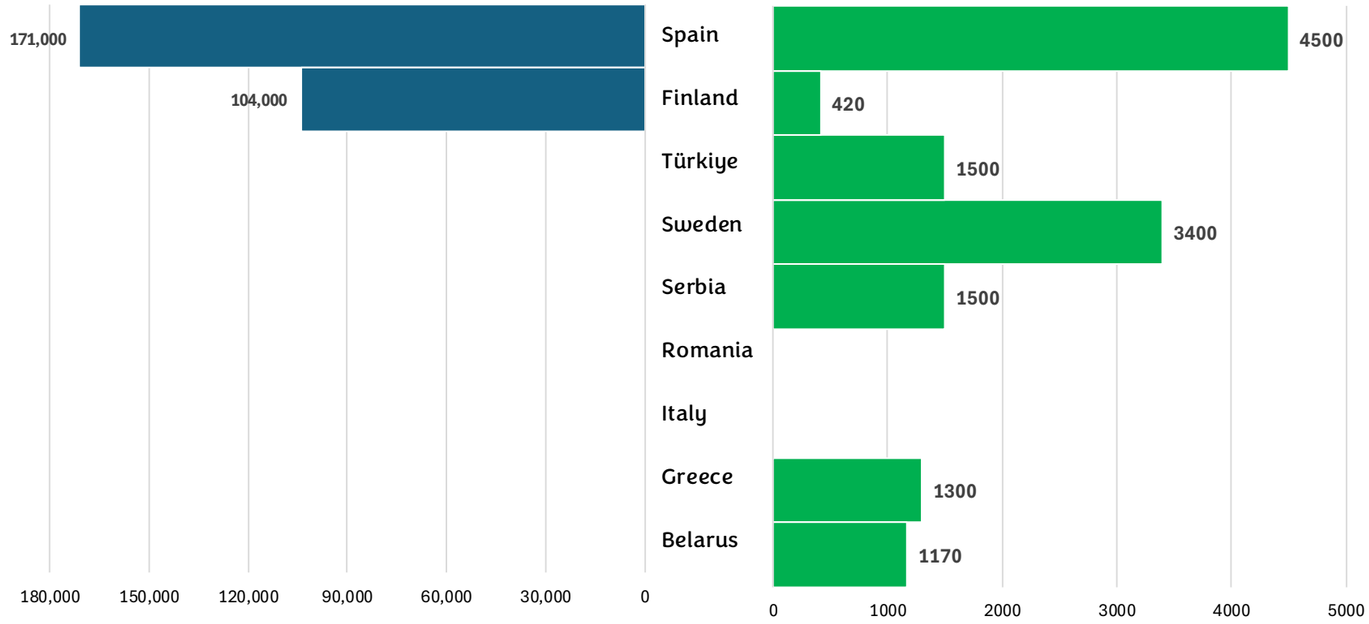
Wollastonite production in the Euro-Mediterranean area averages 27,500 tpa, which corresponds to a small share of world production. Extraction has been carried out since the 1950s in the Ihalainen deposit (Finland) and more recently has also begun in the Aldea del Obispo deposit (Spain). Finnish production has remained quite stable over the last decade, while Spanish wollastonite has seen a clear productive increase from 2019 to present.

Wollastonite has since long been mined both in Türkiye (Çan region) and Serbia (Jaram-Duboka) while two deposits in Sweden (Hulta-Gruvor) and Romania (Băița-Plai) appear under development; however, official statistics do not report any production in recent years. Further wollastonite occurrences are reported in Belarus, Finland, Greece, Italy, Spain, Sweden, and Türkiye.

Spanish reserves can ensure many decades at the current rate of wollastonite extraction, while Finnish reserves guarantee at least 40 years. Reserves claimed in Türkiye, Sweden, Serbia, Greece and Belarus are also substantial, but the actual cost-effectiveness of their exploitation must be verified.

Wollastonite deposits in the Euro-Mediterranean area are of skarn-type (46b BCD) as originated by contact metamorphism due to granitic intrusions on carbonatic units [6,7]. Intrusions are of various ages: from Paleoproterozoic (Sweden) to Upper Paleozoic (Spain, Italy) and Paleogene (Greece).





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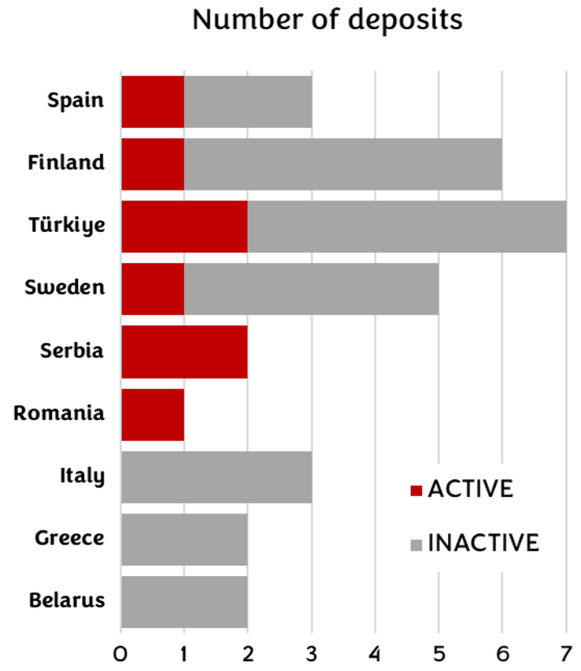
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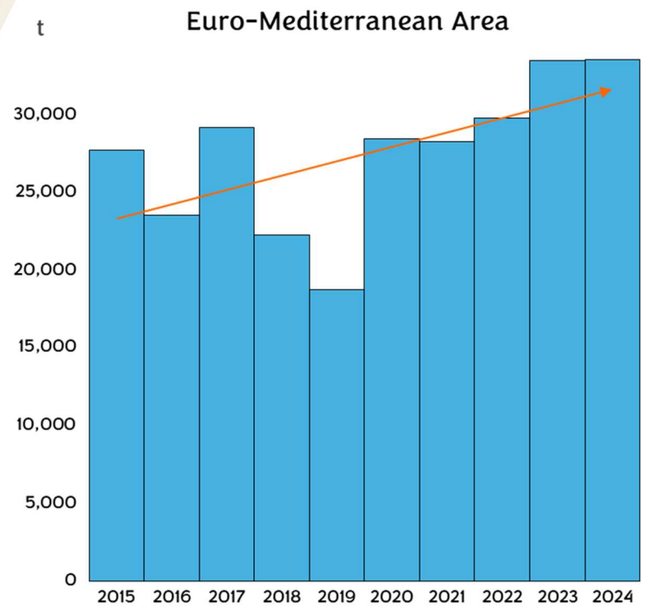
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Wollastonite
active
inactive
Pyrophyllite
active
inactive
Sweden
Norway
Finland
Oslo
Stockholm
St Petersburg
Санкт-Петербург
Baltic Sea
Estonia
Latvia
Lithuania
North Sea
Denmark
United Kingdom
Ireland
Netherlands
Berlin
Poland
Warsaw
Belarus
Moscow
Москва
Kazan
Казань
Yekaterinburg
Екатеринбург
London
Germany
Belgium
Paris
Czechia
Slovakia
Ukraine
Kyiv
Київ
Austria
Hungary
Moldova
France
Romania
Croatia
Serbia
Marseille
Italy
Rome
Barcelona
Black Sea
Georgia
Azerbaijan
Portugal
Spain
Lisbon
Tyrrhenian Sea
Bulgaria
Istanbul
Greece
Athens
Αθήνα
Türkiye
Algiers
مدينة الجزائر
Tunis
تونس
Mediterranean Sea
Tunisia
Syria
Lebanon
Iraq
Morocco
Israel
Jordan
Cairo
القاهرة
Algeria
Libya
Egypt
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Number of deposits
Spain
Finland
Türkiye
Sweden
Serbia
Romania
Italy
Greece
Belarus
ACTIVE
INACTIVE
0
1
2
3
4
5
6
7


Euro-Mediterranean Area
t
30,000
25,000
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0
2015
2016
2017
2018
2019
2020
2021
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2024

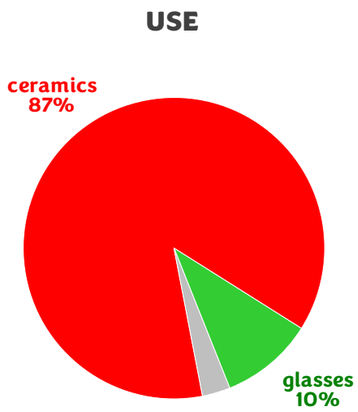
Feldspar (nepheline syenite and anorthosite)

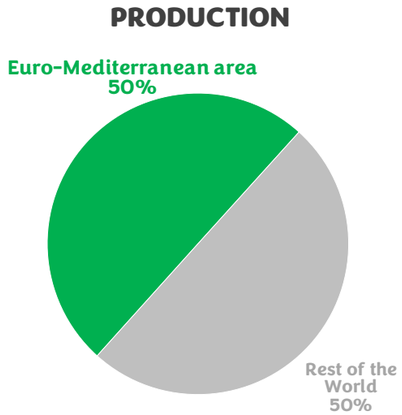
Feldspathic raw materials include feldspar ore, quartz-feldspathic sands, nepheline syenite, and anorthosite [1-3]. They are essentially used as fluxes by the glass and ceramic industries, which together absorb almost the entire production in the Euro-Mediterranean area. Demand for feldspathic fluxes is polarized by porcelain stoneware tiles, which require mainly high-grade sodic feldspar; minor shares are for sanitaryware, tableware and glazes, which need primarily high-grade potassic feldspar [3]. Demand for soda-lime glass has been gradually decreasing, as recycling increased and more cullet glass replaced feldspar.

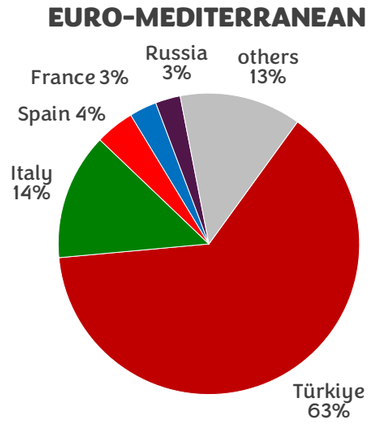
The feldspar production is about 17 million tpa on average, carried out by over 170 mines in two dozen countries of the Euro-Mediterranean area. This represents approximately half of global output. The major producer is Türkiye, accounting for 63% of the Euro-Mediterranean production, followed by Italy, Spain, France and Russia. The trend has fluctuated mostly between 15 and 16 million tpa over the past decade, with a sharp peak in 2021-2022, presumably linked to the recovery after Covid restrictions.

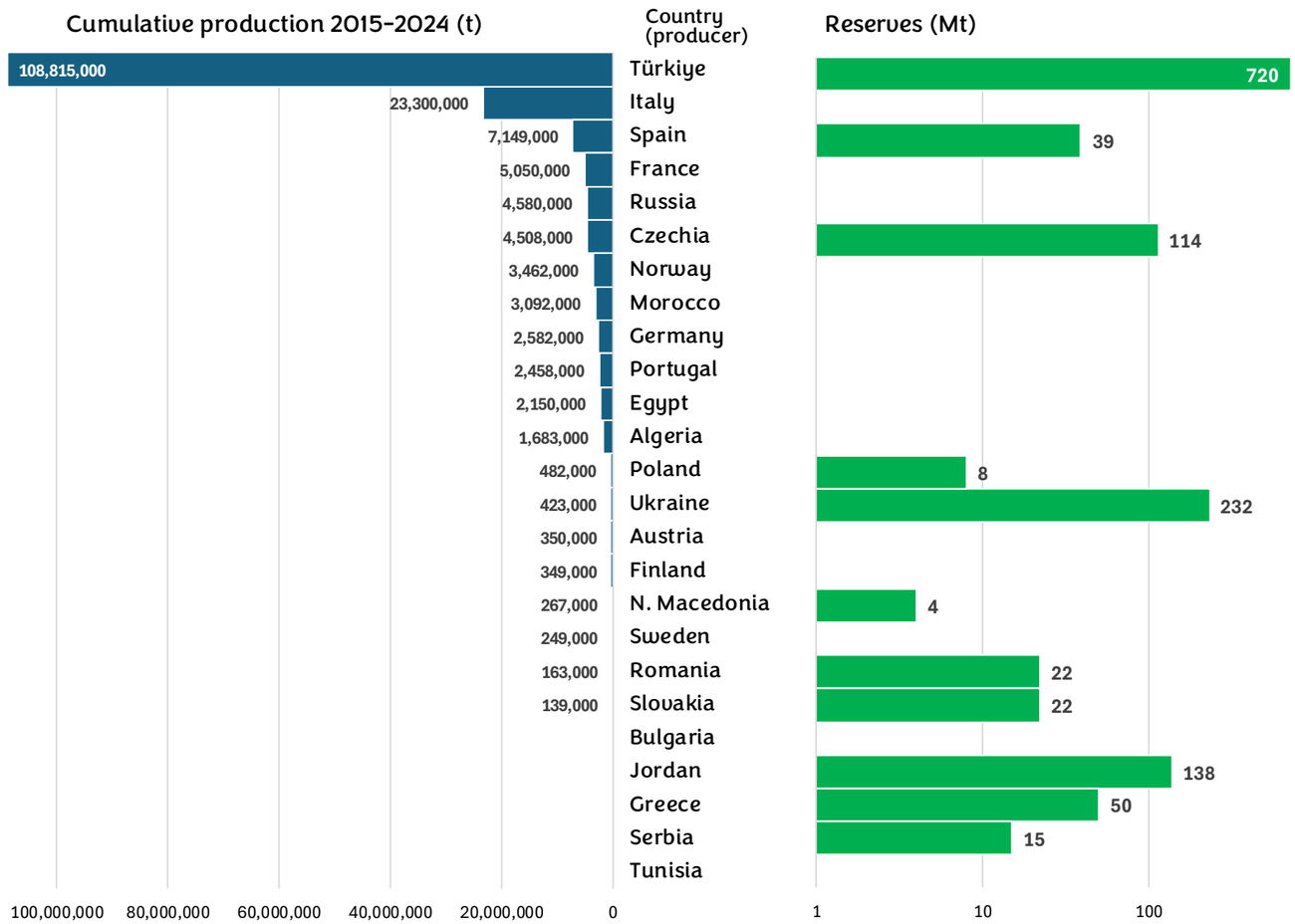
Resources of feldspathic raw materials are in principle huge, but estimation of reserves is seldom provided. In any case, they mainly concern lower-grade deposits, and the challenge is to discover economically profitable deposits of high-grade sodic and potassic fluxes [3].

Feldspar deposits may have magmatic, metamorphic, metasomatic or sedimentary origin [4,5]. The most important are by far albitites of igneous-metasomatic genesis, exploited in the Menderes massif (Türkiye) and Sardinia (Italy) with further deposits in France, Spain, and North Macedonia. Magmatic deposits are numerous and widespread in practically all producing countries, including pegmatites-aplites (41d D), granitoids (41a DE), nepheline syenites and phonolites (42b E), and felsic volcanics (41b D). Sedimentary deposits, essentially arkosic arenites (41a I), are important especially in Spain, Italy, Czechia and Germany. Anorthosite, extracted in Norway, Finland and Ukraine, has been occasionally used by the ceramic and glass industries, mainly for stone wool manufacturing.









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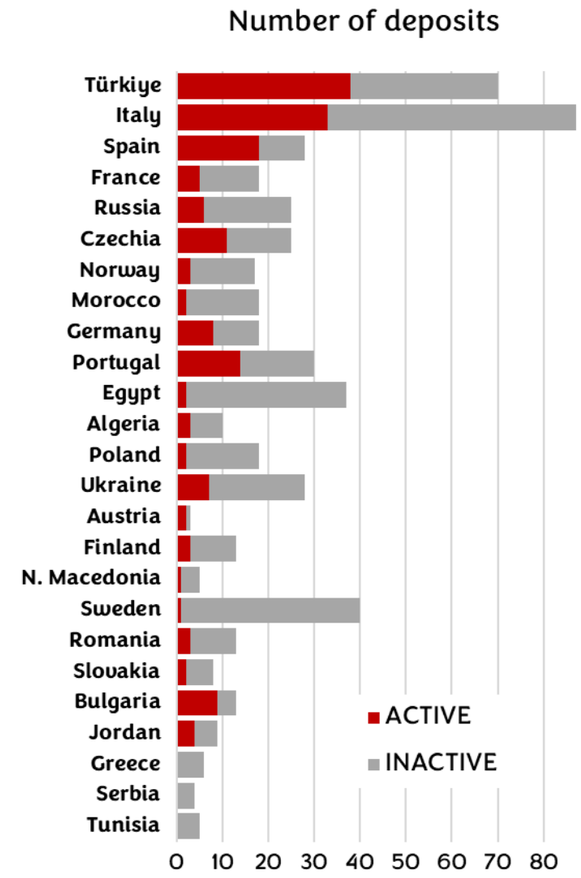
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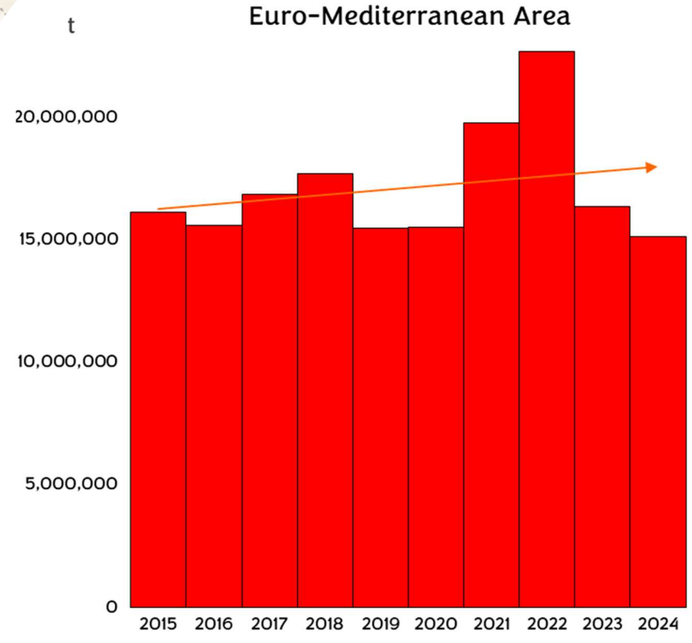
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Feldspar
active
inactive
Nepheline Syenite
active
inactive
Arkosic sand
active
inactive
Anorthosite
active
inactive
Norwegian Sea
Sweden
Norway
Finland
Oslo
Stockholm
St Petersburg
Санкт-Петербург
Baltic Sea
Estonia
Latvia
Lithuania
North Sea
Denmark
United Kingdom
Ireland
Netherlands
Berlin
Poland
Warsaw
Belarus
London
Germany
Belgium
Paris
Czechia
Kyiv
Київ
Ukraine
Moldova
Austria
Hungary
France
Romania
Croatia
Serbia
Marseille
Italy
Rome
Barcelona
Spain
Lisbon
Black Sea
Georgia
Azerbaijan
Istanbul
Greece
Athens
Αθήνα
Tyrrhenian Sea
Algiers
مدينة الجزائر
Tunis
تونس
Tunisia
Mediterranean Sea
Syria
Lebanon
Iraq
Israel
Jordan
Cairo
القاهرة
Egypt
Libya
Algeria
Morocco
Western Sahara
Moscow
Москва
Yekaterinburg
Екатеринбург
Kazan
Казань
Chelyabinsk
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Number of deposits
Türkiye
Italy
Spain
France
Russia
Czechia
Norway
Morocco
Germany
Portugal
Egypt
Algeria
Poland
Ukraine
Austria
Finland
N. Macedonia
Sweden
Romania
Slovakia
Bulgaria
Jordan
Greece
Serbia
Tunisia
ACTIVE
INACTIVE
0
10
20
30
40
50
60
70
80


Euro-Mediterranean Area
t
20,000,000
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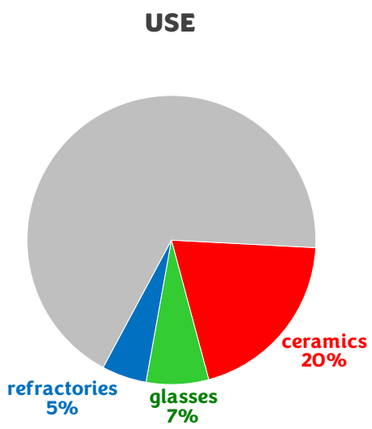
Kaolin

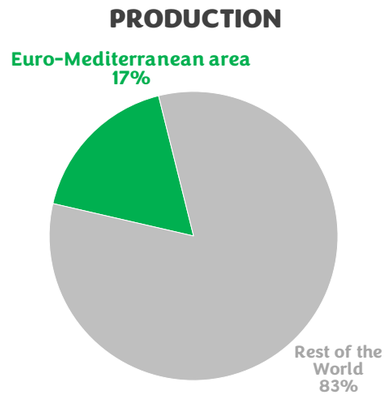
Kaolin can be defined as “a white or nearly white clay comprising naturally occurring kaolinite group minerals” [1]. However, the amount of kaolinite (or halloysite) can vary significantly within raw materials marketed as “kaolin” for ceramics [2], which can be *high-grade kaolin* (>75% kaolinite), *low-grade kaolin* (50–75% kaolinite) and even *raw kaolin* (25–50% kaolinite). These distinctions are not made in production statistics, which can bring together kaolins of different grades.

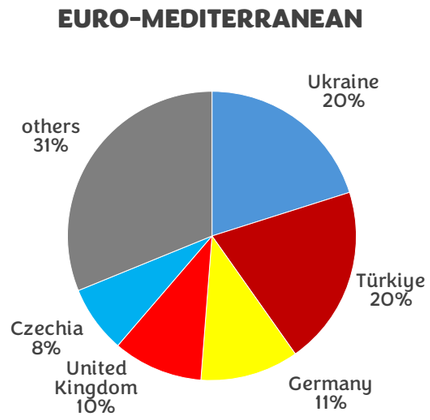
Kaolin is quintessentially associated with porcelain, but its use by the glass and ceramic industries extends to sanitaryware and tableware, porcelain stoneware tiles, silicate refractories, and fiberglass, just to name the main applications [1–4].

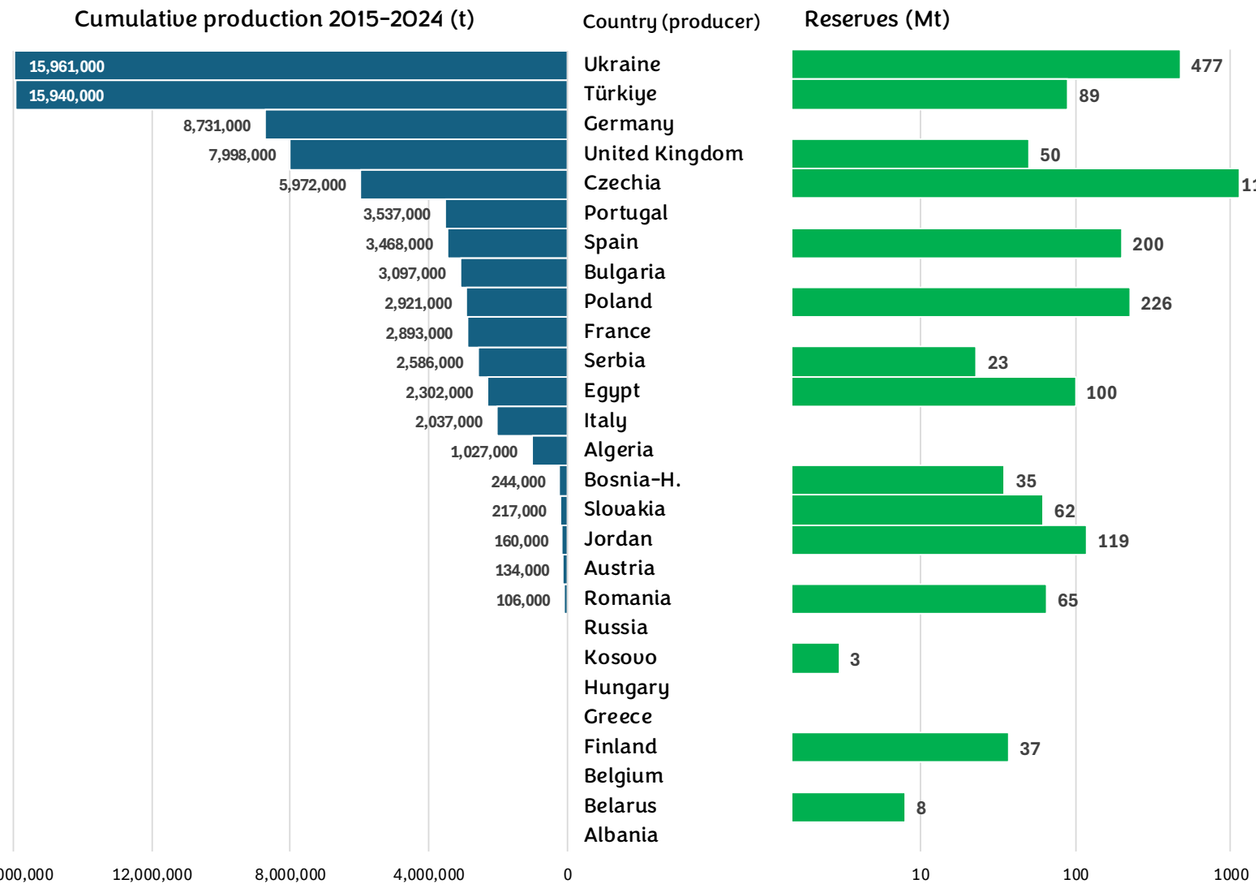
The production of kaolin in the Euro-Mediterranean area is carried out in over 200 mines and averages 7.9 million tpa, which corresponds to 17% of the global output. The trend of the last decade shows a clear contraction in kaolin production: from around 9 million tpa (2015–2018) it dropped to around 6 million tpa (2023–2024). The major producers are Ukraine, Türkiye, Germany, the United Kingdom, and Czechia, which together ensure ~70% of the Euro-Mediterranean output; the remaining is extracted in twenty countries. Declared reserves of kaolin are generally large and ensure the current rate of production for decades or even for centuries, depending on the country. However, reserves of important suppliers (Germany, Portugal, Bulgaria, France) are not disclosed.

Kaolin deposits are traditionally distinguished in primary (weathering, hydrothermal or exhalative origin) and secondary (sedimentary) albeit genetic conditions are often complex [4–6]. Important are the deposits stemming from alteration of granitoids (mostly Variscan) and felsic metamorphics, such as in Cornwall and Devon (UK), Karlovy Vary (Czechia), Ukraine, Saxony (Germany), Brittany and Massif Central (France), Galicia (Spain), Northern Portugal, Poland, Bosnia, Algeria, central Anatolia and Pontides (Türkiye). Another key source is represented by kaolinized sands of various age: Precambrian (Finnish Lapland), Carboniferous at Plzeň (Czechia) and Sinai (Egypt), Triassic (Bavaria and Thuringia, Germany), Cretaceous (Portugal, Spain, Libya, Egypt and Jordan) and Cenozoic (Ukraine, Romania and France). Kaolinized pyroclastics are the major source in Türkiye, Italy, Hungary (Oligocene–Miocene and Quaternary) and Slovakia (Paleozoic). Karst deposits ensure the kaolin production in Bulgaria (and part of that in Algeria and Belgium).









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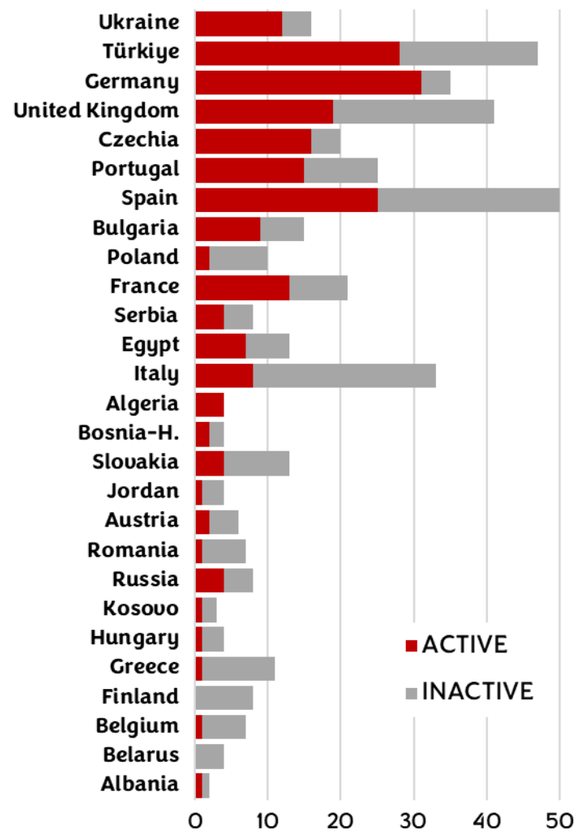
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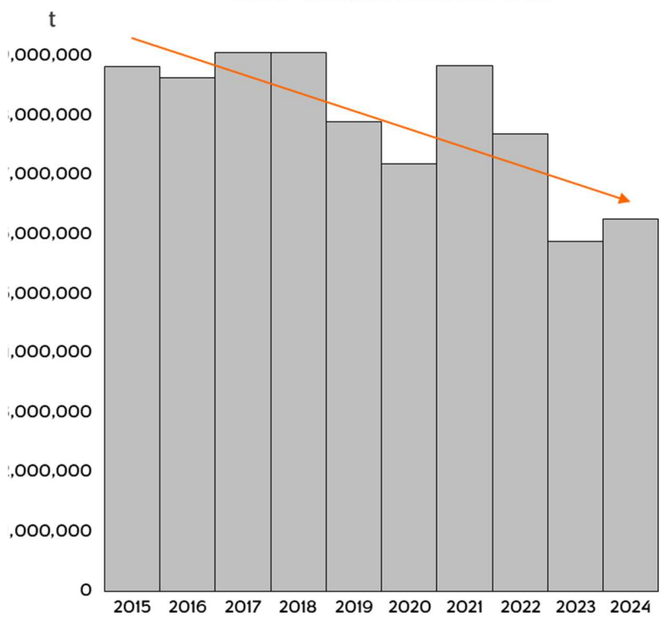
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Number of deposits



Euro-Mediterranean Area



Magnesite (hydromagnesite and huntite)

Magnesite is widely used by the refractory industry to produce magnesia (calcined, dead-burnt, fused) as well as magnesia-chrome, magnesia-graphite, cordierite, spinel, and forsterite refractories. It is also sometimes employed for glasses, glazes and glass-ceramics. Magnesite is a precursor in the synthesis of technical ceramics (periclase, Mg-doped zirconia, etc.) and a common additive in vitrified ceramic tiles to avoid sticking to kiln rollers [1,2]. Huntite can replace magnesite and dolomite in glasses, glazes and refractories.

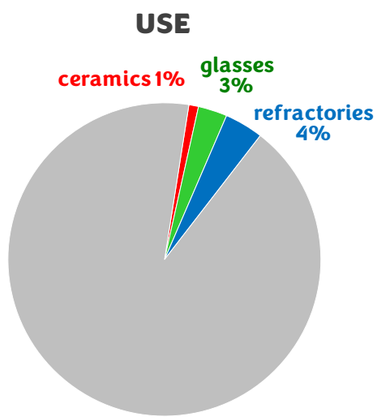
Magnesite production in the Euro-Mediterranean area averages 6 million tpa, including a small amount of hydromagnesite and huntite but excluding magnesia obtained from seawater. This corresponds to about one quarter of the global output. The extraction is carried out by 60 mines in a dozen countries, with the major producers (Türkiye, Russia, Slovakia, Austria and Spain) accounting for 90% of the Euro-Mediterranean output. Other suppliers are Poland, Finland and Greece, while Egypt, Kosovo, Serbia, Ukraine and Bosnia-Herzegovina claim some magnesite production, but data are not disclosed. The trend over the last decade has been steadily declining, at an average rate of -250,000 tons per year.

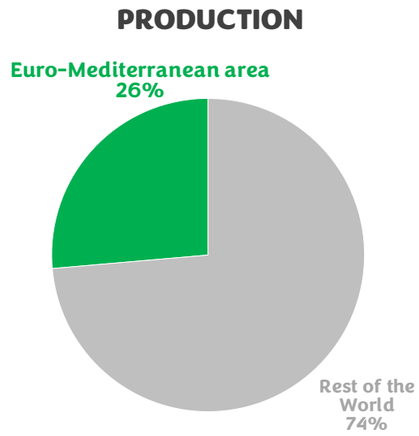
Magnesite reserves are abundant, particularly in Russia, Slovakia, and Greece, where the current extraction rate seems assured for hundreds of years. Other producing countries also boast large magnesite reserves, sufficient for decades at the current rate of mining activity.

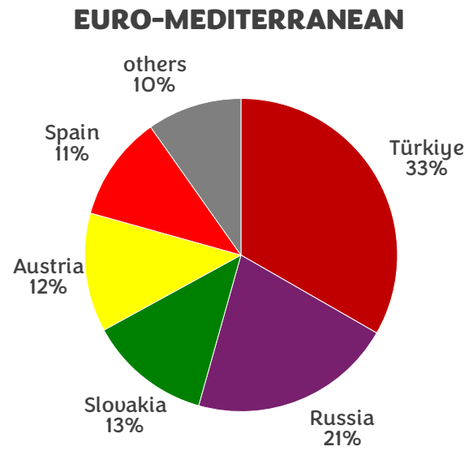
Magnesite is obtained from a vast array of deposits of magmatic or sedimentary origin, formed from Late Proterozoic to Neogene [3-7]:

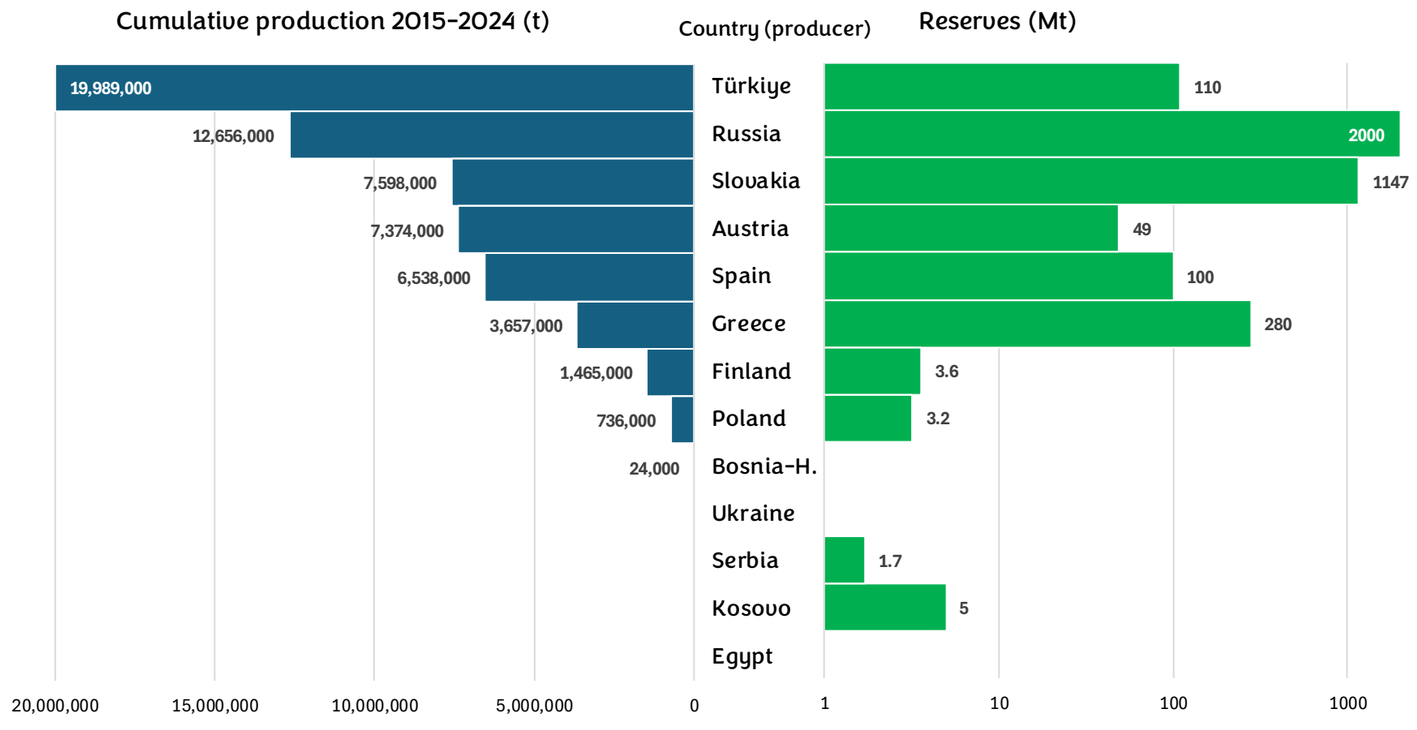
- sparry magnesite veins in serpentinites and gabbros, type 28a A (Poland);
- massive, cryptocrystalline magnesite lenses and pockets in ultrabasic rocks, 28b A (Türkiye, Greece, Austria and Slovakia);
- thrustbound talc-magnesite deposits, 28b G (Austria, Bosnia-Herzegovina);
- stratiform sparry magnesite deposits in calcareous rocks (Veitsch-type), 28b K (Austria, Spain, Russia and Slovakia);
- magnesite deposits in lacustrine sediments, 28cd J (Serbia, Türkiye).

In addition, huntite-hydromagnesite deposits in lakes, 28b J (Greece, Türkiye).









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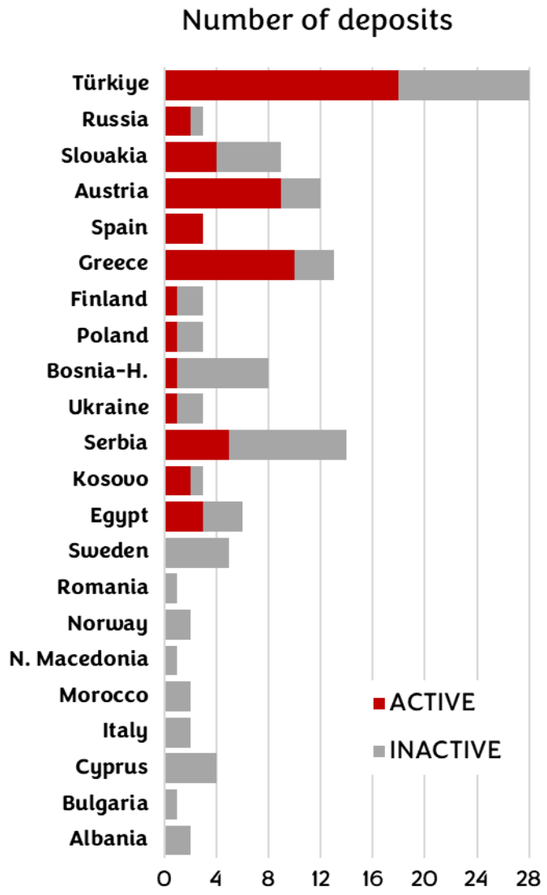
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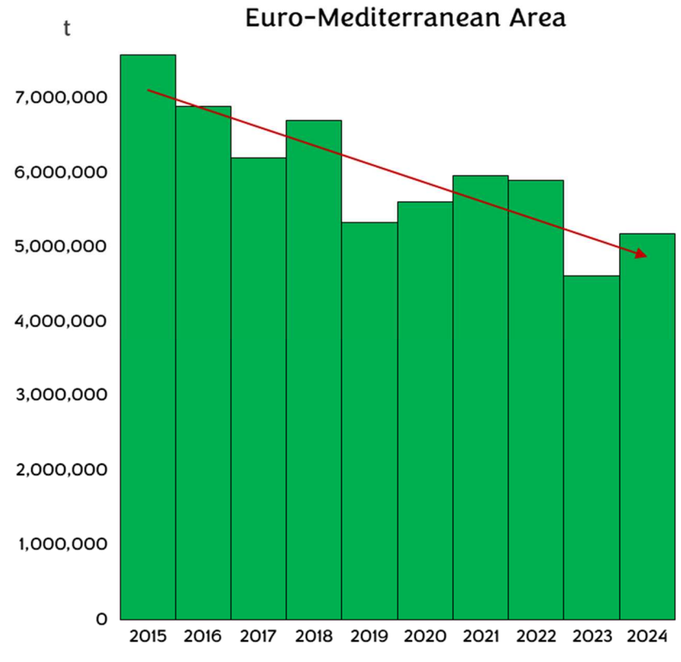
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Magnesite
and huntite
active
inactive
Sweden
Norway
Finland
Oslo
Stockholm
St Petersburg
Санкт-Петербург
Baltic Sea
Estonia
Latvia
Lithuania
North Sea
Denmark
United Kingdom
Ireland
Netherlands
Berlin
Poland
Warsaw
Belarus
London
Germany
Belgium
Paris
Czechia
Slovakia
Ukraine
Kyiv
Київ
Moldova
Hungary
France
Romania
Croatia
Serbia
Marseille
Italy
Rome
Bulgaria
Black Sea
Georgia
Azerbaijan
Barcelona
Portugal
Spain
Lisbon
Tyrrhenian Sea
Istanbul
Greece
Athens
Αθήνα
Türkiye
Algiers
مدينة الجزائر
Tunis
تونس
Tunisia
Mediterranean Sea
Syria
Lebanon
Iraq
Morocco
Israel
Cairo
القاهرة
Jordan
Algeria
Libya
Egypt
Moscow
Москва
Kazan
Казань
Yekaterinburg
Екатеринбург
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Number of deposits
Türkiye
Russia
Slovakia
Austria
Spain
Greece
Finland
Poland
Bosnia-H.
Ukraine
Serbia
Kosovo
Egypt
Sweden
Romania
Norway
N. Macedonia
Morocco
Italy
Cyprus
Bulgaria
Albania
ACTIVE
INACTIVE
0
4
8
12
16
20
24
28


Euro-Mediterranean Area
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2024

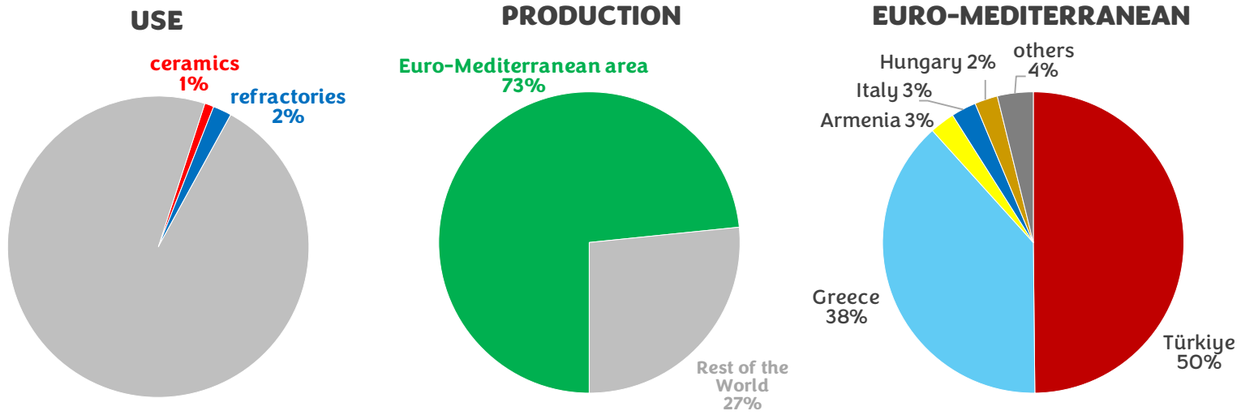
Perlite

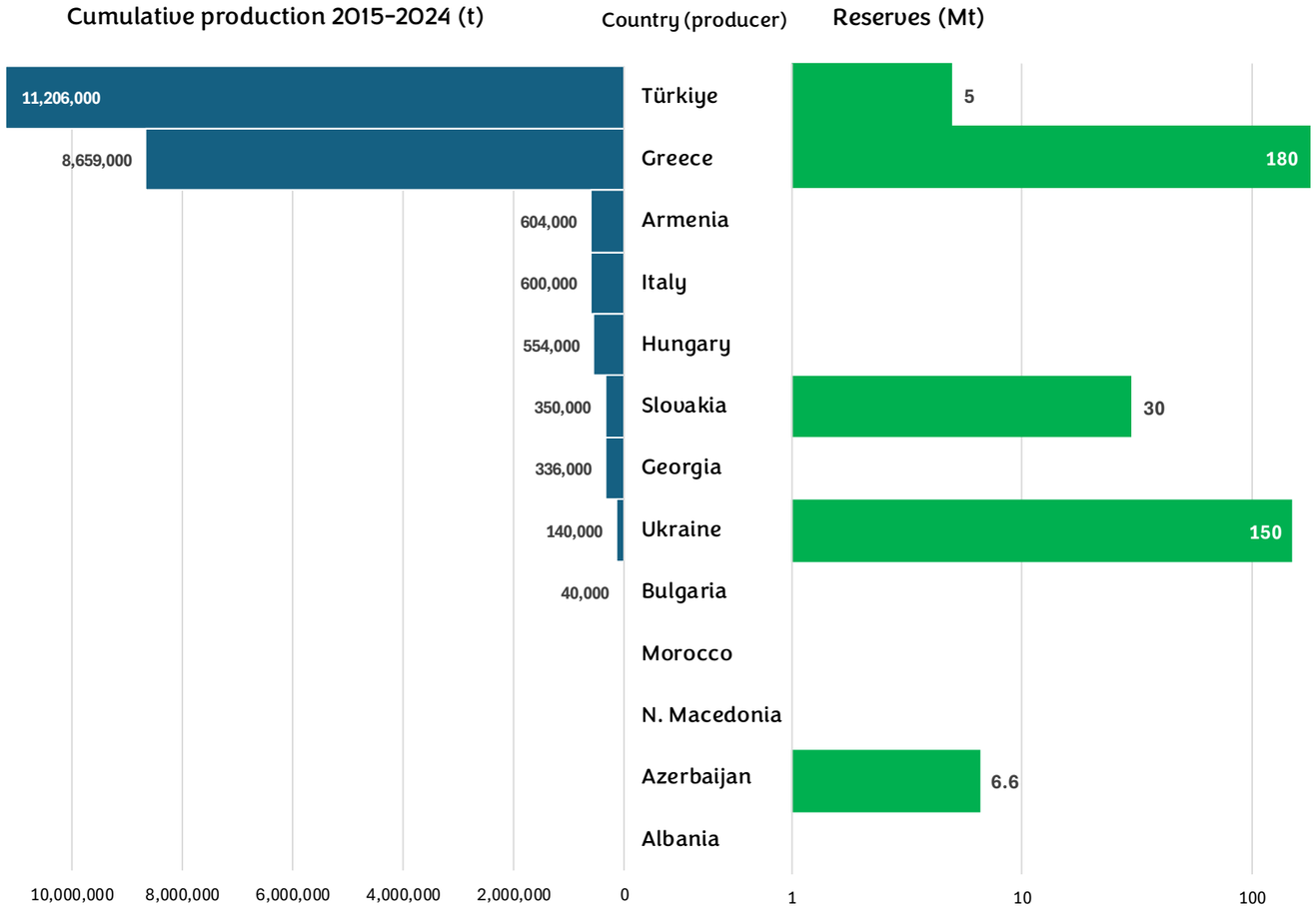
Perlite consists of hydrated volcanic glass (2 to 5 wt% water) usually of rhyolitic composition (~70% to 75% SiO_2). Pitchstone and hydrated volcanic ash (or "pumicite") may also be included amongst perlite-like materials [1]. Crude perlite is almost entirely destined for the production of expanded perlite, which can be either foam (multicellular) or microspheres (unicellular). Since it is obtained with a high temperature heat treatment (600-900°C), expanded perlite is essentially a ceramic material, used extensively in construction and as filler, filter and abrasive, among other applications. Expanded perlite is an ingredient of insulating refractories (both shaped and unshaped). Crude perlite, especially low grades or mining waste, is used also as ceramic flux, in replacement of feldspar [1,2].

Perlite production in the Euro-Mediterranean area is carried out by 30 mines in ten countries, for an annual average around 2.25 million tonnes, representing almost three-quarters of world output. The extraction has fluctuated over the last decade mostly between 2.0 and 2.6 million tonnes, with a decreasing trend from 2017 onwards, before rebounding to 2.5 million tonnes in 2024. Major producers are Türkiye and Greece, which together account for 88% of the Euro-Mediterranean output. Other important suppliers are Armenia, Italy, Hungary, Slovakia, Georgia and Ukraine, while Bulgaria and Morocco provide small or unspecified contributions, respectively.

Few data are available on the size of perlite reserves. Those available are generally large and able to sustain the current extraction rate for many years.

Perlite is thought to have been formed by the chemical weathering of high-silica obsidian or similar glass-bearing pyroclastic and volcanic rocks [1,3]. Nevertheless, a long chain of fundamental events is necessary for perlite formation – of which vesiculation-fracturing-dehydration, rapid cooling, and low-temperature bulk hydration are key steps – making it a very complex process [1]. All perlite deposits in the Euro-Mediterranean area are Neogene to Quaternary in age and pertain to the same type, 4Oh CD [3].





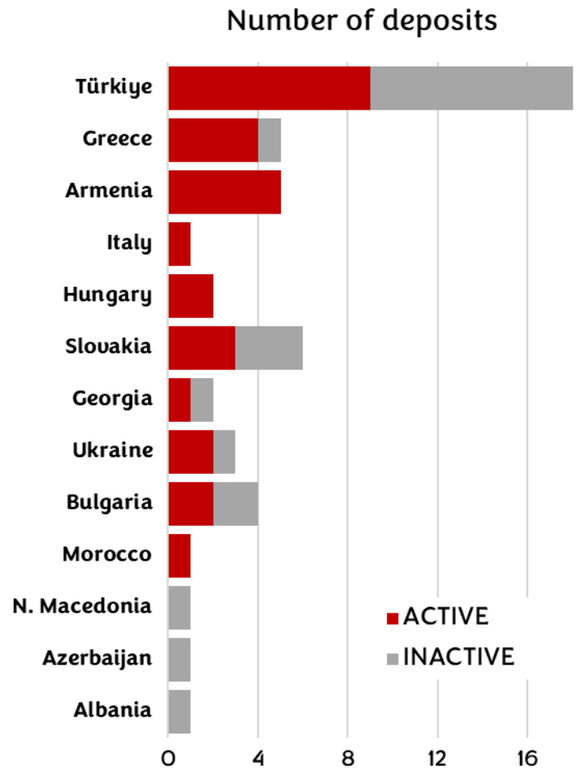
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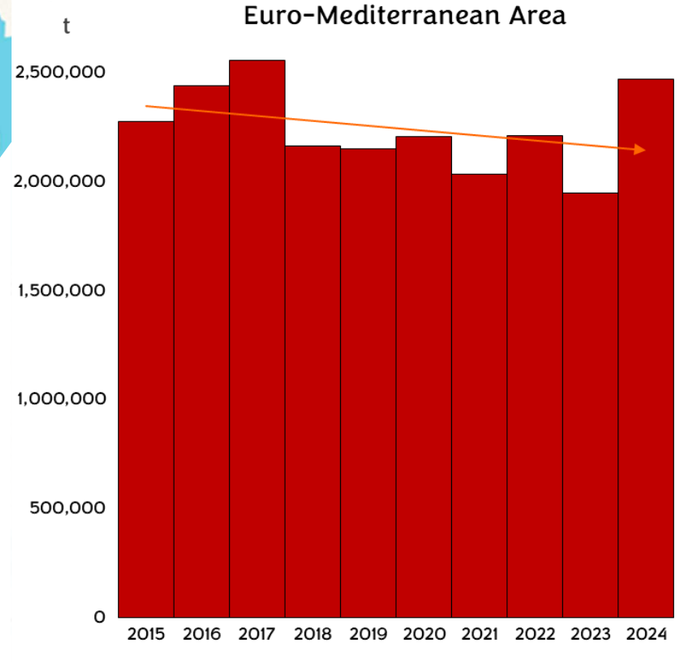
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Perlite
active
inactive
Sweden
Norway
Finland
Oslo
Stockholm
St Petersburg
Санкт-Петербург
Baltic Sea
Estonia
Latvia
North Sea
Denmark
Lithuania
Moscow
Москва
Kazan
Казань
United Kingdom
Ireland
Netherlands
Berlin
Poland
Warsaw
Belarus
London
Germany
Belgium
Paris
Kyiv
Київ
Czechia
Slovakia
Ukraine
Austria
Hungary
Moldova
France
Romania
Croatia
Serbia
Marseille
Italy
Rome
Black Sea
Bulgaria
Georgia
Barcelona
Istanbul
Azerbaijan
Portugal
Spain
Tyrrhenian Sea
Ankara
Greece
Türkiye
Lisbon
Athens
Αθήνα
Algiers
مدينة الجزائر
Tunis
تونس
Syria
Mediterranean Sea
Tunisia
Lebanon
Iraq
Morocco
Israel
Cairo
القاهرة
Jordan
Algeria
Libya
Egypt
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Number of deposits
Türkiye
Greece
Armenia
Italy
Hungary
Slovakia
Georgia
Ukraine
Bulgaria
Morocco
N. Macedonia
Azerbaijan
Albania
ACTIVE
INACTIVE
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4
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16


Euro-Mediterranean Area
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2,500,000
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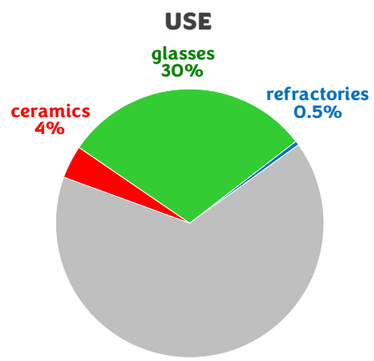
Quartzous materials (silica sand, quartz, quartzite)

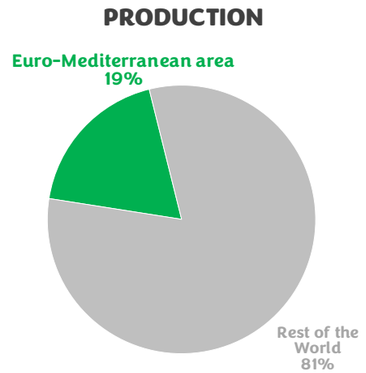
Quartzous raw materials are widely used by the glass and ceramic industries. They are the major component of soda-lime glass (container and flat) and fiberglass, along with an important ingredient of mineral wool and special glasses (e.g., borosilicate). Quartz is the basis of silica refractories [1,2]. Quartzous raw materials are also fundamental ingredients of ceramic batches for whiteware (sanitaryware and tableware), frits and engobes, wall and floor tiles (where quartz is partially introduced by clays and feldspathic fluxes). In heavy-clay production, quartz is the most common tempering agent used to regulate plasticity [2-4]. Despite growing concern about the toxicity of respirable crystalline silica, quartz raw materials are irreplaceable in glass production as in most ceramic applications [4,5].

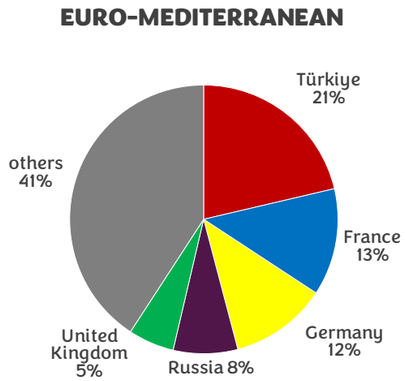
Quartzous raw materials are extracted in over 400 quarries present in almost every Euro-Mediterranean country. Production is on average around 82 million tpa, which represents approximately one fifth of the global output. The trend over the last decade has been clearly increasing from around 76 million tonnes (2015-2016) to 85 million tonnes (2023-2024), peaking at over 90 million tonnes in 2022. Major producers are Türkiye, France, Germany, Russia and the United Kingdom, which together ensure about 60% of the Euro-Mediterranean output.

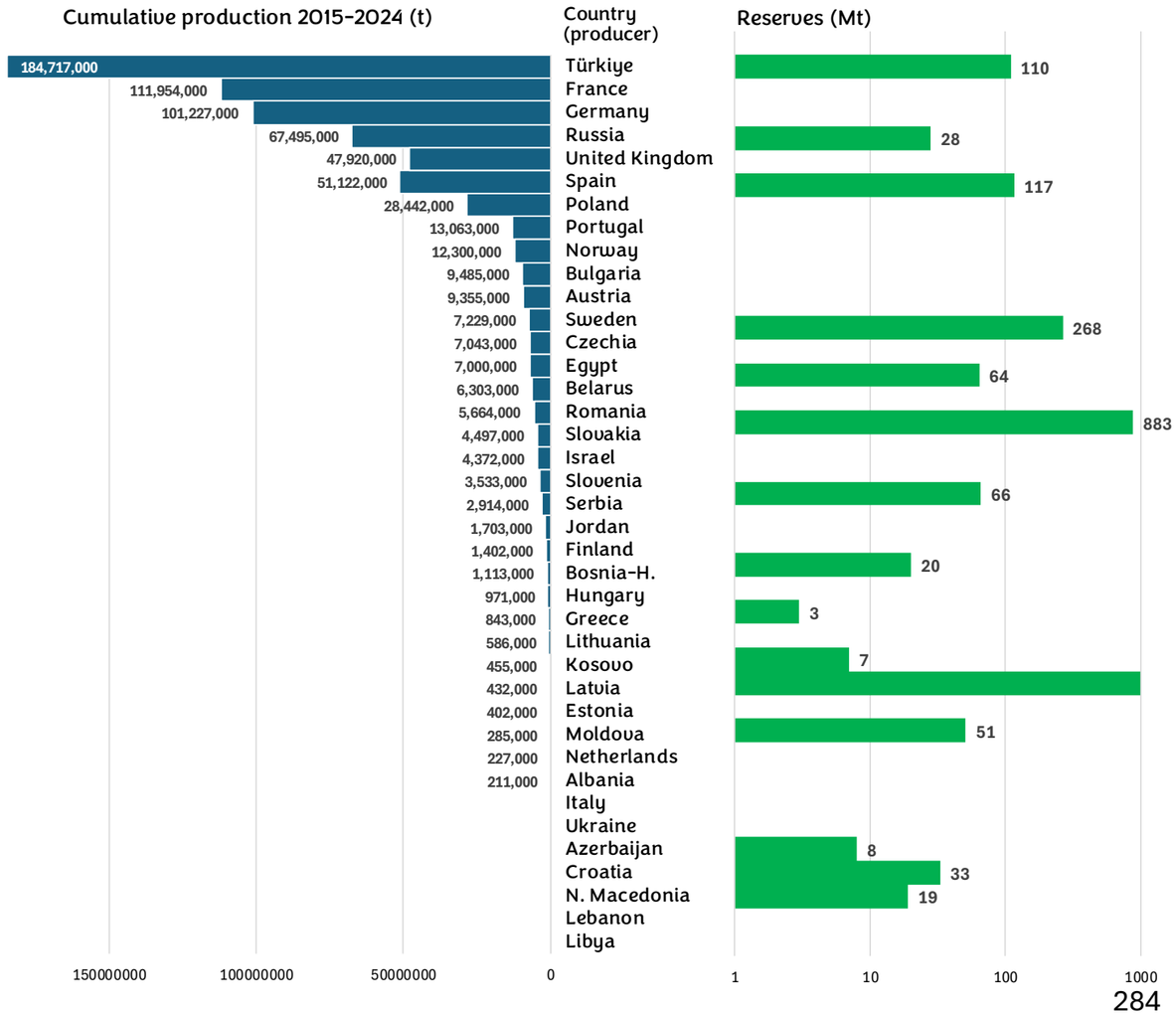
Quartz resources are considered large, even if reserves have been indicated by only one in three producing countries. These data seem sufficient for at least a few decades at the current extraction rate of quartzous raw materials. However, data from many countries are lacking, including some major suppliers, and reserves can be revalued upwards by exploration.

Quartz is recovered from a variety of deposits of magmatic, sedimentary and metamorphic origin [1,2,6]. The most important source is represented by quartz sand and arenites (also called *silica sand*); this type of deposit (40c I) is present in almost all countries considered in this Atlas and can be formed in a range of sedimentary environments: continental (aeolian, fluvial, deltaic, lacustrine) and marine (beach, estuarine, shelf and slope). Metamorphic deposits (type 40d I), basically quartzites and meta-arenites, are of major significance in some countries (e.g., Germany and Italy). Magmatic and structure-related quartz deposits are locally important: pegmatites (40 dD) as well as shallow (40a G) and deep-seated quartz veins (40c G) are exploited, e.g., in the Iberian and Scandinavian countries.









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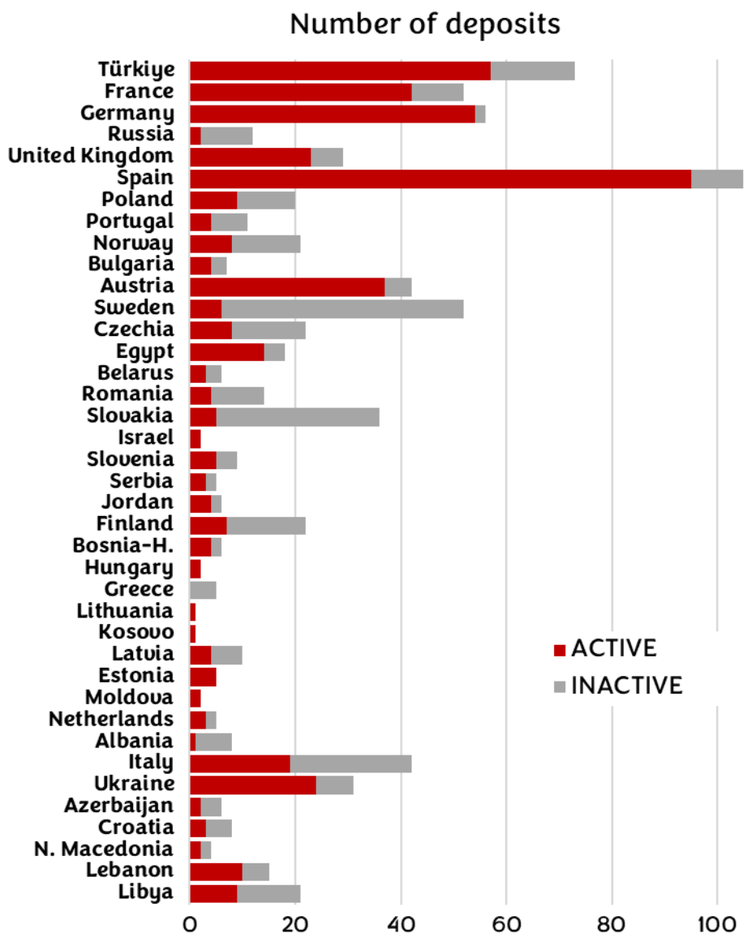
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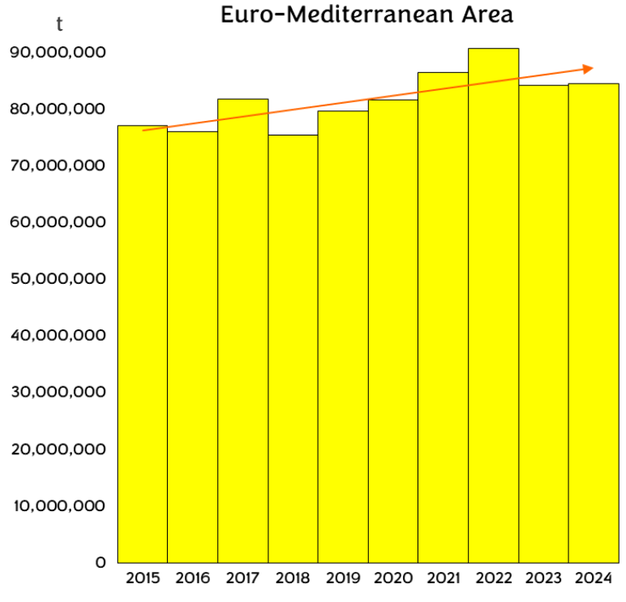
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Quartzous materials
active
inactive
Sweden
Norway
Finland
Oslo
Stockholm
St Petersburg
Санкт-Петербург
Baltic Sea
Estonia
Latvia
Lithuania
North Sea
Denmark
United Kingdom
Ireland
Netherlands
Belgium
Germany
London
Paris
Poland
Warsaw
Belarus
Moscow
Москва
Kyiv
Київ
Ukraine
Moldova
Czechia
Slovakia
Austria
Hungary
France
Romania
Croatia
Serbia
Marseille
Italy
Rome
Barcelona
Portugal
Spain
Lisbon
Tyrrhenian Sea
Bulgaria
Greece
Athens
Αθήνα
Black Sea
Georgia
Azerbaijan
Türkiye
Ankara
Algiers
Tunis
Mediterranean Sea
Tunisia
Syria
Lebanon
Iraq
Israel
Jordan
Morocco
Algeria
Libya
Egypt
Western Sahara
Google My Maps
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Number of deposits
Türkiye
France
Germany
Russia
United Kingdom
Spain
Poland
Portugal
Norway
Bulgaria
Austria
Sweden
Czechia
Egypt
Belarus
Romania
Slovakia
Israel
Slovenia
Serbia
Jordan
Finland
Bosnia-H.
Hungary
Greece
Lithuania
Kosovo
Latvia
Estonia
Moldova
Netherlands
Albania
Italy
Ukraine
Azerbaijan
Croatia
N. Macedonia
Lebanon
Libya
ACTIVE
INACTIVE
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20
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100


Euro-Mediterranean Area
t
90,000,000
80,000,000
70,000,000
60,000,000
50,000,000
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10,000,000
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2015
2016
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2024

Red clays (including red stoneware clays)

Red clays include a wide range of clay raw materials with different mineralogical composition, particle distribution, degree of compaction and plasticity. They are used in the manufacture of pottery, clay bricks and blocks, roof tiles, wall and floor tiles with red paste (e.g., red stoneware), lightweight aggregates, and vitrified drainage pipes [1-3]. This array of heavy-clay products absorbs almost all red clays, but for a fraction used as corrective in Portland clinker production.

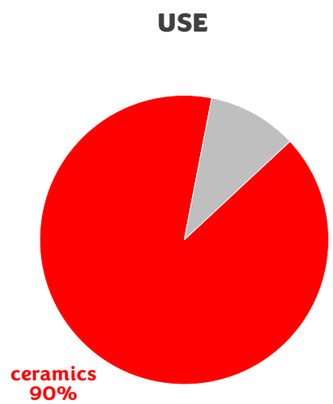
The extraction of red clays is carried out by about 1500 quarries in the Euro-Mediterranean area, with an average production of 56.7 million tpa, which is certainly underestimated, because 20 out of the 48 producing countries did not provide statistics on red clays. Since there are no data on the global production of red clays, we could only make an estimate, on eminently demographic grounds, of the Euro-Mediterranean share, which stands at around one tenth of the world total. The trend over the last decade shows a clear contraction in red clay production, which gradually fell from around 62 million tonnes in 2015 to around 45 million tonnes in 2024. Major producers are Germany, Türkiye, Spain, Italy and France, which together ensure more than half of the Euro-Mediterranean demand.

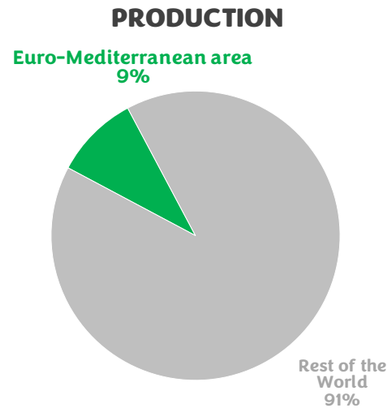
Resources of red clays are huge, even though reserves are declared by less than half of the producing countries and by none of the major players. Despite the wide availability of red clays, growing competition for land use must be taken into account, which almost always results in favour of service and industrial activities. This is creating major problems for clay mining in intensively anthropized areas.

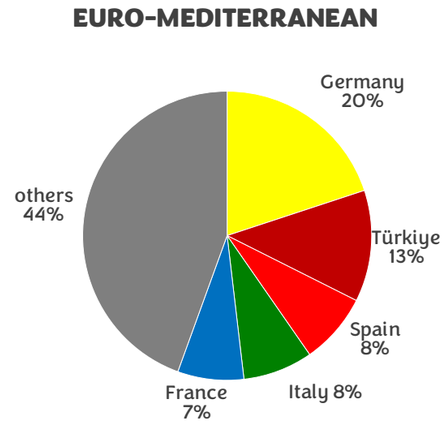
Red clays, claystones and shales are obtained from a wide spectrum of sedimentary deposits, ranging from Quaternary to Cambrian in age [2-4]:

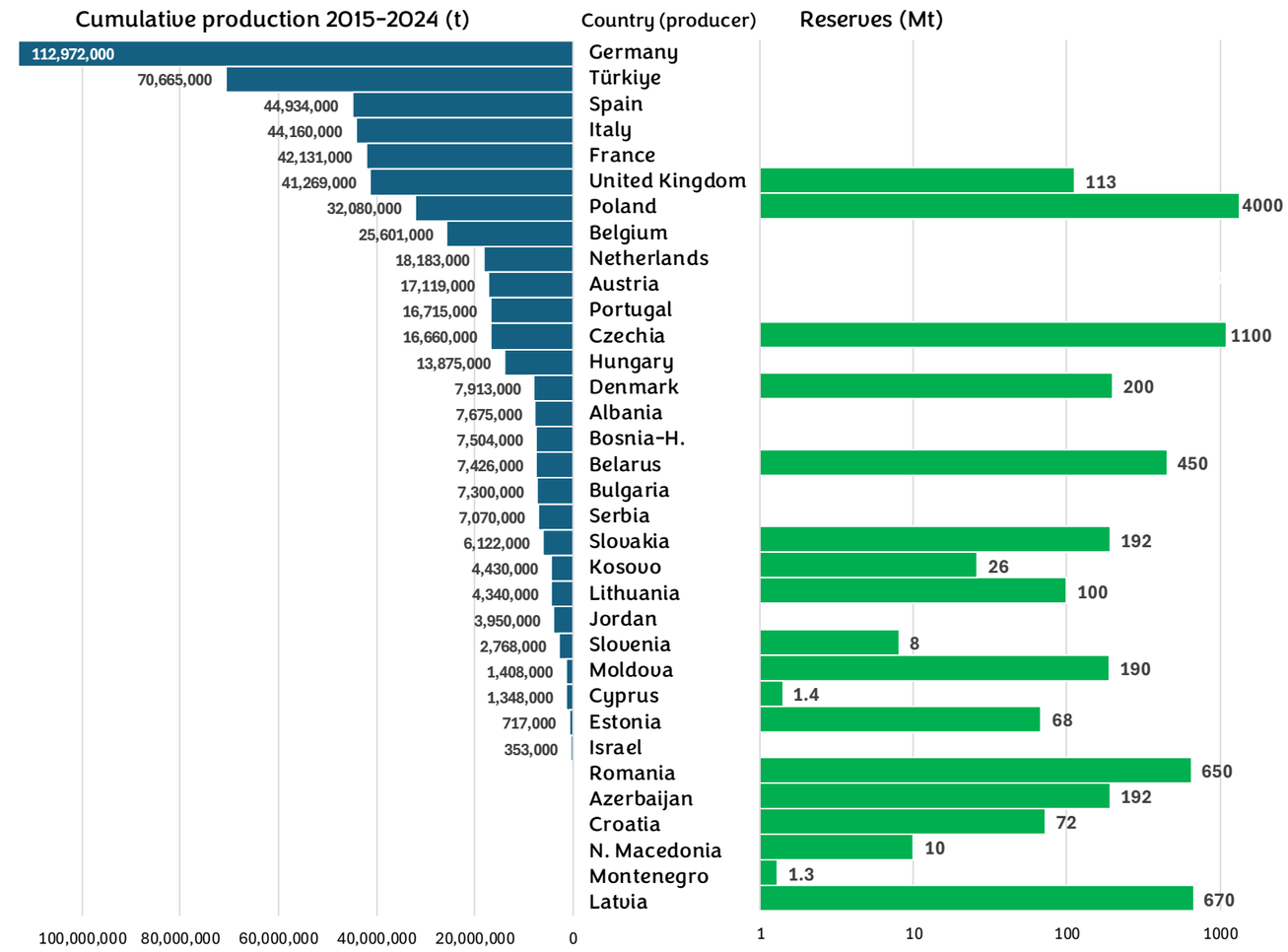
- eluvial and colluvial clays, often related to glacial regolith (59a H);
- continental sediments deposited in lacustrine, palustrine, fluvial, deltaic, and glacial environments (59a J);
- marine to paralic deposits, consisting of estuarine, shelf, slope and deep-sea argillaceous series (59a J);
- slates and phyllonites of very low- to low grade regional metamorphism (59c J-60 J).

Red stoneware clays are mainly recovered from marine and fluvio-lacustrine sediments. Commonly, various red clay sources are exploited simultaneously, except for countries with a small production. All the above types of clay deposits are under exploitation in many Euro-Mediterranean countries, but systematic statistics are available only for a few states [2,3].









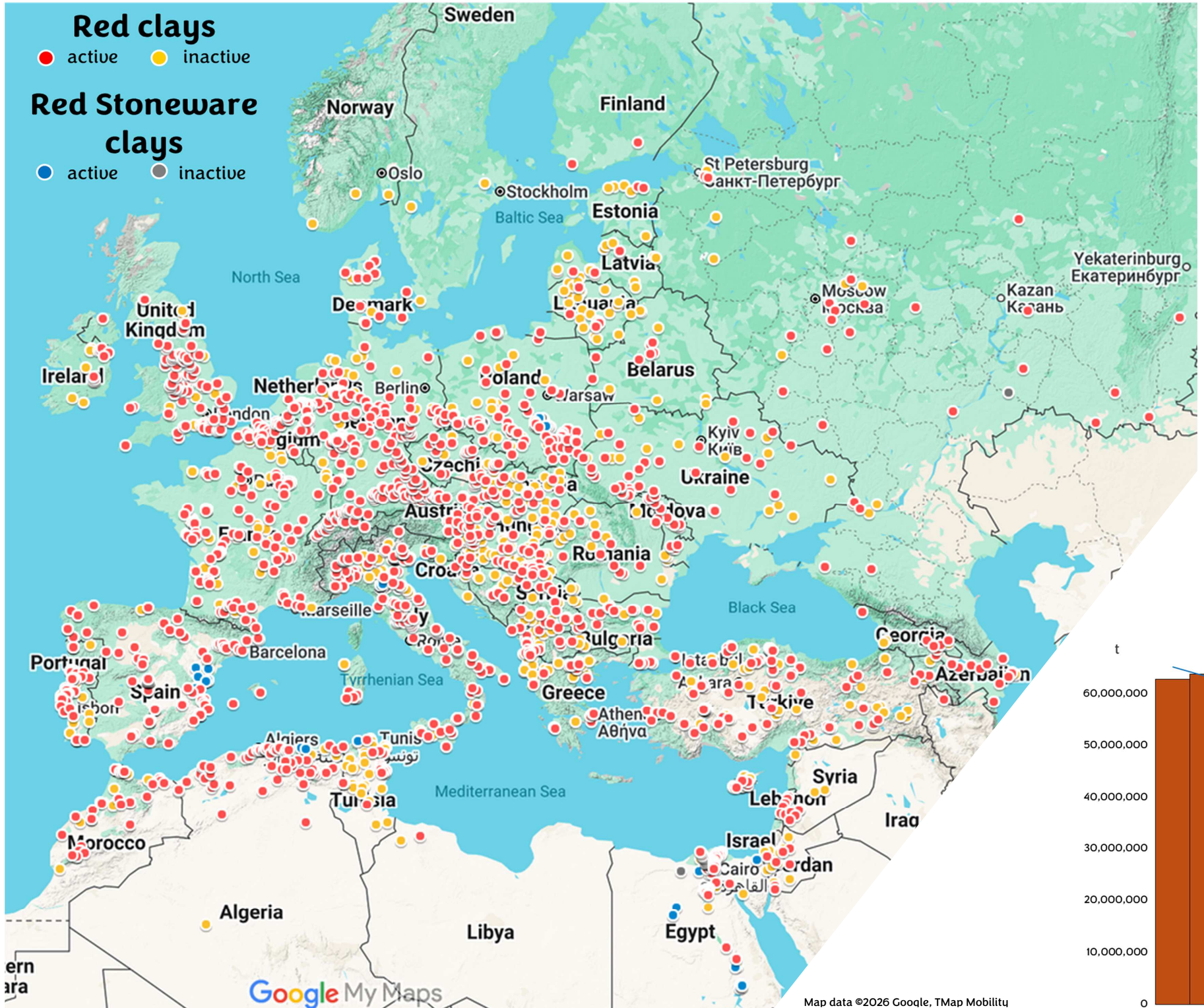
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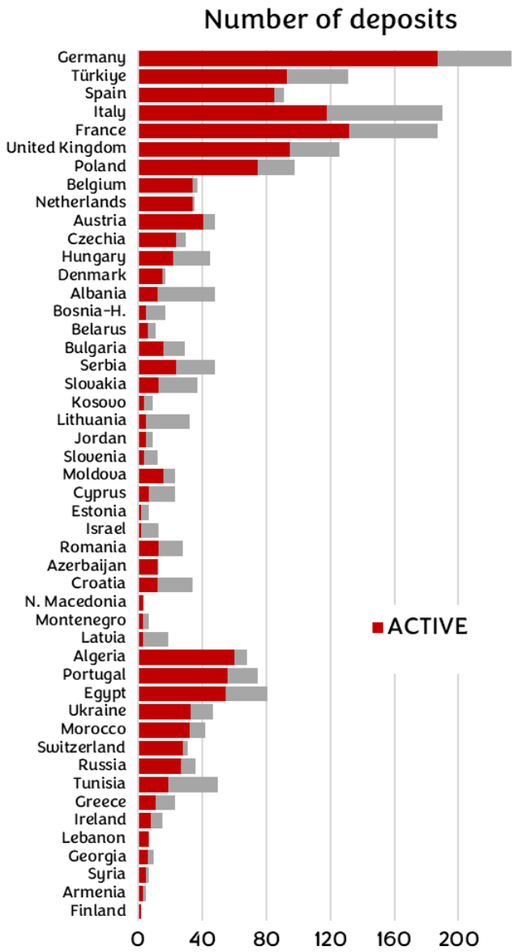
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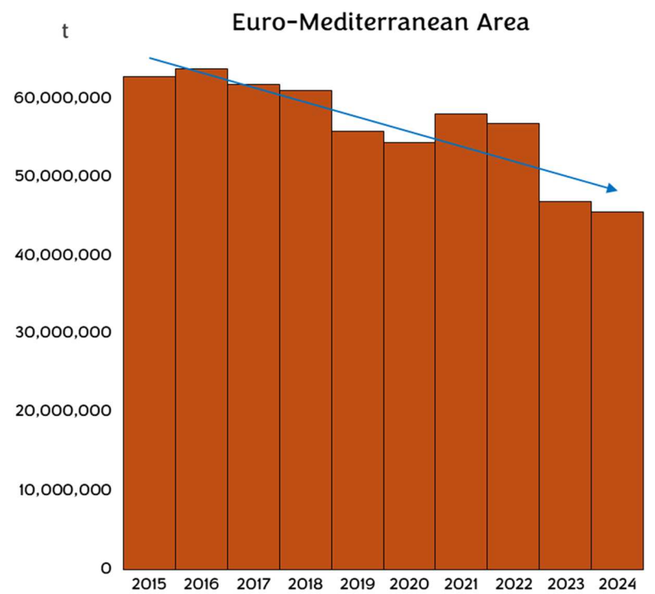
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Red clays
active
inactive
Red Stoneware clays
active
inactive
Sweden
Norway
Finland
Oslo
Stockholm
St Petersburg
Санкт-Петербург
Baltic Sea
Estonia
Latvia
North Sea
Yekaterinburg
Екатеринбург
Moscow
Москва
Kazan
Казань
Denmark
United Kingdom
Ireland
Belarus
Netherlands
Berlin
Poland
Warsaw
Kyiv
Київ
Ukraine
Moldova
Romania
Czechi
Austria
Black Sea
Georgia
Bulgaria
Barcelona
Portugal
Spain
Tyrrhenian Sea
Greece
Athens
Αθήνα
Algiers
Tunis
Mediterranean Sea
Syria
Lebanon
Iraq
Israel
Cairo
القاهرة
Morocco
Algeria
Libya
Egypt
Google My Maps
Map data ©2026 Google, TMap Mobility


Number of deposits
Germany
Türkiye
Spain
Italy
France
United Kingdom
Poland
Belgium
Netherlands
Austria
Czechia
Hungary
Denmark
Albania
Bosnia-H.
Belarus
Bulgaria
Serbia
Slovakia
Kosovo
Lithuania
Jordan
Slovenia
Moldova
Cyprus
Estonia
Israel
Romania
Azerbaijan
Croatia
N. Macedonia
Montenegro
Latvia
Algeria
Portugal
Egypt
Ukraine
Morocco
Switzerland
Russia
Tunisia
Greece
Ireland
Lebanon
Georgia
Syria
Armenia
Finland
ACTIVE
0
40
80
120
160
200


Euro-Mediterranean Area
t
60,000,000
50,000,000
40,000,000
30,000,000
20,000,000
10,000,000
0
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024

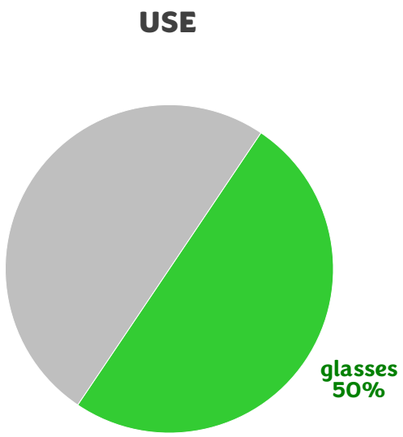
Soda ash (natural and synthetic)

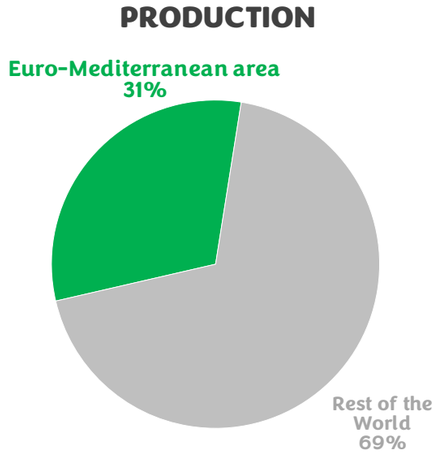
Sodium carbonate (soda ash) is massively used by the glass industry, which accounts for about half of total demand. Soda ash is a major ingredient of soda-lime glasses (container, flat, windshields, etc.) and an important component of fiberglass, ceramic frits and specialty glasses. Soda ash can be obtained from natural deposits of sodium carbonates (trona, pirssonite and nahcolite) and sodium sulphates (glauberite, mirabilite and thenardite) or through the Solvay ammonia-soda process, which obtains soda ash from halite and limestone, with ammonia as catalyst, or alternative chemical processes [1,2].

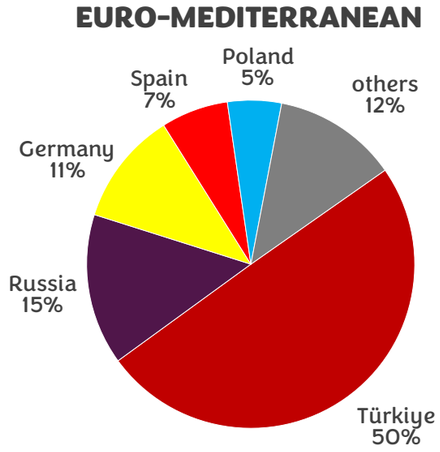
The Euro-Mediterranean production of soda ash, both from natural deposits and from the synthetic route, averages 22.7 million tpa, which is around 30% of the global output. The trend over the past decade has been sharply increasing, as production in the Euro-Mediterranean area more than doubled from 13.5 million tonnes in 2015 to 29 million tonnes in 2024. This formidable growth is essentially due to the more than 5-fold increase in mining of trona, glauberite, and thenardite, since the manufacture of synthetic soda ash remained essentially stable around 10 million tonnes. Natural sodium sulphate deposits are exploited in Spain, while natural sodium carbonate deposits are mined in Türkiye and Egypt. The manufacture of synthetic soda ash (mostly Solvay process) is carried out by around twenty plants in ten countries, with Russia, Germany, Poland, France, and Italy being the main producers.

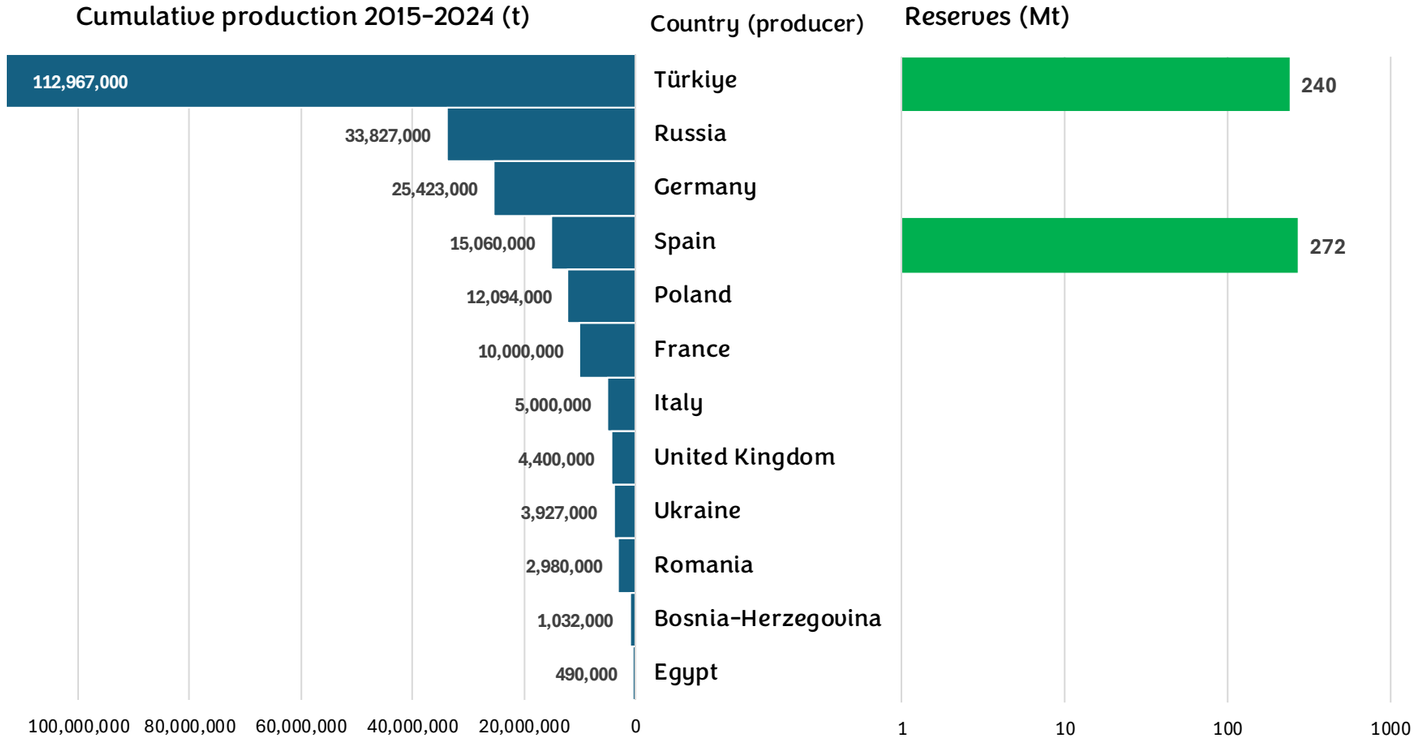
Reserves of natural sodium carbonates and sodium sulphates are large in Spain and Türkiye and appear to be sufficient for several decades at current extraction rates.

Deposits of sodium carbonates and sodium sulphates in the Euro-Mediterranean area were formed under arid climate in alkaline lakes and in lacustrine or playa lake evaporitic sequences, ranging from Eocene to present, even though the largest resources are in Miocene sediments [1-6].









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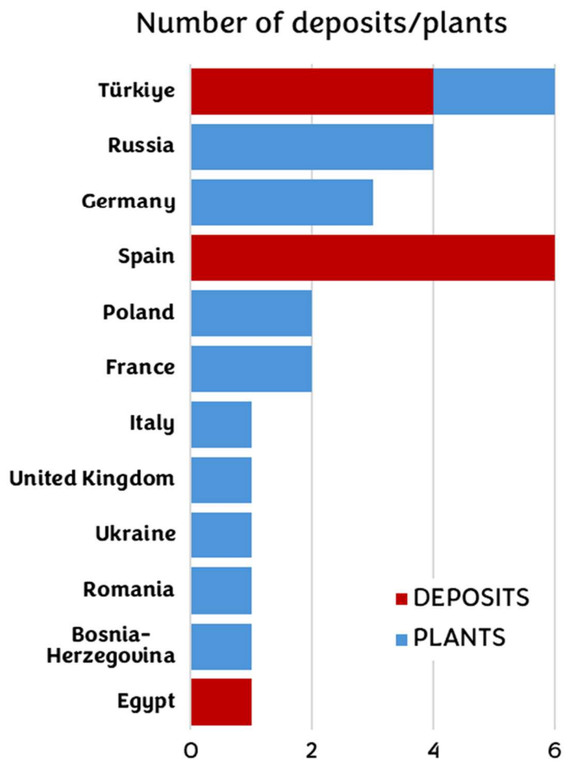
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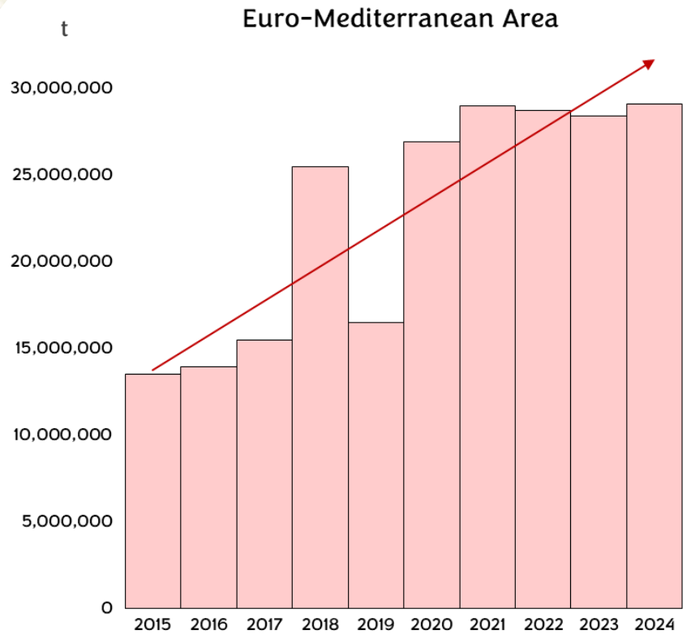
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Soda ash
active
inactive
Sweden
Norway
Finland
Oslo
Stockholm
Baltic Sea
St Petersburg
Санкт-Петербург
Estonia
Latvia
Lithuania
North Sea
Denmark
United Kingdom
Ireland
Moscow
Москва
Kazan
Казань
Belarus
Poland
Warsaw
Netherlands
Berlin
London
Germany
Belgium
Paris
Czechia
Slovakia
Ukraine
Kyiv
Київ
Austria
Hungary
Moldova
France
Romania
Croatia
Serbia
Black Sea
Marseille
Italy
Rome
Bulgaria
Georgia
Azerbaijan
Portugal
Barcelona
Tyrrhenian Sea
Spain
Lisbon
Istanbul
Ankara
Türkiye
Greece
Athens
Αθήνα
Algiers
مدينة الجزائر
Tunis
تونس
Mediterranean Sea
Syria
Lebanon
Iraq
Tunisia
Morocco
Israel
Jordan
Cairo
القاهرة
Algeria
Libya
Egypt
Google My Maps
Map data ©2026 Google, TMap Mobility


Number of deposits/plants
Türkiye
Russia
Germany
Spain
Poland
France
Italy
United Kingdom
Ukraine
Romania
Bosnia-Herzegovina
Egypt
DEPOSITS
PLANTS
0
2
4
6


Euro-Mediterranean Area
t
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024

Talc (steatite, soapstone, leucophyllite)

Talc is used in the manufacturing of substrates for catalytic converters, ceramic tiles, refractories, and electrical porcelain [1,2]. Talc is a major component in honeycomb cordierite substrates for automotive catalytic converters and diesel particulate filters. It is also an important ingredient of synthetic steatite electro-porcelain, as well as cordierite and enstatite refractories. In addition, talc plays as fluxing additive in floor tiles [1,2]. The raw materials used in these applications are talc or its varieties: *steatite*, a relatively pure, massive talc ore; *soapstone*, a talc-magnesite-chlorite assemblage; *leucophyllite*, a muscovite-chlorite-quartz mixture [1-3].

Talc production in the Euro-Mediterranean area amounts to 1,140,000 tpa on average, which corresponds to around 16% of global output. Extraction is carried out by about 30 mines in a dozen countries, with further 15 countries claiming talc occurrences. The main producers are France, Finland, Italy, Austria and Slovakia, which together account for 88% of Euro-Mediterranean talc output. The regional trend shows a production growth up to 1.24 million tonnes in 2018, but after that it began to decline down to around one million tonnes of talc in 2023-2024.

No reserves data are provided, except for Slovakia and Finland, so it is not possible to make any prediction, at the Euro-Mediterranean level, on talc mining at the current rate of extraction. However, as ceramic applications are less demanding than other uses (cosmetic, paper, etc.) regarding talc features, future availability should be ensured.

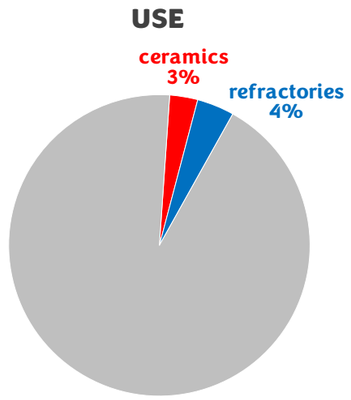
Talc deposits are formed by four main processes [1,4]:

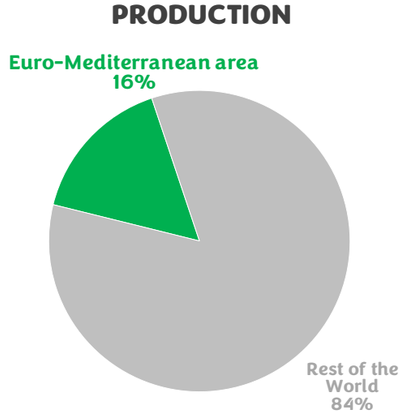
i) serpentinization of ultrabasic or basic rocks, followed by carbonization of serpentinite (type 56a AB), resulting in talc-magnesite-chlorite parageneses (soapstone), typically found in ophiolitic complexes; examples include Norway, Finland, Russia, Italy (peridotite as host rock) and Egypt (gabbro as host rock).

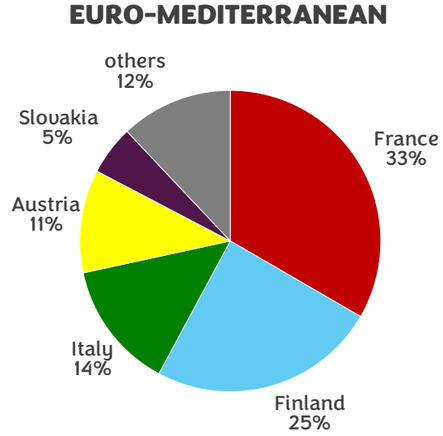
ii) hydrothermal alteration of host rock (dolomite or magnesite) by silica-containing fluids, forming talc-dolomite-calcite-chlorite assemblages; examples are deposits in France and Spain.

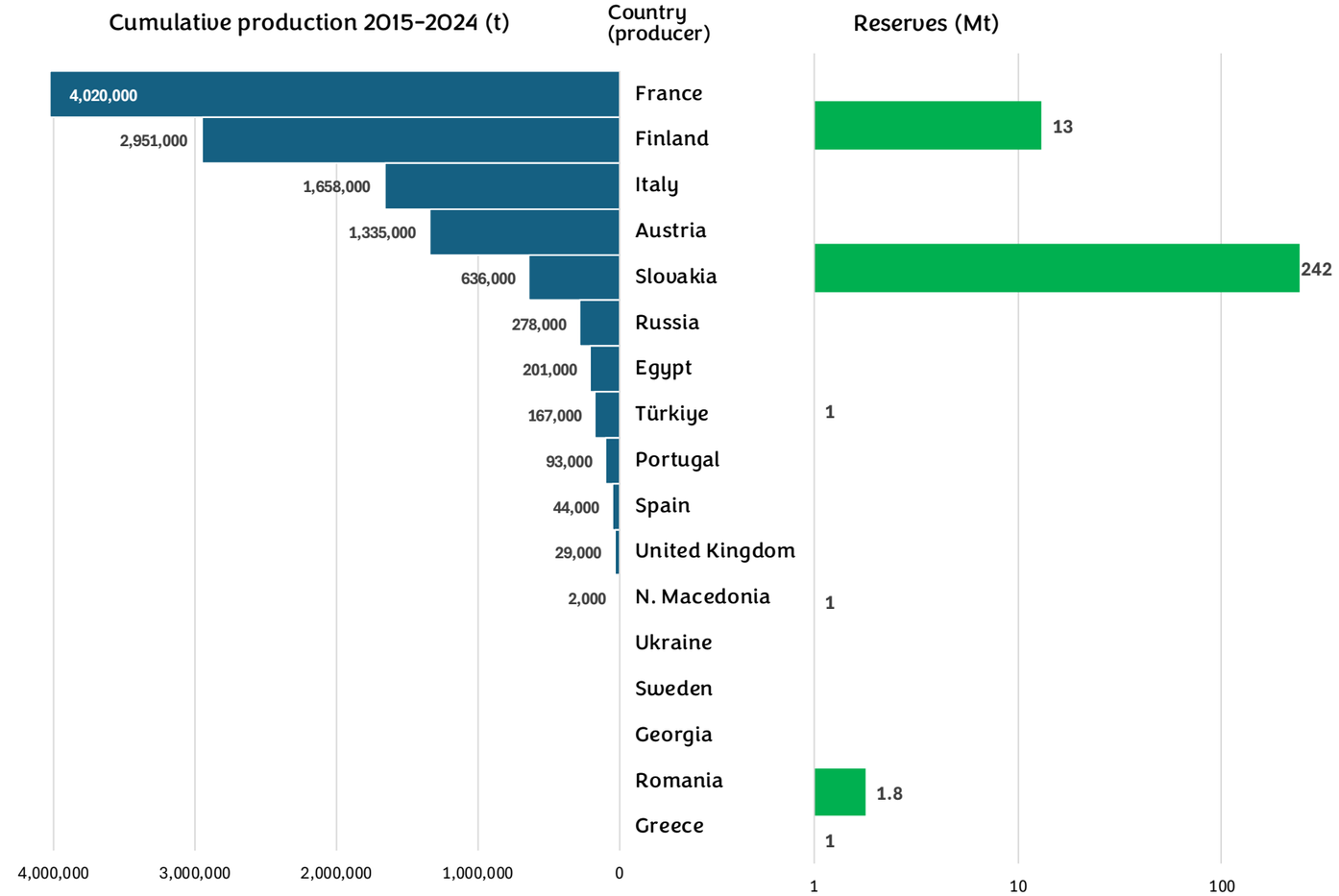
iii) metamorphism of dolomitic marbles, followed by alteration of amphiboles (driven by pressure and temperature) to talc and carbonates associations; examples are deposits in Slovakia and Italy.

iv) retrograde metamorphism of gneisses in shear zones, leading to leucophyllite or talc mineralization (56a G-56a K-60 K); examples are in Austria and Hungary.









References

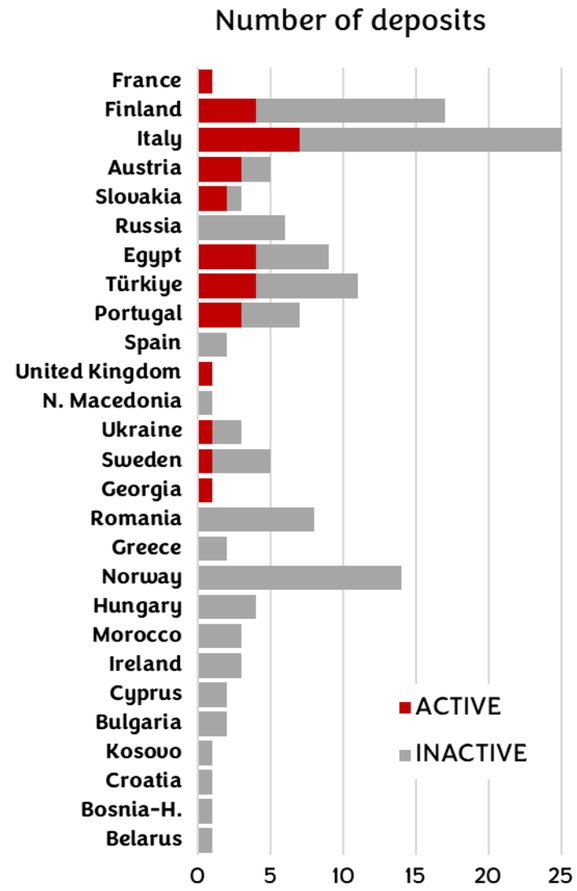
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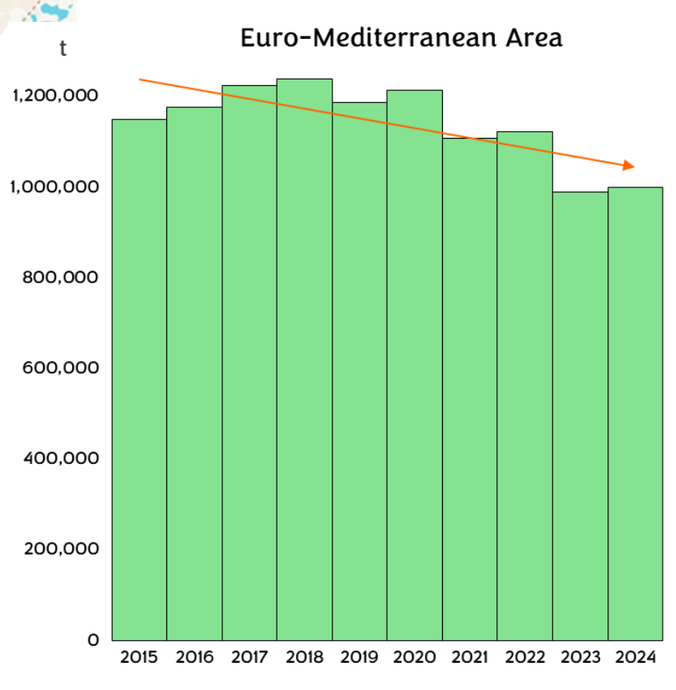
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Talc
active
inactive
Sweden
Norway
Finland
Oslo
Stockholm
Baltic Sea
St Petersburg
Санкт-Петербург
Estonia
Latvia
Lithuania
North Sea
Denmark
United Kingdom
Ireland
Netherlands
Berlin
London
Belgium
Germany
Paris
Poland
Warsaw
Belarus
Moscow
Москва
Yekaterinburg
Екатеринбург
Kazan
Казань
Kyiv
Київ
Ukraine
Moldova
Czechia
Slovakia
Austria
Hungary
France
Romania
Croatia
Serbia
Marseille
Italy
Rome
Barcelona
Portugal
Spain
Lisbon
Tyrrhenian Sea
Bulgaria
Black Sea
Istanbul
Ankara
Greece
Athens
Αθήνα
Türkiye
Georgia
Azerbaijan
Algiers
مدينة الجزائر
Tunis
تونس
Tunisia
Mediterranean Sea
Syria
Lebanon
Iraq
Israel
Jordan
Cairo
القاهرة
Morocco
Algeria
Libya
Egypt
Western Sahara
Google My Maps
Map data ©2026 Google, TMap Mobility


Number of deposits
France
Finland
Italy
Austria
Slovakia
Russia
Egypt
Türkiye
Portugal
Spain
United Kingdom
N. Macedonia
Ukraine
Sweden
Georgia
Romania
Greece
Norway
Hungary
Morocco
Ireland
Cyprus
Bulgaria
Kosovo
Croatia
Bosnia-H.
Belarus
ACTIVE
INACTIVE
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25


Euro-Mediterranean Area
t
1,200,000
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400,000
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2015
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2024

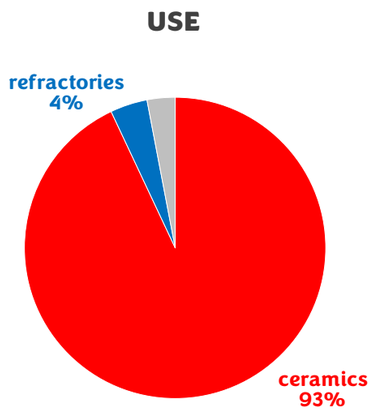
White clays

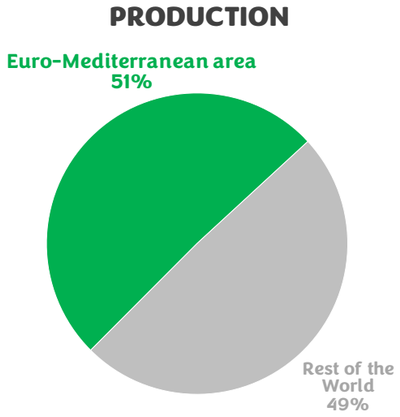
White clays (whether ball clays or refractory clays) are quintessentially ceramic raw materials, as they are used, in the Euro-Mediterranean area, almost exclusively as a plastic component of batches for whiteware, wall and floor tiles, engobes, and silicate refractories. Ball clays are fundamental for the manufacture of sanitaryware and porcelain stoneware tiles, just to mention the main end-users [1-3]. Refractory clays are equally important in the manufacture of mullite, alumina-mullite, cordierite-mullite, and mullite-zirconia refractories for furnace furniture, including rollers [4,5].

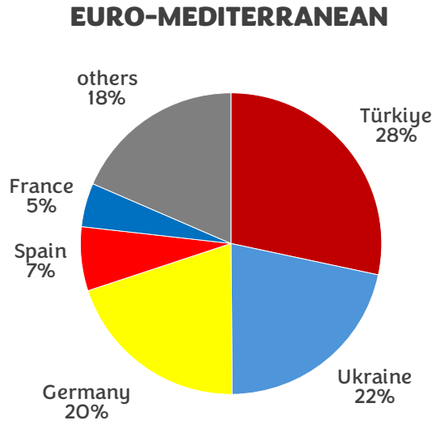
The production of white clays in the Euro-Mediterranean area (17.8 million tpa on average) is virtually half of world output. It is carried out by over 270 mines in 25 countries, with Türkiye, Ukraine, Germany, Spain and France as the main suppliers, which together ensure around 80% of the Euro-Mediterranean production. Nevertheless, the trend of the last decade has been in conspicuous decline, going from around 22 million tonnes in 2015 down to 12-13 million tonnes in 2023-2024. It reflects various causes, such as the drastic reduction in Ukrainian ball clay extraction, due to Russian aggression, and the decline in ceramic tiles production due to trade barriers and repeated increase of the energy cost.

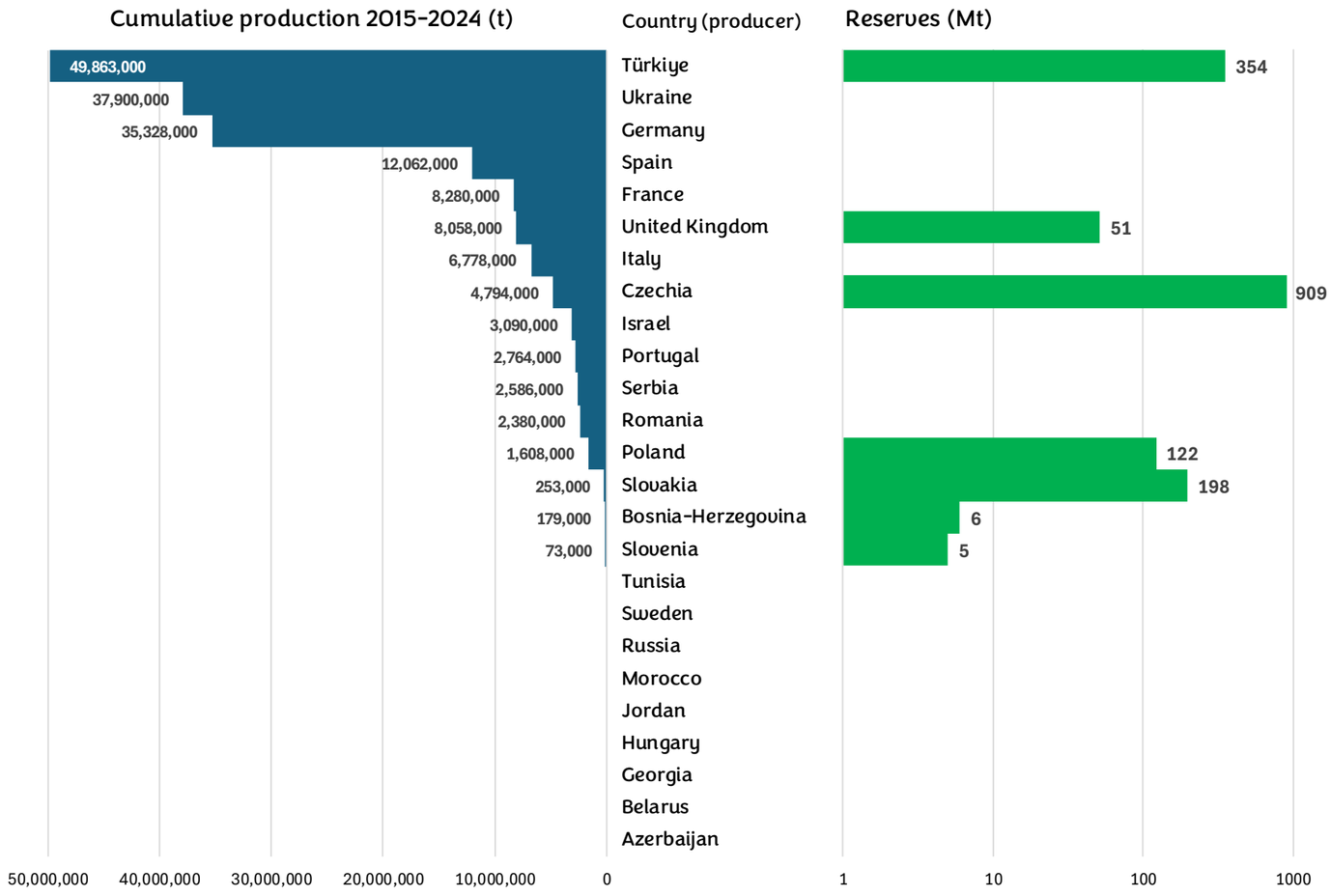
The reserves indicated are large, compared to the current extraction rates, and can guarantee several dozen years of autonomy. However, many countries (and particularly most of the larger suppliers) do not disclose their reserves. In addition, a general problem, which cannot be gathered by analysing reserve data, is the qualitative depletion of clay deposits, as complained in virtually all mining districts.

White clays consist mainly of phyllosilicates (kaolinite, illite, smectite and interstratified terms thereof) associated with quartz, feldspars, and accessories. They are found predominantly within continental sedimentary sequences and particularly in low energy depositional environments: typically lacustrine and palustrine, but sometimes also fluvial, deltaic and estuarine [2,3]. Refractory clays are often interbedded with coal or lignite seams and may also lie below bauxite levels [4]. White clays were sedimented from lower Paleozoic to Quaternary in the Euro-Mediterranean area. Deposits are mainly Miocene in age in eastern Europe, Türkiye and Tunisia; Oligocene-Eocene in central and western Europe; Pliocene-Quaternary in Portugal; Cretaceous in Spain, Egypt and Czechia; Jurassic in Sardinia, Sweden and Israel; Paleozoic in Jordan. About one third of deposits is in Paleogene formations, but half of the Euro-Mediterranean production comes from Miocene units. There are few cases of epithermal genesis, with a peculiar clay assemblage (kaolinite, sericite, pyrophyllite, etc.).









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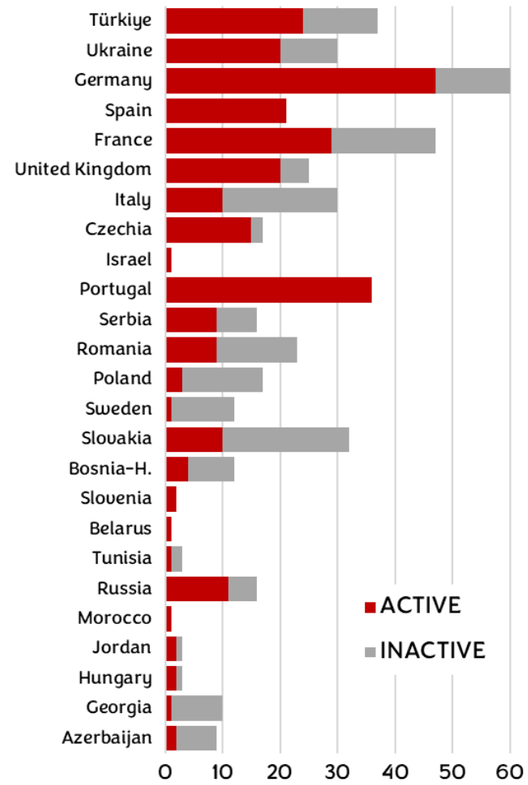
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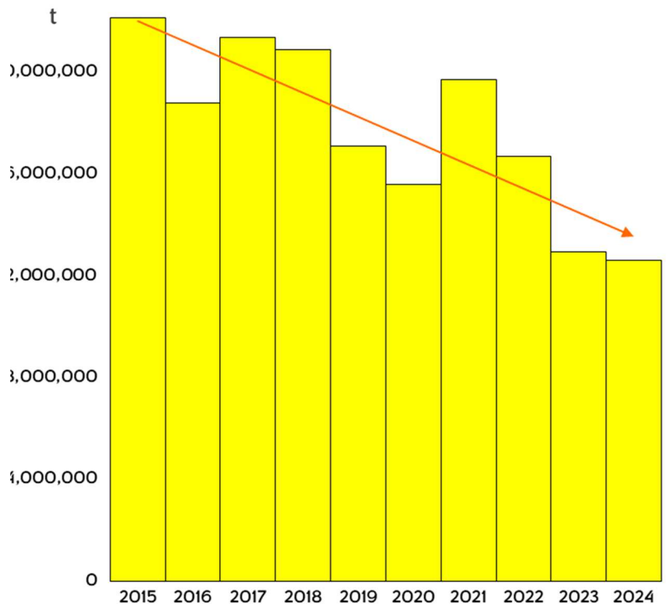
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Number of deposits



Euro-Mediterranean Area



Zeolites

Zeolites are not used directly by the ceramic and glass industries [1,2], but volcanic tuffs and epiclastic sediments – more or less intensely zeolitized – can be employed in the production of lightweight aggregates and as feldspar substitutes in ceramic tiles [3,4].

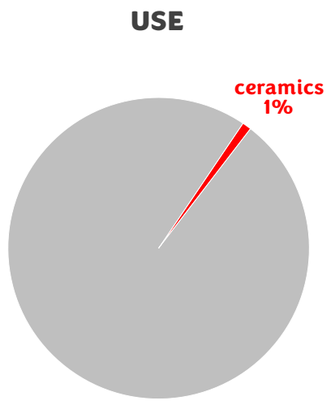
The production of zeolitized raw materials is carried out by at least 35 quarries in 15 countries of the Euro-Mediterranean area. Major producers are Slovakia, Georgia, Türkiye, Russia, and Hungary for an average output is 455,000 tpa. However, this figure is certainly underestimated, as 9 out of 15 producing countries did not disclose the quantity extracted. In any case, the Euro-Mediterranean share is around one third of global production. The trend over the past decade has steadily increased from ~350,000 tonnes in 2015 to ~540,000 tonnes in 2024.

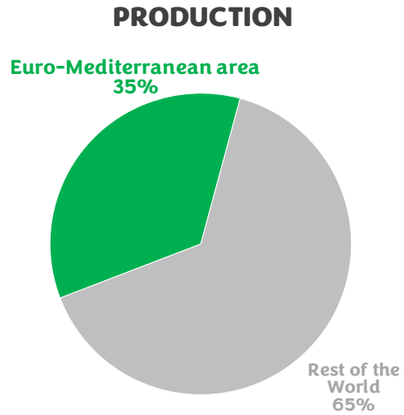
Declared reserves of zeolites are large and assure the current rates of extraction for a long time, at least for Slovakia, Georgia, and Jordan. At any event, resources of zeolitized raw materials in the remaining producing countries of the Euro-Mediterranean area appear to be large with respect to demand.

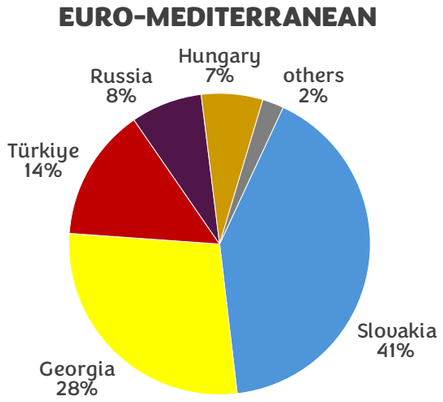
Deposits of zeolites in the Euro-Mediterranean area were formed from Quaternary to Jurassic (Miocene, Eocene-Oligocene, and Cretaceous are the most frequent ages). Zeolites extracted are mainly clinoptilolite and to a lesser extent chabazite, phillipsite, analcime, and mordenite (rarely heulandite, laumontite, and faujasite).

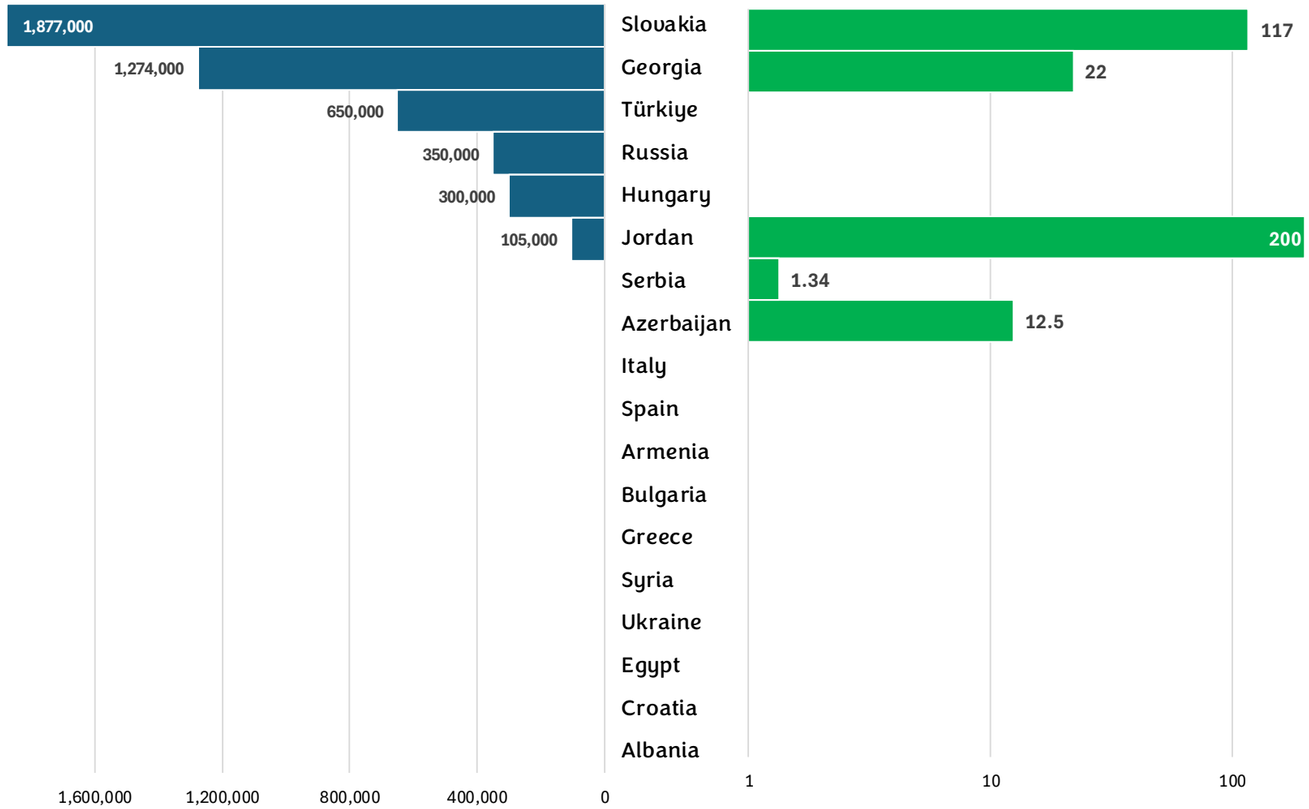
Zeolite deposits pertain to three types [5-7]:

- Supergene-hypogene zeolitization upon cooling of volcanic flows and reaction with water after being consolidated (43d BCDE); these zeolitites are mined in Slovakia, Türkiye, Hungary, Jordan and Italy.
- Volcano-sedimentary zeolitic tuffs interbedded in continental and shallow marine sequences; examples are in Georgia, Russia, Serbia, Azerbaijan, Armenia and Bulgaria.
- Epiclastic zeolitic sediments in saline alkaline lakes (43f JL); examples are reported in Italy, Spain, and Syria.









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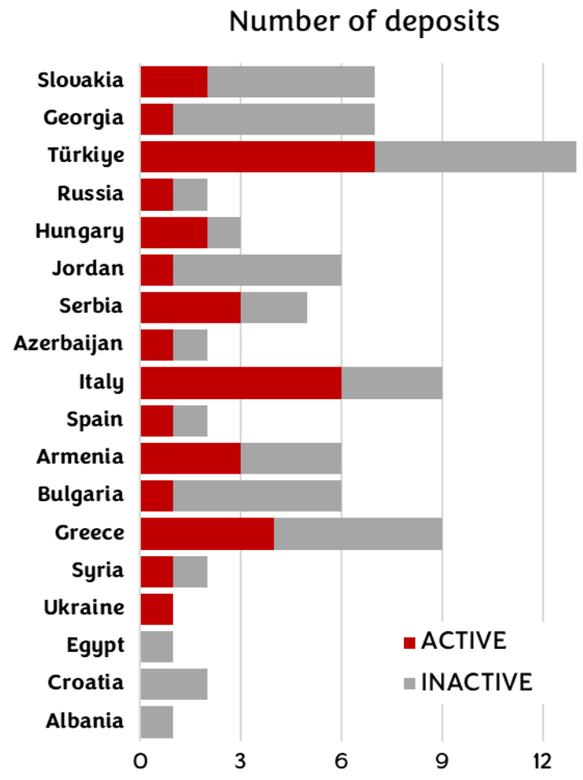
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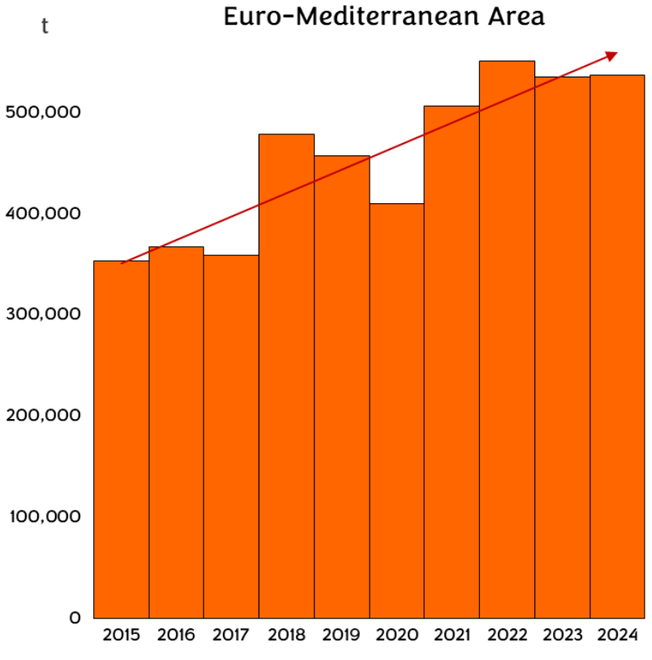
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Zeolites
active
inactive
Sweden
Norway
Finland
Oslo
Stockholm
St Petersburg
Санкт-Петербург
Baltic Sea
Estonia
Latvia
North Sea
Lithuania
Denmark
Moscow
Москва
Kazan
Казань
United Kingdom
Ireland
Belarus
Poland
Netherlands
Berlin
Warsaw
London
Germany
Belgium
Kyiv
Київ
Czechia
Ukraine
Paris
Slovakia
Austria
Moldova
Hungary
France
Romania
Croatia
Serbia
Black Sea
Marseille
Italy
Rome
Bulgaria
Barcelona
Portugal
Spain
Tyrrhenian Sea
Istanbul
Ankara
Azerbaijan
Greece
Türkiye
Lisbon
Athens
Αθήνα
Algiers
مدينة الجزائر
Tunis
تونس
Syria
Mediterranean Sea
Tunisia
Lebanon
Iraq
Morocco
Israel
Jordan
Cairo
القاهرة
Algeria
Libya
Egypt
Google My Maps
Map data ©2026 Google, TMap Mobility


Number of deposits
Slovakia
Georgia
Türkiye
Russia
Hungary
Jordan
Serbia
Azerbaijan
Italy
Spain
Armenia
Bulgaria
Greece
Syria
Ukraine
Egypt
Croatia
Albania
ACTIVE
INACTIVE
0
3
6
9
12


Euro-Mediterranean Area
t
500,000
400,000
300,000
200,000
100,000
0
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024

Zircon and baddeleyite (Zirconium minerals)

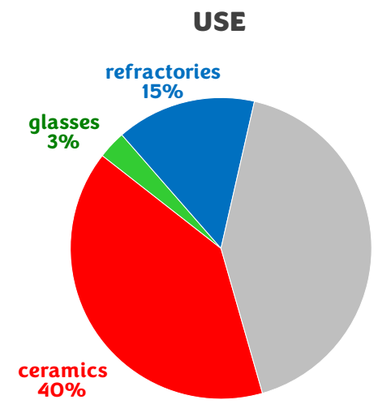
Zirconium minerals are employed to a large extent by the ceramic and glass industries, which make use of both natural zircon and synthetic baddeleyite (zirconia). Zircon is the preferred opacifier in glazes, engobes and super white floor tiles, and is the basis of zircon refractories [1,2]. However, limitations to its use are due to radioactivity induced by low U and Th contents [3]. Zirconia is a major component of zirconia-mullite refractories and ceramic pigments, as well as an ingredient in special glasses and frits [1]. Ceramics based on stabilized (or partially stabilized) zirconia are important in dentistry, while ZrC and ZrB_2 are ultra-high temperature ceramics, essential also in matrix composites for extreme temperatures [4,5].

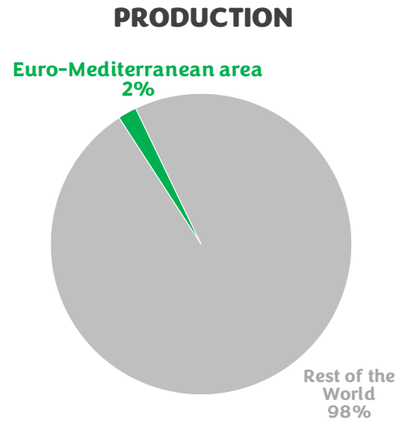
Zirconium minerals have been produced by four mines in the Euro-Mediterranean area, located in Ukraine, Russia and Türkiye. The average output is 26,700 tpa, which corresponds just to 2% of the global production. Nevertheless, the mining of zirconium minerals in the Euro-Mediterranean region has declined sharply in the past decade, with a decrease from around 40,000 tonnes in 2015 to 11,000 tonnes in 2023-2024. This was caused by the reduction in Ukrainian production due to Russian aggression and the closure of the Turkish mine.

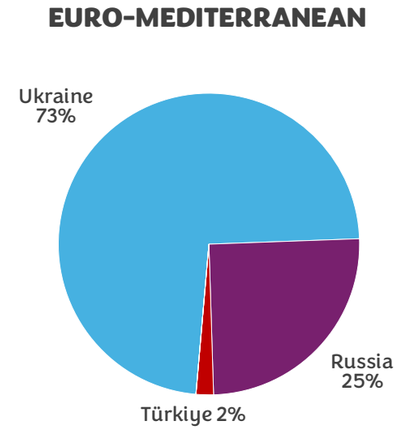
Ukrainian declared reserves are large, but data are missing for Russia and Türkiye. Half a dozen countries boast zircon resources, but the size of possible deposits is not provided, except for Jordan, nor is information on their actual exploitability in economic terms. Arguably, the list of countries with zircon occurrences might be not limited to Syria, Portugal, Morocco, Latvia, Jordan and Egypt.

There are two types of zirconium mineral deposits in the Euro-Mediterranean area [6]:

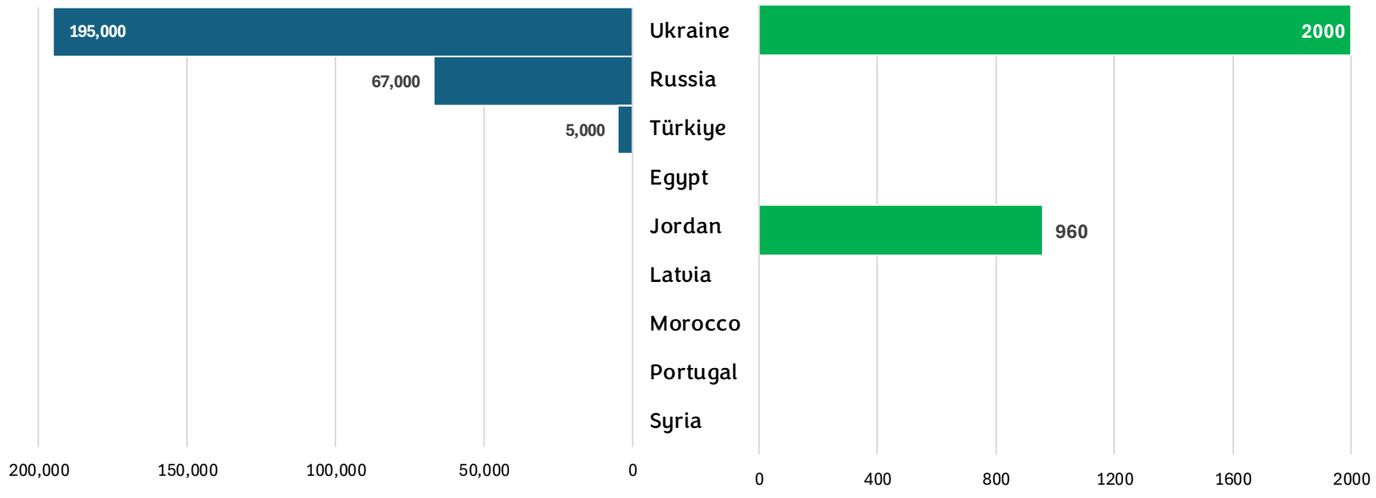
- sedimentary placers (type 39 I) where zircon sand is obtained as byproduct of titanium minerals mining, as in the Ukrainian and Turkish deposits, as well as in the above-mentioned occurrences [2,7,8];
- baddeleyite mineralization in carbonatite-alkaline igneous complexes (39 E) as in the Kovdor deposit in the Kola Peninsula and a Portuguese occurrence [1,8].







Cumulative production 2015-2024 (t)



Country (producer)

Reserves ('000 t)

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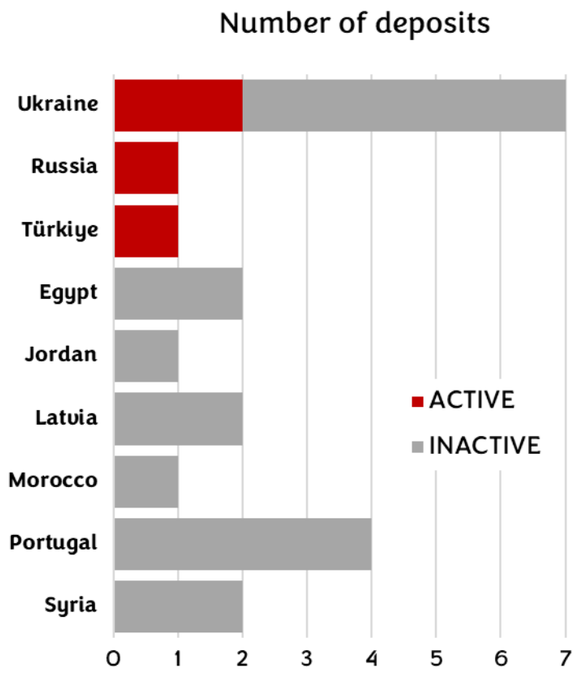
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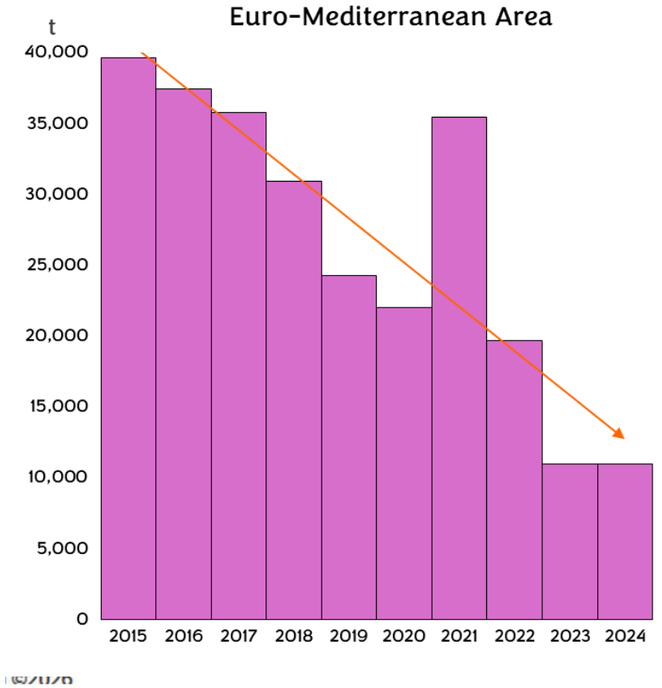
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Zirconium minerals
active
inactive
Kyanite Andalusite
Sillimanite
active
inactive
Sweden
Norway
Finland
Oslo
Stockholm
Baltic Sea
St Petersburg
Санкт-Петербург
Estonia
Latvia
North Sea
Denmark
Lithuania
Moscow
Москва
Kazan
Казань
Yekaterinburg
Екатеринбург
United Kingdom
Ireland
Netherlands
Berlin
Poland
Warsaw
Belarus
London
Germany
Belgium
Kyiv
Київ
Ukraine
Czechia
Slovakia
Paris
Austria
Hungary
Moldova
France
Romania
Croatia
Serbia
Marseille
Italy
Rome
Black Sea
Georgia
Bulgaria
Istanbul
Barcelona
Portugal
Spain
Tyrrhenian Sea
Ankara
Türkiye
Azerbaijan
Greece
Lisbon
Athens
Αθήνα
Algiers
مدينة الجزائر
Tunis
تونس
Syria
Tunisia
Mediterranean Sea
Lebanon
Morocco
Israel
Cairo
القاهرة
Jordan
Algeria
Libya
Egypt
Google My Maps
Map data ©2026 Google, TMap Mobility


Number of deposits
Ukraine
Russia
Türkiye
Egypt
Jordan
Latvia
Morocco
Portugal
Syria
ACTIVE
INACTIVE
0
1
2
3
4
5
6
7


Euro-Mediterranean Area
t
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024

Kyanite Andalusite Sillimanite

Although kyanite, andalusite, and sillimanite (polymorphs with the same Al_2SiO_5 composition) have different properties, these minerals are essentially ceramic raw materials that are used primarily by the refractory industry. Main application is for smelting and processing of ferrous metals, while nonferrous metallurgy, glassmaking and ceramic manufacturing represent smaller shares [1]. Kyanite-group minerals are utilized also in the ceramic sector, for investment casting, kiln furniture, and abrasive, among others. They can be added to bodies for sanitaryware, wall tiles, and special purpose ceramics, even if this is not a common industrial practice [1].

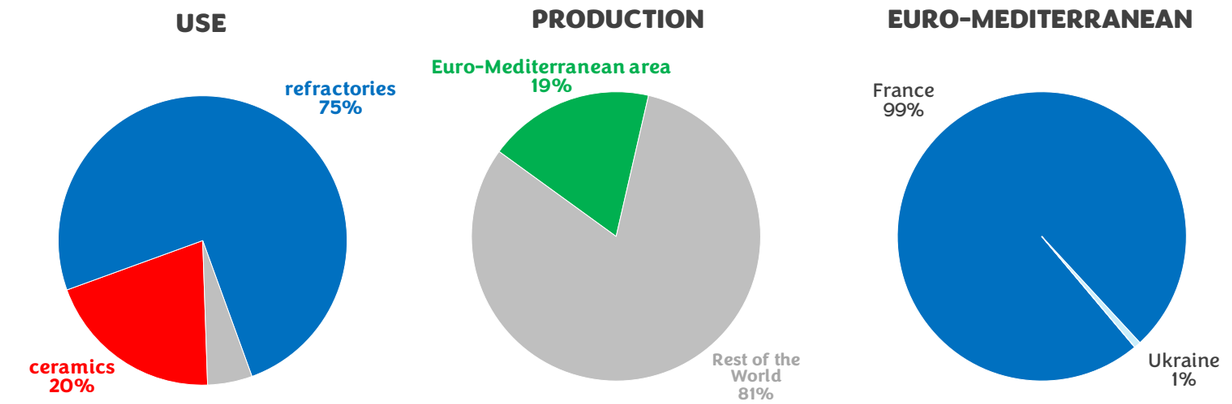
The production in the Euro-Mediterranean area is nearly constant around 60,000 tpa, apparently limited to andalusite mined in France (which accounts for about a fifth of world production of kyanite group minerals) as the quantities obtained in Ukraine and Morocco are not disclosed.

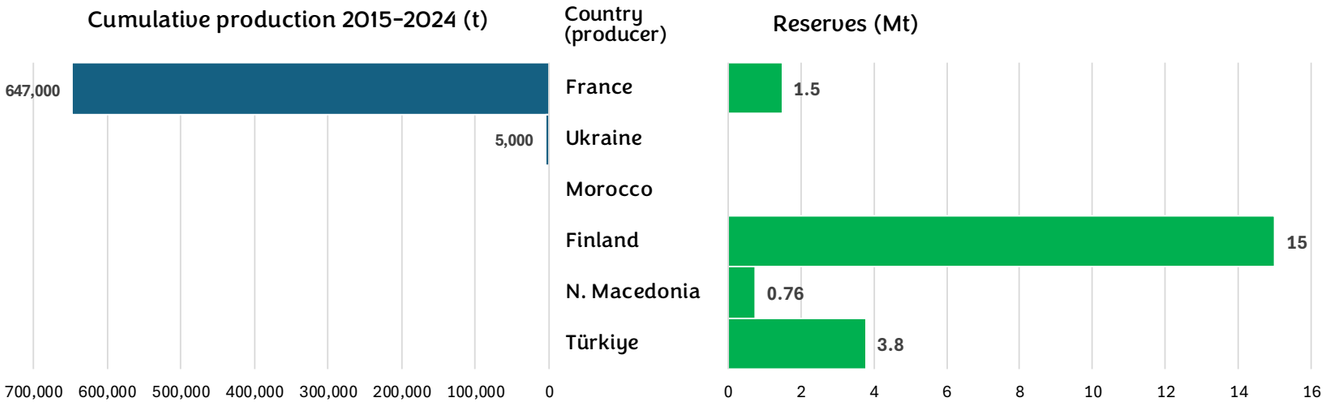
Andalusite reserves in France are sufficient for at least 25 years, at the current rate of extraction [2].

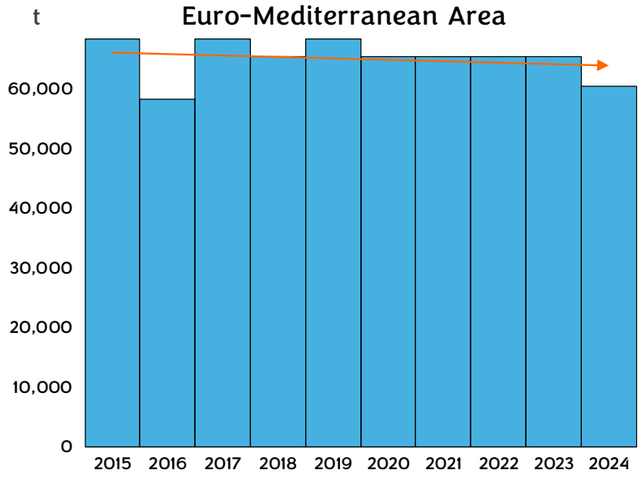
The exploitation of kyanite-group minerals concerns particularly hornfels, where andalusite deposits were originated by contact metamorphism on highly peraluminous pelitic rocks, as in the archetype deposit of Glomel in Brittany (France) and in similar occurrences, like in Morocco [1-3].

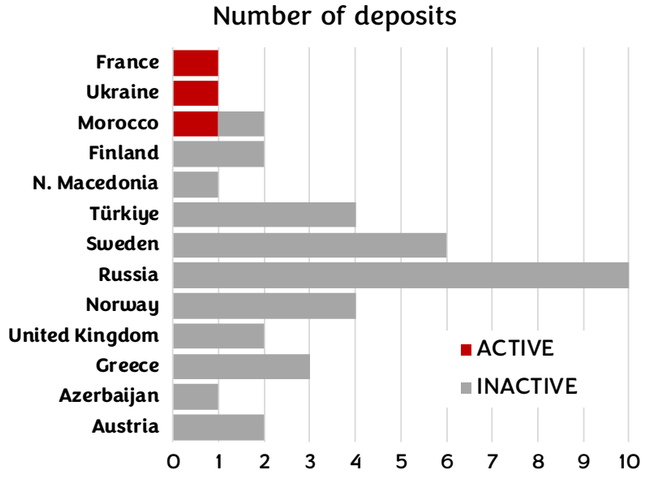
Also, sedimentary deposits in coastal placers – type 49a I, according to Dill [4] – operated for ilmenite, rutile and zircon, are extracting kyanite and sillimanite, as currently in Ukraine.

The largest reserves are in other metamorphic deposits (Finland, Türkiye) consisting of andalusite-sillimanite-kyanite crystalline schists, quartzites and gneisses (type 49c IJ). Several occurrences are reported in the Svecofennian Precambrian Shield (Sweden, Russia) and Caledonides (Norway, Scotland). Few of these deposits have been developed to exploitation, which has so far always been unsuccessful.









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Modern uses in glass and ceramic manufacturing

Wall and floor tiles

Clay bricks and roof tiles

Lightweight aggregates

Silicate glasses

Glazes, frits and engobes

Refractories

Clay drainage pipes

Sanitaryware and tableware



Wall and floor tiles

Ceramic tiles are engineered products used in a wide range of construction applications – including flooring, internal and external wall cladding, and ventilated façades – that require rigorous control over dimensions, flatness, mechanical performance, and aesthetics. The ceramic tile industry follows performance standards (ISO 13006 and EN 14411). Technical classification under ISO 13006 is primarily based on water absorption (WA) and the forming method (Group A for extruded tiles and Group B for dry-pressed tiles):

Group I (WA < 3%): subdivided into BIa (WA < 0.5%, *porcelain stoneware*) and BIb (0.5% < WA ≤ 3%, *white stoneware/red stoneware*).

Group II (WA 3–10%): subdivided into IIa (3–6%) and IIb (6–10%, e.g., *cottoforte*).

Group III (WA > 10%): high-porosity tiles (e.g., *majolica, monoporosa, earthenware*).

Commercially, the distinction is based on end-use (wall tiles for Groups III and IIb; floor tiles for Groups I and IIa) and body colour (light or dark). This creates a complex terminology where technical standards and commercial trade names overlap.

For ceramic tiles, several dominant categories are distinguished [1–3]:

Porcelain Stoneware (Group BIa, WA < 0.5) is characterised by almost total absence of porosity and is the result of a dense and highly vitrified microstructure, designed to maximize mechanical strength. The ratio between plastic components (clays) and non-plastic components (fluxes, fillers) is typically 40:60. Medium-high plasticity ball clays are preferred for increasingly large and thin slabs. Differences exist between glazed bodies (GPS) and unglazed bodies (UPS) in terms of colour, firing behaviour and technological performance.

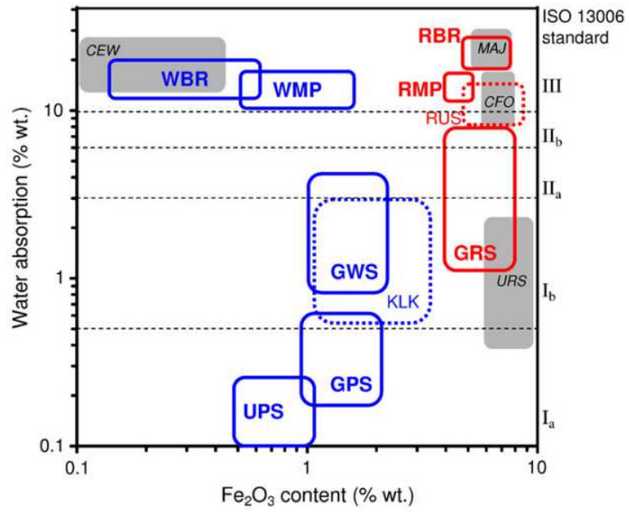
Red stoneware (GRS, Group BIb / BIIa / BIII) is based on red clays (together with fluxes and fillers, if necessary). Iron oxide is usually between 3% and 9%. The iron and alkali-earths present in red clays act as auxiliary fluxes, making it more difficult to control pyroplastic deformation compared to white vitrified bodies.

Monoporosa (Group BIII, WA > 10%) constitutes the adaptation of majolica or earthenware bodies to single-firing technology for wall tiles. Monoporosa formulations are rather complex and imply the use of different clays for WMP od RMP (white or red coloured, respectively) and fillers to maximize the permeability to gases during firing. Such high-porosity bodies allow a net-zero firing shrinkage through the formation of new phases (anorthite, melilite, and clinopyroxene), so guaranteeing lightness and dimensional consistency, which are fundamental requirements for walling applications.

Birapida (Group BIII, WA > 10%) represents the adaptation of majolica or earthenware bodies to double-firing technology for wall coverings. The bodies (WBR or RBR, respectively white or red coloured) are fired a first time to create a porous but mechanically resistant structure and a second time for glaze. Marly clays are often used for RBR, while for WBR ball clays are employed with the addition of calcite or dolomite) to ensure maximum porosity and lightness. Also birapida bodies have a net-zero firing shrinkage through the same reactions described for monoporosa.

Further types of body have virtually disappeared from the market since long time – being linked to obsolete technologies, as for *majolica* (MAJ), *earthenware* (EAW), *cottoforte* (CFO), *klinker* (KLK), and *unglazed red stoneware* (URS) – or because converted to porcelain stoneware, as the case of *glazed white stoneware* (GWS)

This variety of bodies for wall and floor tiles can be represented as a function of porosity (water absorption) and colour (mostly due to the content of iron oxide).



Typologies of ceramic tiles according to the iron oxide content and water absorption: their classification in agreement with ISO 13006 standard: Groups I, II and III [1].

The ceramic body is based on complex mixtures where clays (light or dark firing) are blended with other raw materials to achieve controlled or zero porosity. Specifically, the ceramic mix consists of four fundamental ingredients [1–3]:

- *clay*: provides plasticity for shaping and green mechanical strength;
- *flux*: (e.g., feldspars) Creates a liquid phase at high temperatures, enabling densification;
- *filler*: (e.g., quartz sand) Forms the "skeleton" that contrasting deformations during firing;
- *additives*: pore-forming agent (e.g., carbonates), pigments, or sintering promoters.

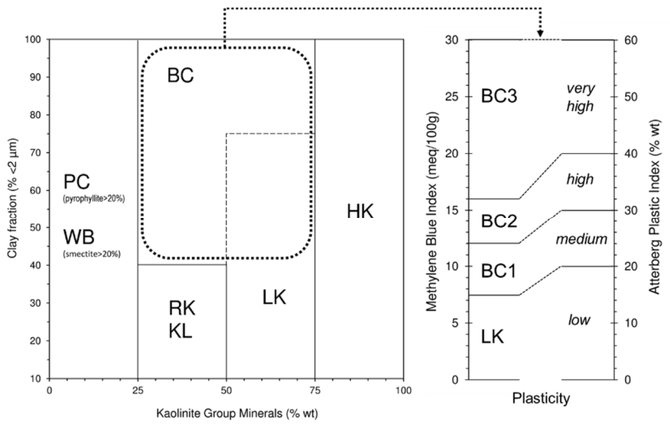
Each type of ceramic tile described above is obtained with a specific formulation of clays, fluxes, fillers and additives, which may vary depending on the characteristics and availability of raw materials and industrial practice (see ternary diagrams on the following page).

Although the clays derive from a broad geological spectrum, not all are suitable for production. Suitability is dictated by technological constraints (rheological behaviour, plasticity, suspension viscosity, particle size distribution, drying sensitivity, firing behaviour) and different types of clays can be distinguished:

Light-firing clays: key parameters are a low content of iron oxide, absence of carbonates, degree of lithification, plasticity and fusibility [1,4].

- *high grade kaolins* (HK), i.e., having more than 75% kaolinite, which are highly refractory, and are used (10–15%) to whiten bodies and to stabilize glaze suspensions;
- *low grade kaolins* (LK) contain 50–75% kaolinite and are characterised by a lower plasticity (with respect to ball clays) and are utilised in vitrified or porous bodies;
- *raw kaolins* (RK) and *kaolinitic loams* (KL) usually contain 25–50% kaolinite, and are characterized by an abundant sandy fraction and low plasticity;

- *ball clays* (BC) have a wide range of kaolinite content (25–75%) along with illite, smectite and interstratified terms thereof; they are fundamental for body workability and green mechanical strength;
- *pyrophyllitic clays* (PC) can play as substitute of kaolin or ball clay, depending on plasticity and refractoriness;
- *white bentonites* (WB) are additives used to boost plasticity as well as green and dry strength but have the limitation to increase the drying sensitivity and slip viscosity and thixotropy.



Classification of light-firing clays according to their amount of kaolinite group minerals and clay fraction as well as their Methylene Blue Index or Atterberg Plastic Index [1].

Dark-firing clays: key parameters are iron oxide content >3%, presence of carbonates, degree of lithification, plasticity and fusibility [1,3].

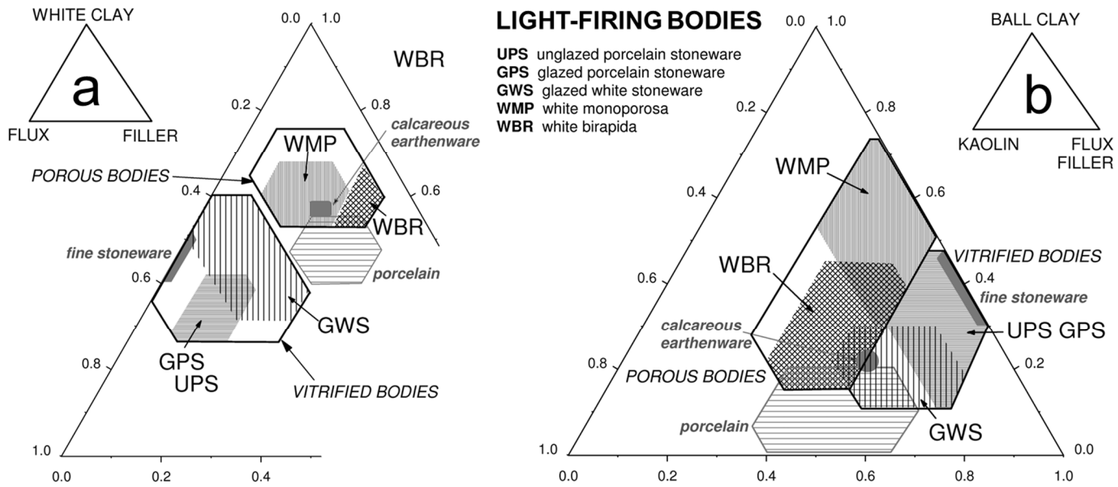
- *red clays* (RC) has a low carbonate content, at most 10%, and commonly contain two or more phyllosilicate groups (illite, chlorite, kaolinite, smectite); therefore, they can be distinguished based on the predominant clay minerals, e.g., kaolinitic red clays, illite-chlorite red clays, illite-smectite red clays. They include *red loams* (RL) which are characterised by a sandy fraction >25% and are typically utilised for extruded products (e.g., rustic tiles, RUS) or as filler substitutes in pressed tiles [...].
- *marly clays* (MC) and *carbonatic clays* (CC) are red-firing argillaceous materials containing carbonates: 10–25% and 25–40%, respectively. They are fundamental for monoporosa and birapida red bodies.

Fluxes: key parameters are grindability, fusibility, and light colour after firing (essentially dictated by the amount of iron oxide). They encompass feldspathic materials from various sources (albitite, granite, aplite-pegmatite, arkosic sand, rhyolite, syenite, etc.) which overall define a wide compositional perimeter in terms of percentage of feldspars and quartz, Na_2O/K_2O ratio, content of Fe_2O_3 and alkali-earth oxides. Consequently, the firing behaviour and fusibility can change substantially [5–7]. Talc, carbonates, and are sometimes added as sintering promoters [5,8].

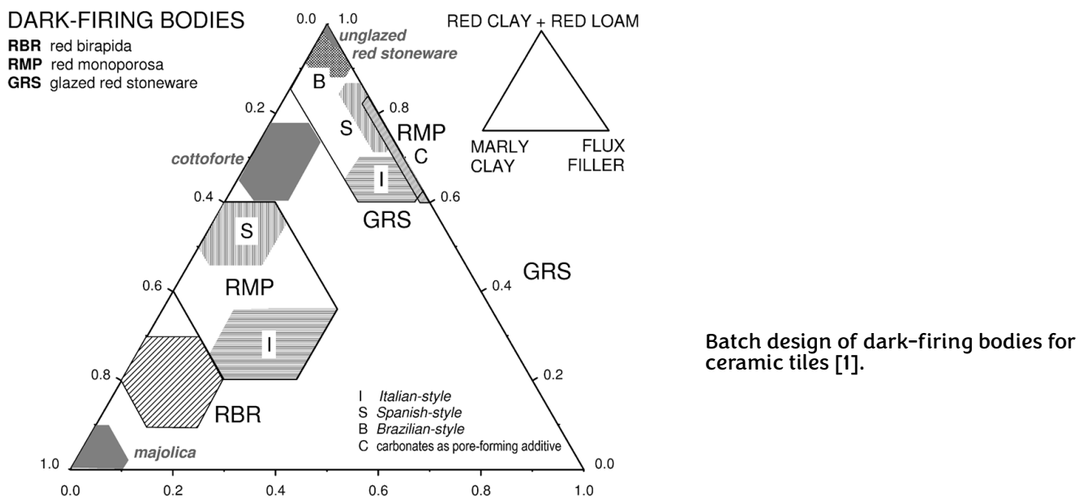
Fillers: key parameters are grindability, light colour after firing, and very low amount of impurities. They are typically quartzous materials (silica sand, quartzite) but also rock fragments and refractory minerals can play the same role. It must be considered that quartz is also provided through clays and fluxes.

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Batch design of light-firing bodies for ceramic tiles [1].



Batch design of dark-firing bodies for ceramic tiles [1].

Clay bricks and roof tiles

Heavy clay products are used in a wide range of building applications (masonry, flooring, roofing and façades) requiring different sizes, shapes, void and solid designs, technical performance and aesthetic appearance. These building materials consist substantially of red clays, to which tempering materials and additives can be added if necessary. Although red clays can be obtained from a broad spectrum of geological sources, degree of compaction/lithification, chemical and mineralogical composition, and particle size distribution, this does not imply that any clay material is suitable for brick making, due to technological (plasticity; shaping, drying and firing behaviour) and compositional constraints (presence of contaminants) along with standards requirements.

Red clays are generally selected based on particle size distribution, plasticity, and occurrence of contaminants. In principle, any brickwork tends to use only one clay source, unless there are limitations of availability, technological properties and contaminants that impose the addition of tempering materials or clays with corrective function.

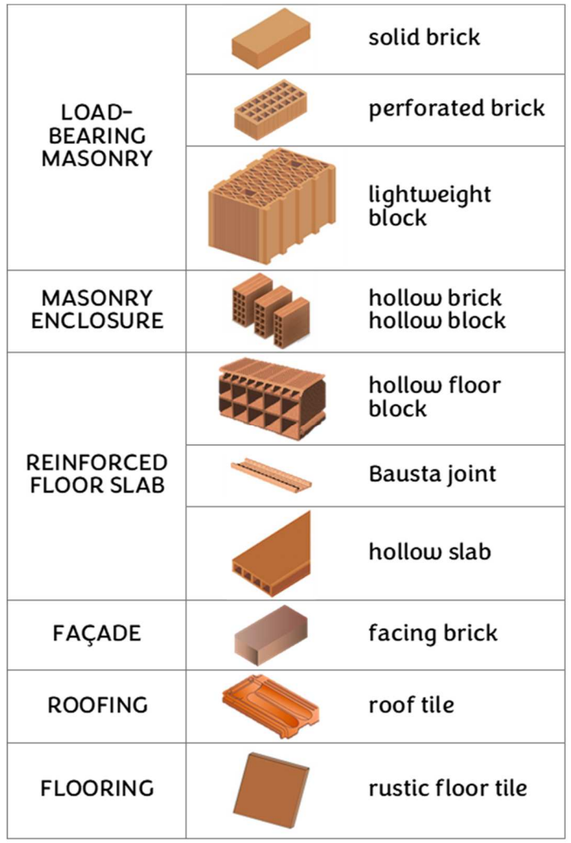
Particle size distribution is used according to a scheme, originally proposed by Winkler in 1954, which discriminates between fine-grained clays (necessary to manufacture the most complex and/or larger shapes and/or with thin septa) and raw materials with a more abundant sandy-silty fraction, useful for solid bricks, especially when handmade or produced by soft-mud technique. Clays with intermediate grain size are intended for products with non-complex shapes and a lower degree of perforation [1].

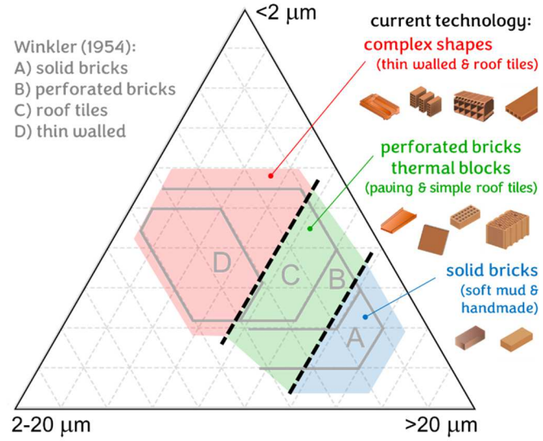
Plasticity (as determined by Atterberg limits) is a good proxy for the extrusion behaviour. There are ranges of plastic index and plastic limit that predict optimal and acceptable behaviour of red clays during extrusion [2-3]. This approach allows to easily design mixes of clays with different plasticity or to correct excessive plasticity by the addition of tempering materials.

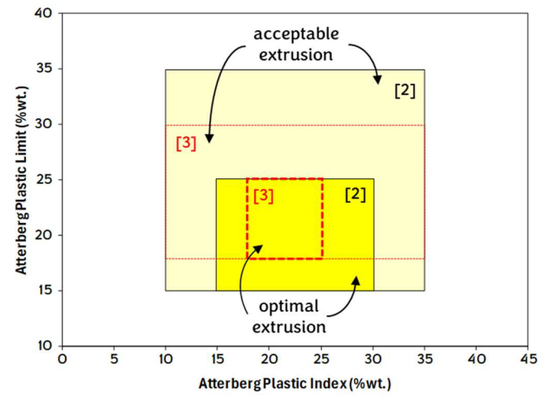
Technological contaminants are elements that can be mobilized during drying and particularly firing, giving rise to hazardous gaseous emissions (F, Cl, S) and undesired aesthetic effects, such as efflorescence (Na, K, Ca, Mg, Cr, V). The concentrations of these elements should not exceed a risk threshold [4-6]. Recently, carbonate content of clays is also a discriminating factor in order to reduce CO_2 emissions and the related carbon tax.

Temper can be any silicate material, which passes easily through pan milling (0.5 to 2 mm, depending on product type) and is to a large extent inert during drying and firing treatments. Tempering materials are typically fine-grained sands (mostly quartzous) or sometimes crushed rocks (igneous, metamorphic or sedimentary) that can be recovered at low cost nearby the brickwork.

Waste materials are common ingredients in clay bricks, more frequently used for masonry products and seldom for facing bricks and roof tiles [7].







product design raw material (% wt.)	perforated masonry brick and block (thick walls)		roof tile, hollow slab, hollow floor block (complex shape, thin walls)		solid brick, façing brick rustic floor tile (soft-mud & handmade)	
Red clay (suitable plasticity)	100		100		70-100	60-100
Red clay (high plasticity)		60-80		10-20		
Red clay (low plasticity)		0-40		80-90		0-40
Tempering material		0-20			0-30	

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Lightweight aggregates

Aggregates are defined as natural or artificial incoherent materials constituted by elements of different grain size. Lightweight aggregates (LWA) must have a weight/volume of particle below 2 Mgm^{-3} and a loose bulk density below 1.2 Mgm^{-3}, according to the EN 13055-1 standard [1]. LWA have a wide range of applications, most of which are in construction, where they are used as bulk fillers in lightweight structural concrete, concrete masonry units, precast concrete structural products, road-surfacing materials, plaster aggregates, and insulating fill [2,3].

Lightweight aggregates can be natural (pumice, volcanic cinders and scoria) or artificial (expanded clay, expanded perlite, expanded vermiculite, expanded slag, etc.). Distinct specifications (e.g., particle density, water absorption, mechanical strength) exist on the market for structural LWA (pre-stressed concrete, lightweight structural concrete), ordinary LWA (concrete blocks and slabs, grouts, geotechnics, civil works), ultra-lightweights (insulating lightweight concrete) and loose LWA for hydroculture, landscaping, drainage, air and water treatment, and so on.

Artificial LWA are mostly represented by expanded clay and expanded perlite, which raw materials are considered in this Atlas, but they are also obtained from byproducts, such as air-cooled, granulated, and expanded slag, or sintered pulverized fuel ash [2]. Natural LWA are cheaper, as they are obtained simply by crushing and sieving volcanic rocks, but they have low performance. They are not considered here, nor are very expensive artificial aggregates for ultra-lightweight structures (expanded vermiculite).

Expanded clay aggregates are manufactured based on red clays, including consolidated and lithified types, i.e., claystone, shale and slate [2-4]. Since most aggregates are shaped by various techniques, the plasticity of the clay is an important issue and the criteria followed are analogous to those described for clay bricks. The key property, however, is expandability, that is, the tendency of the aggregate to expand its volume and bloat during fast firing schedules in rotary furnaces adopted by the LWA industry [5,6].

Not all red clays bloat spontaneously under these conditions, nor do all expanded clays perform as required by standards. For these reasons, bloating additives (which release gases at high temperature) have entered industrial practice and the suitable chemical composition of red clays has been sought since the 1950s. Although quite popular in LWA production, the Riley (1951) plot has proven to be rather inaccurate in predicting expandability [5]. An alternative scheme proposed by Cougny [6] is more reliable and defines a field for expanded clays based on Al_2O_3, Fe_2O_3+FeO, Na_2O+K_2O+CaO+MgO. This target can be achieved by selecting red clays of appropriate composition or even by mix design. Along with red clays, there is an increasing use of waste materials to improve LWA performance as well as economic and environmental sustainability [1,5]. Zeolitized tuffs are also promising raw materials for LWA [7].

Expanded perlite aggregates are basically produced from crude perlite, even if pumicite, altered obsidian and pitchstone may sometimes be used. All these are high-silica rocks, essentially weathered rhyolites with a significant amount of water dissolved in the glassy phase [3,8-10]. As the size of expanded perlite particles mainly depends on the grain size of the feed to the furnace, the major concern is controlling particle size distribution of crude perlite by multiple crushing and sieving steps. This process leads to a foam (multicellular perlite), while to get microspheres (unicellular perlite) an additional milling step is necessary to achieve an average particle size of the feed between 25 to 30 μm [10].

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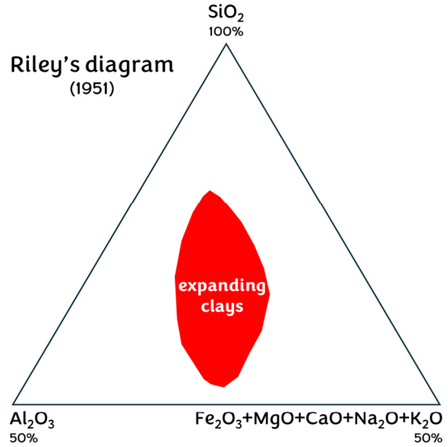
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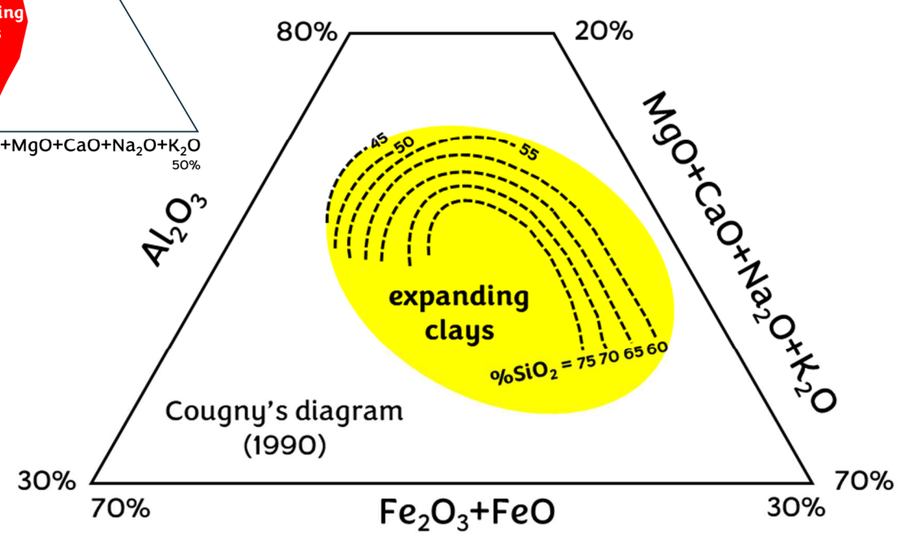
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Silicate glasses (container, flat, fibres, and specialties)

The glass term generally refers to a fragile and transparent matter. In a broader sense, is used to describe several materials with characteristics of supercooled liquid, without crystalline structure or melting point and describable as a highly viscous liquid. According to ASTM definition, glass is an inorganic product of melting which has been cooled to a rigid condition without undergoing crystallization [1]. This definition is correct for commercial products but does not consider minor production methods, e.g., sol-gel process [2]. Glass chemistry is described in terms of oxides concentration, leading to four main grouping: soda-lime glass, lead crystal and crystal glass, borosilicate glass and special glass [3-8]. Stone wool falls outside these groups given by its chemical composition does not fit into any of these categories [9].

The glass making raw materials can be identified and classified as follow [2,3]:

- *Glass-forming materials*: silica sand, processed cullet, post-consumer cullet;
- *Intermediate and glass-modifying materials*: soda ash, limestone, burnt lime, dolomite and burnt dolomite, feldspar, nepheline syenite, potassium carbonate, fluorspar, alumina, zinc oxide, lead oxide, barium carbonate, strontium carbonate, basalt, anhydrous sodium sulphate, calcium sulphate and gypsum, barium sulphate, sodium nitrate, potassium nitrate, boron-containing materials, antimony oxide, arsenic trioxide, blast furnace slag;
- *Colouring/decolouring agents*: iron chromite and oxide, cobalt oxide, selenium/zinc selenite, carbon, sulphides (pyrite).

Sand is used as main silica source. A fluxing agent addition, like sodium carbonate, in necessary to reduce the sand melting temperature. Potassium carbonate is used for certain special glasses. Other metal oxides can be added to achieve specific properties, while feldspar, nepheline syenite or alumina can be used to tune chemical resistance and viscosity at lower temperatures [2]. Also, the use of cullet glass, both inhouse and external, is important for raw material use reduction (1 tonne of glass scraps equals to 1.2 tonnes of raw material), even if quality constraints impose strict controls on external scraps properties (e.g., presence of contaminants) as a function of the specific production. If for fiberglass the internal cullet is practically not recycled, the recycling rate rise to 80% in case of container glass production [2]. The glass production is characterized by a wide variety of products and processes, then manufacturing techniques employed, although remaining a commodity industry. Over 80% of the glass production is an input for different factories, leading to a high dependence from some sectors, like construction and beverage, except for glass specialty [4-8].

Soda-lime glass

Most of the industrial glasses can be included in the soda-lime category, with limited changes in chemical composition (SiO_2 71-75%, Na_2O 12-16%, CaO 10-15%, and smaller amounts of MgO and K_2O). The chemical and physical properties of soda-lime glass determine its wide use for flat glass and container glass. At the same time, they do not allow specific applications involving resistance to intense thermal changes.

Container glass is the largest glass production sector in the Euro-Mediterranean area, with a share about 50-60%, which covers different sectors and products, like food and beverage packaging (by volume the higher percentage is represented by bottles) or pharmaceuticals and technical issues. Although a typical chemical composition is attributable to this kind of soda-lime glass, each producer has its own batch formulation as a function of the specific product and required properties, also in terms of raw material purity [2,4,8].

Flat glass is the second largest glass sector in the Euro-Mediterranean area, considering both float and rolled glass production, even if float glass is the main product. Float glass is mainly used for building and automotive applications, covering approximately 95% of industrial production. Chemical composition often includes minor amounts of K, Ti, Al, Zr, Mn and Fe oxides [2,6,8].

Typical chemical composition and batch formulation of soda-lime glasses [4,6]

Chemical composition (%wt.)	Container glass		Flat glass	
SiO_2	72-73		72-73	
Na_2O	14-15		13-14	
CaO	10-11		8-9	
Al_2O_3	1-2		0.5-1	
MgO	1-2		3-4	
SO_3	~1		0.1-0.3	
Batch formulation (% wt.)	no recycling	with recycling	no recycling	with recycling
glass sand	60-62	12-16	60-62	52-54
soda ash	17-18	3-5	16-17	13-15
limestone	16-18	3-5	13-16	10-13
magnesite, dolomite	2-3	0.4-0.8	6-7	5-6
feldspar, nepheline syenite	4-9	1-2	2-4	1.5-3.5
gypsum, thenardite	~1	–	~1	–
cullet glass	–	75-80	–	12-15

Borosilicate glass

Borosilicate glasses stand out for their high resistance to chemical corrosion and low thermal expansion coefficient. A typical composition generally falls the range: SiO_2 70-80%, B_2O_3 7-15%, Na_2O+K_2O 4-8% and Al_2O_3 2-7%. Applications include chemical process components, laboratory equipment, pharmaceutical containers, lighting, cookware, and oven doors and hobs.

Fiberglass

Fiberglass refers to the production of continuous glass filament, characterized by small tonnage production but high added value. Distinct from fibres insulation once, can be achieved by different processes and supplied in a several shapes: roving, mat, chopped strand, textile (yarn), tissue, and milled fibre. About 90% is addressed for composites production primarily for buildings, transports, and electrical and electronics industry. higher percentages of impurities can be tolerated, except iron that in reduction conditions may form FeO and generating radiant energy transmitting properties.

Typical chemical composition of fiberglass [5]

% wt.	E-Glass	C-Glass	D-Glass	E-CR-Glass	AR-Glass	R-Glass	S2-Glass	Raw materials
SiO_2	52-56	64-68	72-75	54-62	55-75	55-65	64-66	**silica sand**
TiO_2	<1.5			0-4	0-12			*titanium dioxide*
ZrO_2					1-18			**zircon sand**
B_2O_3	5-10	4-6	21-24		0-8			**borax, ulexite**
Al_2O_3	12-16	3-5	0-1	9-15	0-5	15-30	24-25	**alumina**
MgO	0-5	2-4		0-4		3-8	9-10	**magnesite**
CaO	16-25	11-15	0-1	17-25	1-10	9-25		*calcium carbonate*
ZnO		2-5						*zinc oxide*
BaO		0-1						**barium carbonate**
Li_2O					0-1.5			**lithium carbonate**
Na_2O+K_2O	0-2	7-10	0-4	0.2	11-21	0-1		**soda ash**, *potash ash*
Fe_2O_3	<0.8	<0.8	<0.3	<0.8	<5		<0.1	MAXIMUM TOLERATED
F_2	0-1				0-5	0-0.3		*fluorite*
Use	Aerospace, printed circuit boards, general applications	Chemical stability in corrosive acid environment	Low dielectric constant for electric applications	Electrical resistivity, mechanical strength, resistance to acids	Alkali resistance for reinforcing cement and concrete	Reinforcements with higher strength and resistance to acids	Extreme temperature and corrosive environments	

Mineral wool

The mineral wool sector produces glass and stone wool for insulation applications, characterized by randomly interlaced fibres bounded by a resin-based binder, not be confused with fiberglass which have different processes and products. The main products are low-density insulation rolls, medium and high-density slabs, loose wool for blowing, and pipe insulation for building thermal/acoustic insulation, heating and ventilation systems or fire protection. Glass and stone wool are interchangeable in many applications, but some applications demand one product in preference to the other. Stone wool is favoured for high temperature or fire-protection applications while glass wool is frequently used where a light weight is critical. About the 70% of the production finds its use in the building sector where, regardless the huge number of alternative insulation materials (mainly plastic foams), no one materials reach mineral wool performance (price, thermal and acoustic performance, flammability).

High temperature insulation wools: both amorphous and polycrystalline alumina wool can be found. Amorphous wool, with up to 58% Al_2O_3 content, can be classified as follows, according to the European Standard EN 1094-1 [9]:

Aluminium-silicate glass wools (ASW), also known as *refractory ceramic fibres* (RCF)

- aluminium-silicate glass wool (high purity);
- aluminium-silicate-zirconium glass wool.

Alkaline earth silicate glass wool (AES):

- calcium-silicate glass wool;
- calcium-magnesium-silicate glass wool;
- calcium-magnesium-zirconium-silicate glass wool;
- magnesium-silicate glass wool.

All these materials are characterized by low bulk density, heat storage capacity and thermal conductivity. ASW and RCF are generally used for high temperature applications, between 600 and 1400 °C. AES are generally used at temperatures lower than 1200 °C.

Glass-ceramics

Glass-ceramics are fine-grained polycrystalline materials formed when glasses (inorganic and non-metallic) of suitable compositions undergo to heat treating to induce controlled crystallization [4]. The controlled devitrification process may lead to the formation of a crystalline fraction in a wide range (0.5-99.5%). The formed crystals, one or more phases, show different chemical composition respect to the starting glass formulation. The chemical and physical properties may change in a wide range, leading to an as much large application portfolio. Final properties may be tuned by modulating the heating step parameters, which can control the extent of crystallization, crystal morphology, crystal size and aspect ratio. Nucleation is the key element for glass-ceramics production, that can be homogeneous (the crystal feed has the same chemistry of the final one) or heterogeneous (the seed has a different chemistry than the formed one). The crystallization seed must have a size higher than the critical one to lead to a the crystal growth. Nucleation agent may be added to the melted glass to start or catalyse the crystallization process. Commercial glass-ceramics refer to different categories as a function of their applications, like

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Glazes, frits and engobes

Frits are produced starting from raw material mixtures (silica, fluxes and ancillary materials) by melting at 1300–1500°C followed by rapid quenching, to produce flakes of glassy matrixes. Since it would be problematic to handle water-soluble compounds in the glaze application, it is customary to insert all soluble raw materials (e.g., borates, alkali carbonates) into the frit batch, because silicate and borosilicate glasses have low solubility in aqueous suspensions [1,2].

The European frit production was estimated at 1.25 million tonnes already in 2005, mainly concentrated in Italy and Spain, destined for about 95% to coating and decoration of ceramics and metals [1]. The most recent data from 2025 confirm the central role of these two hubs, with the Spanish sector (ANFFECC) experiencing a 1.5% growth and the Italian one in a recovery phase (estimated +5% production for 2025), despite significant pressures stemming from energy costs and the emission trading system.

The main application of frits is in ceramic glazes production for surface coating of wall and floor tiles, sanitaryware and tableware, providing a water/chemicals resistant and decorative coating, once fired [2–5]. Special frits are

Frits may be directly sold to glaze and colour producers or in formulation with other components as final products, even if typically, over half of the frits are directly used inside the glaze production factories. Enamel frits, representing about 5% of frits production, are used in the manufacture of enamel glazes, the principal application of which is the coating of metal surfaces, for cooking equipment production [6,7]. Respect to other glass sectors, frits are relatively high value, low-volume products and transport costs generally comprise a relatively small proportion of the total product price. Worldwide consolidation in the industry is resulting in relatively fewer but larger plants serving wider international markets.

The production process of frits must currently adhere to increasingly stringent emission limits for nitrogen oxides, sulphur oxides and particulate matter. This necessitates the mandatory implementation of dry scrubbing systems or high-efficiency filters to comply with the current Industrial Emissions Directive. Furthermore, the adoption of low-NO_x burners and the integration of oxy-fuel combustion systems have optimized specific energy consumption per tonne of frit produced [1].

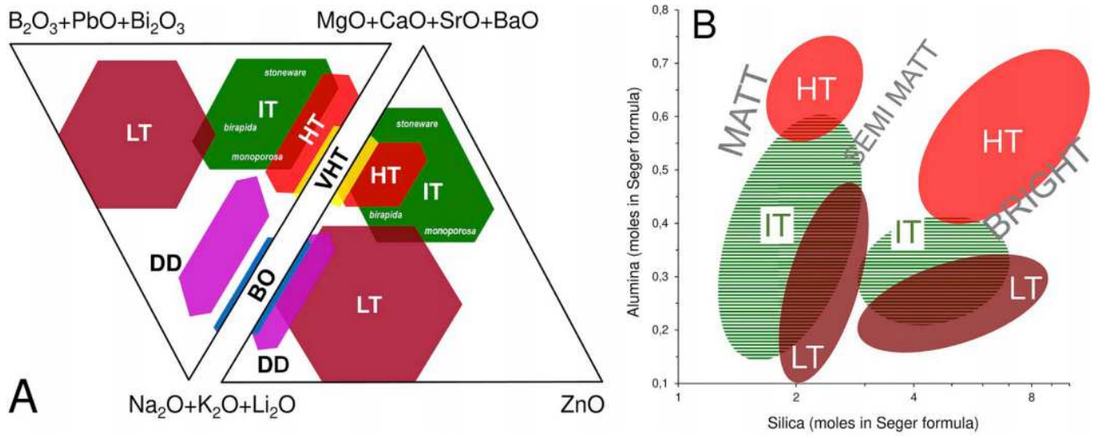
Glazes are vitro-crystalline materials, where solid particles are dispersed in a glassy matrix (at variance of frits, that in principle are entirely made of glass). The solid load can consist of insoluble raw materials, which can withstand the chemical attack during firing (e.g., zircon, corundum), and/or crystalline phases formed during the firing stage (e.g., anorthite, wollastonite, diopside, willemite, rutile, etc.) [3,5]. The glaze raw materials include clay, finely ground silica, and a wide range of fluxes. High alkali and alkaline earth contents and low silica contents are generally desired in glazes to achieve good flow (coverage) during firing. Changing the alumina content, for example, makes glazes with a gloss finish exhibit a matte finish instead. In some cases, lithium silicates (particularly spodumene) are added to glazes to modify their thermal expansion characteristics to achieve better thermal expansion match between the glaze and the ceramic body [5]. A variety of constituents are used in glaze formulations: these encompass raw materials used in the body formulation (kaolin, ball clay, white bentonite, sodic and potassic feldspar, and quartzous materials) along with frits, wollastonite, nepheline syenite, carbonates (Na, K, Li, Ca, Mg, Ba, Sr, dolomite), zinc oxide, alumina, and colouring agents (i.e., dyes, pigments and opacifiers, such as zircon and cassiterite). Lead oxide has long been banned from industrial production and replaced with other low-melting components, such as borates and bismuth oxide [2,3,8].

Glaze composition varies depending on the firing schedule, the technical performances, and the aesthetic characteristics that the ceramic surface must have. Any coating (glaze or glassy) must fit the thermal expansion coefficient of the ceramic substrate (body and engobe) and ensure a proper permeability to gases that are released at high temperature from the ceramic body. In addition, the desired chemical resistance (to acids, bases, stains, and household reagents) and mechanical strength (resistance to scratch and abrasion) must be guaranteed. The glaze appearance can be from transparent (or bright) to opaque (or matt), with many intermediate variants (semi-matt, satin, translucent, etc.). Firing schedules vary according to the ceramic product and the technology used to manufacture it, from low-temperature cycles (e.g., third fire applications) to very high temperature cycles used in sanitaryware and tableware production:

Glaze types in relation to ceramic products, technologies, and firing schedules, modified after [8]

Technology	Ceramic product	Firing	Glaze type
LT Low Temperature	third-fire applications classic slow double-fired products	slow double third fire 700-950°C	low temperature glaze
IT Intermediate Temperature	porous (*monoporosa, birapida*) and semi-vitrified tiles (*stoneware*)	fast single (double) 1080-1160°C 30-50 min	intermediate temperature glaze
HT High Temperature	highly vitrified tiles (*glazed porcelain stoneware*)	fast single 1180-1220°C 50-90 min	high temperature glaze
VHT Very High Temperature	highly vitrified products (*vitreous china, porcelain*)	slow single or double 1250-1400°C	very high temperature glaze
DD Digital Decoration	all tile types: stoneware, porcelain stoneware, third-fire, birapida, monoporosa	fast single 700-1240°C 30-90 min	all glazes and bodies

Glazes and glassy coatings are characterized by different ratios between alkali (Li, Na, K), alkali-earths (Mg, Ca, Sr, Ba), strong fluxes (B and Bi), and zinc oxides. By increasing the intensity of the thermal cycle, a lesser use of strong fluxes and zinc oxide is necessary, which for high and very high temperatures are practically absent. Fast-firing schedules impose to keep a permeability to gases up to temperatures close to 1100°C; this is made possible by using mineral fluxes (mainly feldspars and wollastonite) instead of frits, which are absent or in minimal percentages in HT and VHT glazes.

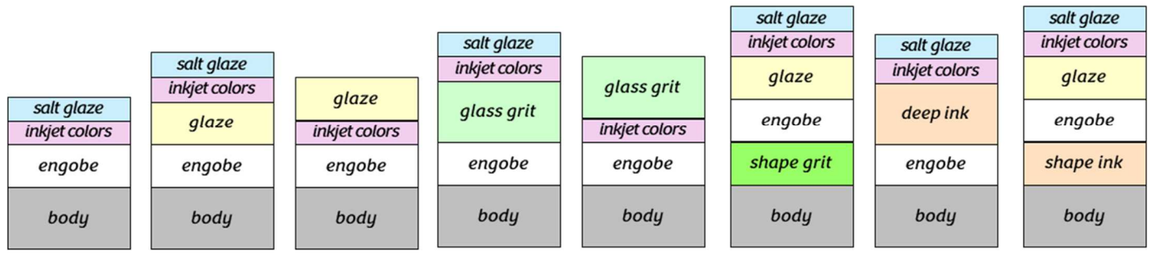


Approximate fields of chemical composition of glazes and glassy coatings in relation to the different ceramic technologies. A) Ternary diagrams of fluxes (% wt.) and B) Stull diagram (Seger formula) of silica and alumina [8].

The silica-to-alumina ratio affects the appearance of glazes and glassy coatings: high ratios favour bright coatings, while low ratios are used to get matt surfaces. In recent years, technological evolution has led to the development of advanced glass-ceramic glazes, which allow for surfaces with superior mechanical and thermal properties due to controlled crystallization during the tile firing cycle. Recent scientific research highlights how the growth of micro-crystals (such as zircon, anorthite, or spodumene) within the glassy matrix not only defines opacity and colour but also drastically increases abrasion resistance and surface hardness—essential parameters for modern large-format ceramic tiles [3].
In this context, the management of waste materials – such as squaring and honing sludges, dust from filtration systems, and excess glaze – has become a cornerstone of the sector's Circular Economy. The reuse of glassy residues directly in melting furnaces as secondary raw materials, and the integration of dried sludges into ceramic bodies, are now standardized practices. At the same time, the use of post-consumer industrial waste from other sectors is spreading – such as cathode ray tube glass or special glasses rich in barium and strontium – which are upcycled to promote the synthesis of new crystalline phases in glazes without compromising environmental safety. This valorisation of residues allows for a drastic reduction in the use of raw materials and minimizes the carbon footprint associated with the thermal decomposition of carbonates during melting. These innovations, combined with process digitalization and the use of virtual reality for plant design, are transforming waste materials into valuable constituents that work alongside traditional materials like feldspar and colouring agents in the final product formulation.

Engobes act, in the ceramic tile structure, as a critical intermediate layer between the ceramic body and the glaze or glassy coating. Traditionally composed by ball clay, kaolin, feldspar, and opacifiers (such as zircon or alumina), the engobe is applied onto the dried or fired (biscuit) body to mask its natural colour and to calibrate surface porosity. This layer is essential for achieving a uniform aesthetic result and for ensuring the correct chemical-physical bonding with the overlying glassy coating.
From a technical standpoint, the formulation of engobes is a key parameter for managing the stress profile of the entire ceramic slab. The role of the engobe is fundamental in achieving a perfect thermal expansion match across the multi-layered system.

By precisely tuning the mineralogical composition, manufacturers can prevent industrial defects such as warping and crazing, which are particularly critical in the production of large-format porcelain stoneware.
In line with the sector's transition toward a Circular Economy, the engobe production has undergone a significant transformation. Unlike the top-glaze, which requires extreme purity, the engobe can incorporate higher percentages of sludges, spray-dried dusts from filtration systems, and recycled glass cullet without compromising the final surface quality. This strategic reintegration not only minimizes the need for raw materials but also reduces the overall environmental footprint of the glazing line.
Furthermore, the recent digitalization of the glazing process has introduced digital englobing technologies. The shift from traditional application to high-resolution inkjet or controlled spray systems allows for a drastic reduction in material quantity and water consumption. These innovations, combined with the use of advanced rheological additives, ensure that the engobe contributes to a more resource-efficient production cycle, transforming what was once a simple masking layer into a high-performance technical interface.



Examples of different coatings on ceramic substrate (*body*) applied with conventional techniques (bell, disc, airless for *engobe* and *glaze*) and digital technologies: inkjet printing for *colours*, sinking effects (*deep ink* and *shape ink*), glue and frit (*glass grit* and *shape grit*), and *salt glaze* (protective glassy coating).

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Refractories

The refractory industry makes use of a broad spectrum of raw materials, which vary depending on the chemical composition, technological performance, and intended use of refractories [1]:

- acidic refractories (silica-based, fireclay, alumina-silica);
- basic refractories (magnesia, magnesia-chrome, forsterite, cordierite, spinel);
- neutral refractories (alumina, chromite, zircon/zirconia-based).

Silica-based refractories are mainly formulated with quartzous raw materials and refractory clay as binder, in varying ratios to obtain different SiO_2 percentages [2]. Their use is since long declining and apparently restricted to specific applications, such as glass tank crowns (silica >93%) and kilns for firing refractories (silica and siliceous refractories in high- and low-temperature zones, respectively).

Fireclay refractories are based on kaolin and/or refractory clay and used in a range of not-so-demanding applications [1-3]. Impurity content (particularly Na, K, and Ca) is critical for raw materials, while iron is tolerable even in fair amount. Lower grades (30% Al_2O_3) constitute, e.g., the back-up lining of pot furnace in aluminium industry. Higher grades (35-40% Al_2O_3) are suitable for inlet and outlet zones of lime calcination kilns, for cement rotary furnaces (except for burning zone as well as upper and lower transition zones) and particularly in their upper cyclones. The highest grade (42-45% Al_2O_3) is utilized in the stack areas of blast furnaces. All grades are employed in ceramic kilns (tunnel, roller, chamber, etc.) but in various zones, depending on the % Al_2O_3.

Alumina-silica refractories are manufactured starting from kyanite-group minerals, synthetic mullite, bauxite or alumina, with refractory clay (or kaolin) as binder [1-3]. Mullite can be synthesized from proper mixtures of the above mentioned raw materials.

Andalusite refractories are intended for head wall and flue wall of anode baking furnaces (i.e., anodes used in the pot furnace for molten aluminium) and chlorinator in fluidized bed reactor for making TiO_2 by the chloride route, among others.

Sillimanite and kyanite refractories are typically destined for glass tank furnaces and hot blast stove of blast furnaces.

Mullite refractories are advantageous in specific applications: tap hole area of blast furnaces, torpedo ladles, hearth of reheating furnaces (ferrous metallurgy); glass tank furnace regenerators; crucibles for ceramic pigments; melting and holding furnaces of aluminium industry.

Refractories	Refractory clays	Kaolin	Quartzous raw materials	Kyanite Sillimanite Andalusite	Alumina (tabular and calcined)	Bauxite (calcined)	Zirconia-mullite	Zircon	Zirconia (stabilized)	Talc	Olivine	Magnesite (calcined)	Chromite
Silica refractories (>93% SiO_2)	3-7		93-97										
Siliceous refractories (85-93% SiO_2)	15-30		70-85										
Semisilica refractories (70-85% SiO_2)	30-45		55-70										
Fireclay refractories (30-50% Al_2O_3)	>80												
Sillimanite refractories (50-65% Al_2O_3)	<10			>90									
Mullite refractories (70-80% Al_2O_3)	30-40				60-70								
Bauxite refractories (80-85% Al_2O_3)	<10					>90							
High-alumina refractories (>90% Al_2O_3)	<10				>90								
Alumina-mullite-zirconia refractories	10-20	5-15			55-65		10-20						
Zirconia-mullite refractories	5-10				35-45			50-60					
Zircon refractories								>85					
Zirconia refractories									>95				
Cordierite -alumina-mullite refractories	15-20	10-15			60-65					5-10			
Cordierite refractories	25-30	25-30			10-15					30-40			
Forsterite refractories	<10										>90		
Spinel refractories					70-75							25-30	
Magnesia refractories (>80% MgO)												>80	
Magnesia-chrome refractories (55-80% MgO)												55-80	<25
Chrome-magnesia refractories (25-55% MgO)												25-55	25-55
Chromite refractories (<25% MgO)												<25	55-80

Bauxite refractories are largely used in Portland cement rotary kiln, steel teeming ladle, roof of electric arc furnaces, etc.
High-alumina refractories are essential in a range of high-duty applications (particularly in highly reducing atmospheres) including steel ladle side walls (ferrous metallurgy) and firing of technical ceramics.

Zirconia-based refractories are obtained from zircon and/or zirconia (stabilized by Ca, Mg or Y depending on the use) or zirconia-mullite composites [4-6].
Zircon refractories constitute linings in furnaces for soda-lime glass, aluminium, and ferrous alloys.
Zirconia refractories are used in case of very high temperatures, in contact with low silica and low iron materials.
Alumina-zirconia-mullite refractories are best in glass tank furnaces (fused) and in ceramic kiln furniture (especially rollers).

Basic refractories are substantially based on magnesia and Mg-silicates. Raw materials are typically talc, magnesite (raw or calcined), olivine, alumina, and refractory clay for cordierite, forsterite and spinel refractories, while magnesite (fused or dead-burnt) and chromite are used for the magnesia-chrome suite [1,7-9]. Chromite used by the refractory industry should contain more alumina and magnesia (thus, less chromium and iron) than the corresponding raw material for metallurgy [10].
Magnesia refractories are the benchmark for ferrous (lining primary and secondary steelmaking furnaces, converters, and ladles) and nonferrous metallurgy, as well as for the Portland cement industry (clinker rotary kilns).
Magnesia-chrome and chrome-magnesia refractories are utilized in the same applications of magnesia refractories but in kiln zones where enhanced resistance to abrasion and chemical attack is required, e.g., secondary steel-making furnaces, steel teeming ladles, transition and burning zones in clinker rotary kilns, and so on.
Chromite refractories have been essentially developed for the steel industry, even if are applied also in other highly aggressive environments, such as furnaces for fiberglass or fluorine-bearing borosilicate glass. The use of Cr-based refractory products is declining, mainly due to the hazard of hexavalent chromium and its possible occurrence in spent refractories and the materials with which they came into contact [10].
Spinel refractories are gaining ground mainly at the expense of chromite and chrome-magnesia products in some applications: cement rotary kiln (upper and lower transition zones), iron and steel industries (lining of steel ladle, as alumina-rich spinel castables), glass tank furnace (checker structures of regenerator), converters of copper smelting plants, and manufacturing of aluminium alloys [9].
Forsterite refractories are reliable alternatives to magnesia in the lining of cement rotary kiln and steelmaking furnaces.
Cordierite refractories are widely used by the automotive industry, as honeycomb substrate of catalytic converters and filtering element for diesel engines. In addition, cordierite-alumina-mullite products are commonly selected for furniture (plates, rollers, etc.) in ceramic kilns.

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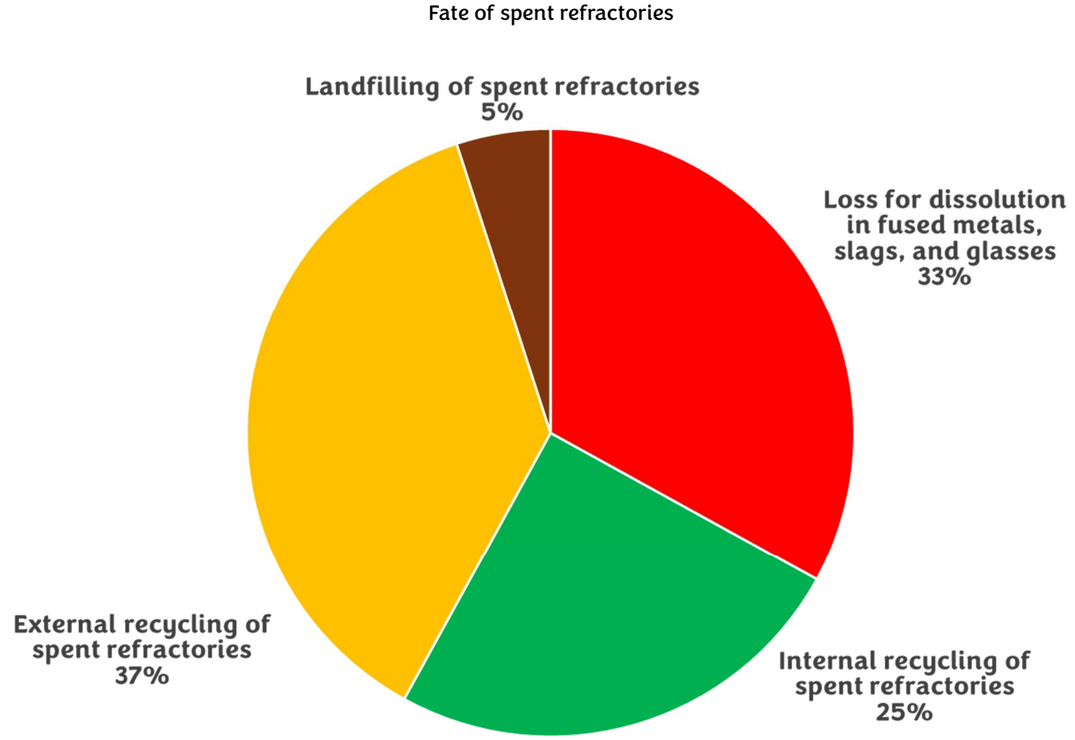
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Clay drainage pipes

Technological properties of the various types of refractory materials

Refractories type	Refractoriness Index	Resistance to Thermal Pressure	Thermal Shock Resistance	Thermal Conductivity	Resistance to Acidic Slags	Resistance to Basic Slags	Resistance to Abrasion
Silica	◊◊◊◊	◊◊◊◊◊	◊	◊◊◊	◊◊◊◊◊	◊	◊◊◊
Fireclay	◊◊◊	◊◊◊	◊◊◊	◊◊◊	◊◊◊◊	◊◊	◊◊◊
Sillimanite group	◊◊◊◊	◊◊◊◊	◊◊◊◊	◊◊◊	◊◊◊◊◊	◊◊◊	◊◊◊◊
Mullite	◊◊◊◊	◊◊◊◊◊	◊◊◊◊	◊◊◊	◊◊◊◊◊	◊◊◊	◊◊◊◊
Bauxite	◊◊◊◊	◊◊	◊◊◊◊	◊◊◊	◊◊◊◊◊	◊◊◊◊	◊◊◊◊
High-alumina	◊◊◊◊◊	◊◊◊◊◊	◊◊◊	◊◊◊	◊◊◊◊◊	◊◊◊◊	◊◊◊◊
Zircon	◊◊◊◊◊	◊◊◊◊	◊◊◊◊	◊◊◊◊	◊◊◊◊	◊◊◊	◊◊◊◊
Zirconia	◊◊◊◊◊	◊◊◊◊◊	◊◊◊◊	◊◊◊◊	◊◊◊◊	◊◊◊◊	◊◊◊◊
Cordierite	◊◊	◊◊	◊◊◊◊◊	◊◊◊	◊	◊◊	◊◊◊
Forsterite	◊◊◊◊	◊◊◊◊◊	◊◊◊	◊◊◊	◊◊	◊◊◊◊◊	◊◊◊
Spinel	◊◊◊◊◊	◊◊◊◊◊	◊◊◊	◊◊◊	◊◊	◊◊◊◊◊	◊◊◊◊
Magnesia	◊◊◊◊◊	◊◊◊◊	◊	◊◊◊◊	◊	◊◊◊◊◊	◊◊◊
Magnesia-chromite	◊◊◊◊◊	◊◊◊◊	◊◊◊	◊◊◊◊	◊	◊◊◊◊◊	◊◊◊
Graphite	◊◊◊◊◊	◊◊◊◊◊	◊◊◊◊◊	◊◊◊◊◊	◊◊◊◊◊	◊◊◊◊◊	◊
Silicon carbide	◊◊◊◊	◊◊◊◊◊	◊◊◊◊◊	◊◊◊◊◊	◊◊◊◊◊	◊◊◊	◊◊◊◊◊

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Traditionally, two types of clay pipes are manufactured: *porous* (mostly intended for agricultural drainage) and *vitrified* (sewage and surface water drainage, chemical effluent disposal, conduits for underground cable installations, and, more recently, trenchless technologies in construction and civil engineering). While the use of porous clay pipes and salt-glazed pipes has long been in decline, the production of vitrified, glazed or unglazed, clay pipes remains an essential part of municipal infrastructure [1,2].

Vitrified clay pipes are dense and impervious products, but due to their size, geometry, and thickness, the process makes dimensional stability critical. To prevent distortion and differential shrinkage during firing, clay bodies should have an adequate vitrification range. These bodies must also have sufficient plasticity and mechanical strength (green and dry) to retain their shape after shaping and to allow handling prior to firing [3,4]. Vitrified drainage pipes are fundamentally based on red clays, but to meet all technological requirements, a blend of different clay materials is often used. A typical batch should contain roughly equal proportions of kaolinite, illite and quartz, while the percentage of iron oxide is usually noteworthy [3]. Addition of a less plastic clay or a non-plastic material (such as a grog or chamotte) is a common practice to keep dimensional accuracy under control, even using an otherwise unsuitable raw material. In the manufacture of clay drainage pipes, especially in western Europe, fireclay is normally used in blend with other clays [1]. In this sense, the term *fireclay* is not restricted to refractory clays and not only raw materials with high alumina content are used. Conventionally, fireclays (or underclays) are found in coal measures, often directly beneath coal or lignite deposits. However, the progressive closure of coal mines has significantly reduced these sources, so stockpiles in abandoned coal districts can be also used. As a matter of fact, currently up to 40% of the raw material used in vitrified clay pipe production can come from recycled clay products [5] and even waste materials [6].

Red clays (including claystones, and shales) used in the manufacture of vitrified pipes can come from a variety of deposits [7] even though their compositional range cannot be as wide as that of raw materials for clay bricks and roof tiles. Technological constraints impose carbonate-free clays with low Na_2O, MgO and CaO contents, essentially to match vitrification range and dimensional accuracy targets [3,8].

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Sanitaryware and Tableware

The ceramic sanitaryware sector includes items for personal hygiene, such as washbasins, bidets, and toilets, as well as domestic items like sinks. Production is based on a strict selection of materials according to their intended use. For high-end products and furnishings for public and private bathrooms, *vitreous china* is commonly used; it features a glassy coating that ensures impermeability. For large items, *fireclay* is preferred; this is a less refined body enriched with "chamotte" (pre-fired and crushed ceramic) that offers high resistance to impact, thermal shock, and chemical detergents. The production cycle of sanitaryware begins with slip casting into plaster or resin moulds, followed by drying, coating with protective glazes, and slow firing between 1230 and 1280 °C to ensure full vitrification [1-6].

Both **vitreous china** and **fireclay** bodies consist of the following raw materials, in different ratios:

- *ball clays* and *kaolins*, which provide the necessary plasticity for shaping and green mechanical strength;
- *quartz/silica sand*, which act as an inert skeleton to limit shrinkage during drying and firing;
- *feldspar* and *nepheline syenite*, which play as fluxing agents;
- *chamotte:* a pre-fired and ground ceramic that reduces shrinkage and increases thermal stability;
- crushed *fired scrap*, which can be used as a partial replacement of hard raw materials;
- *additives*, like soda ash and barium carbonate, used to control slip rheology and efflorescence, respectively.

Typical batch formulations for sanitaryware (% weight)

Raw materials	Vitreous china	Fireclay
Ball clays	22-25	20-30
Kaolins	16-31	10-20
Feldspar/Nepheline syenite	18-30	0-7
Chamotte	-	37-55
Quartz/Silica sand	13-24	0-13
Fired scrap	0-5	0-5

Tableware production adopts different solutions for body, such as *domestic stoneware*, widely used in Northern Europe and characterized by high vitrification, often produced through automated single-firing processes, or the classical *porcelain* with its variants (soft and hard) including also phosphatic porcelain, the so-called *bone china* [7-9]. Alternatively, *earthenware* is used; it is more economical and usually double-fired. The earthenware body is purified from iron impurities and shaped through dry pressing for simple forms or casting for complex shapes. For limited productions, plastic pressing is used because this material does not suffer from "memory effect," which would cause unwanted deformations. The aesthetic phase includes industrial screen printing or hand-painted decorations, with final firings between 940 and 1150 °C.

The proportions of raw materials in tableware batches vary to meet cost and performance requirements. They are all *triaxial bodies*, based on plastic components, fluxes and fillers [7]

Domestic stoneware (vitrified, water absorption is below 3%):

- ball clays (45-55%),
- quartzous materials (20-25%),
- feldspars (25-30%).

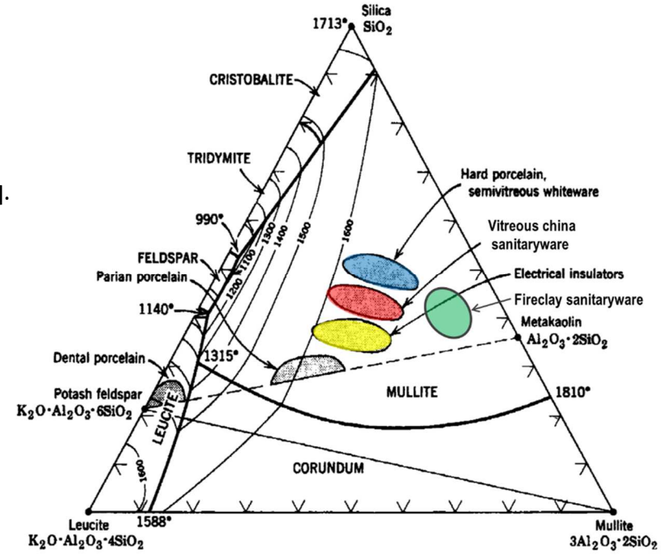
Porcelain (highly vitrified, water absorption is below 0.5%) which classic formulation consists of:

- kaolin (~50%),
- quartz/silica sand (~25%),
- feldspar, commonly potassic (~25%).

Hard porcelain requires higher Al_2O_3 percentage, usually achieved by adding more kaolin and/or alumina.

Soft porcelain implies lower refractoriness, hence less Al_2O_3 percentage, by replacing some kaolin with ball clay and adding more or stronger fluxes.

In porcelains, kaolin can be substituted by pyrophyllite [10], and feldspar by wollastonite [11].



Ternary diagram silica-leucite-mullite with typical compositional fields of sanitaryware and tableware (porcelain), modified after [7].

Bone china (highly vitrified, water absorption is below 0.5%):

- kaolin (~25%),
- feldspar, typically a quartz-feldspathic material (~25%),
- bone ash, i.e. hydroxylapatite (~50%).

Soft earthenware (porous, water absorption >10%):

- plastic components, mostly ball clays (40-50%);
- fillers, like silica sand or white porous chamotte (25-27%);
- fluxes, such as calcite, dolomite, and talc (23-35%).

Mixed and hard earthenware (semi-porous, water absorption 6-10% and 3-6%, respectively): carbonates are reduced in favour of sodium feldspar (2-5%), promoting partial vitrification for greater strength.

Artisanal production of **ornamental ware** is still a lively activity at many places in the Euro-Mediterranean area. Along with the bodies mentioned above (porcelain, stoneware, earthenware), *majolica* is one of the most popular ceramic materials for crafts (it is essentially made from red clays with a significant amount of carbonates).

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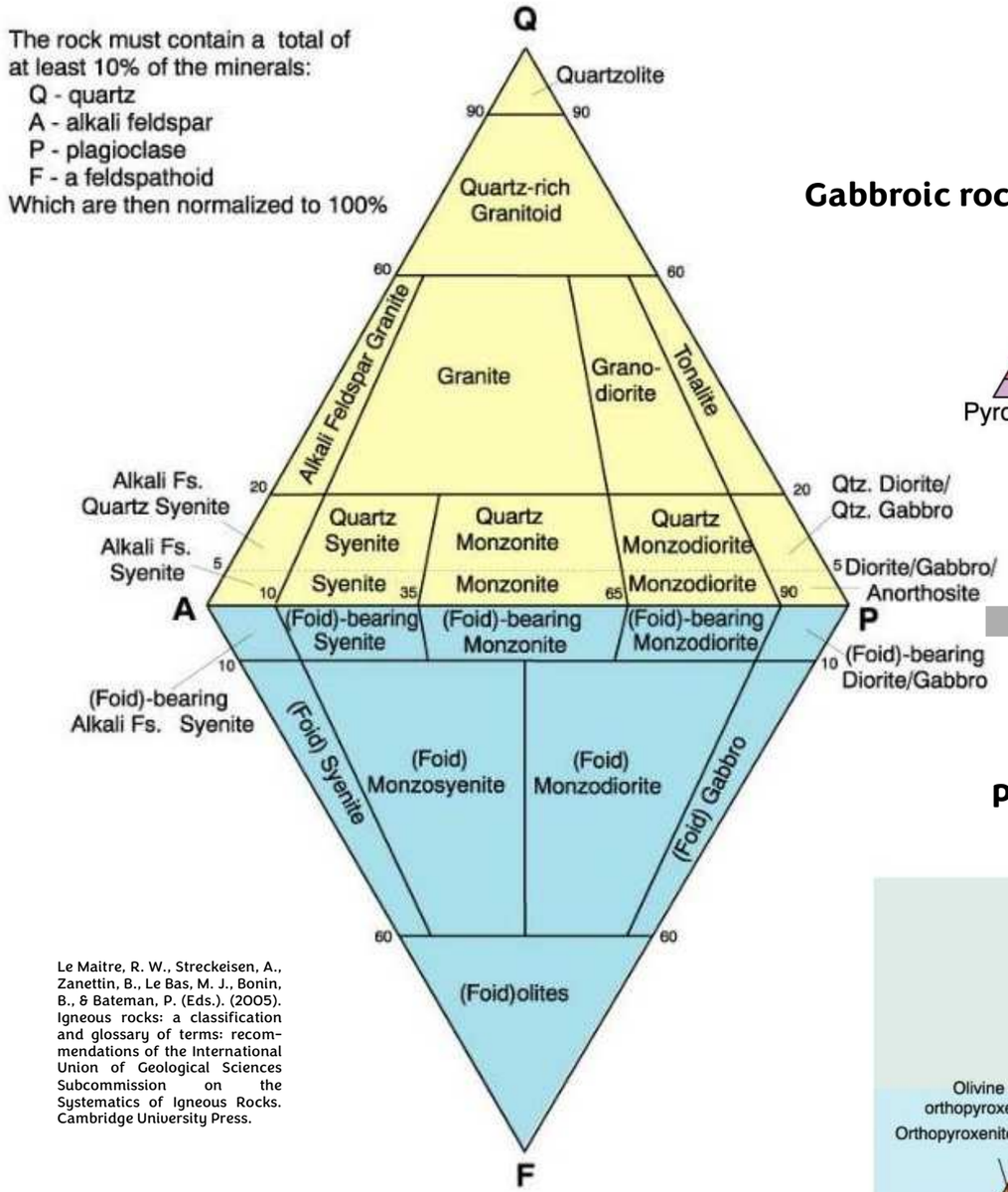
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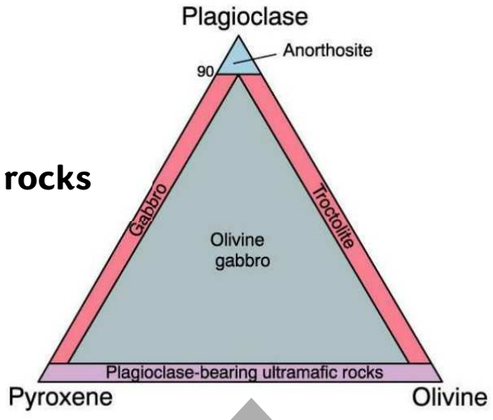
Appendix 1. Classification of rocks

Igneous rocks: intrusives

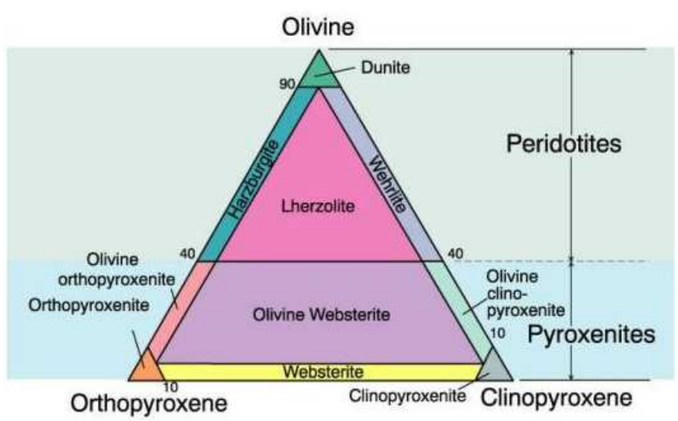


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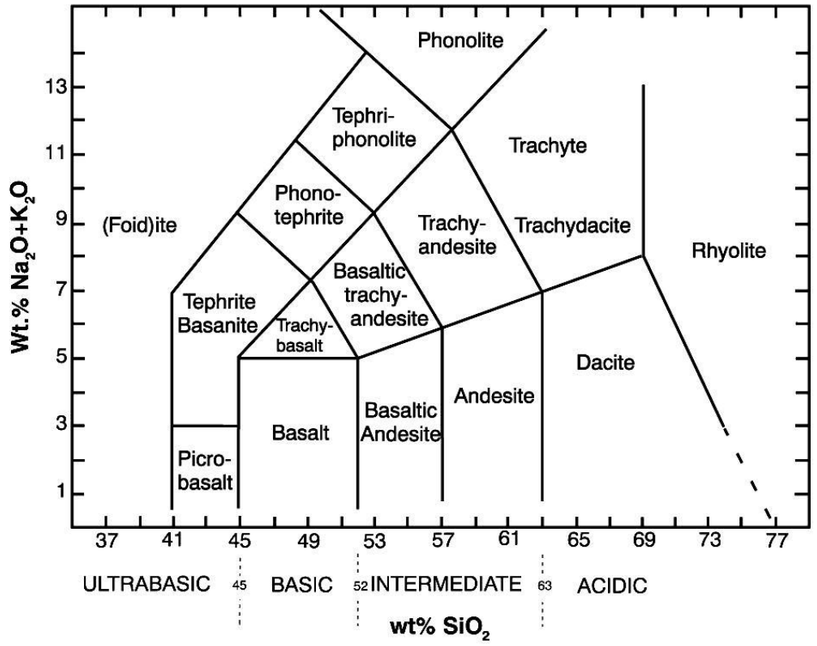
Gabbroic rocks



Plutonic rocks: peridotites

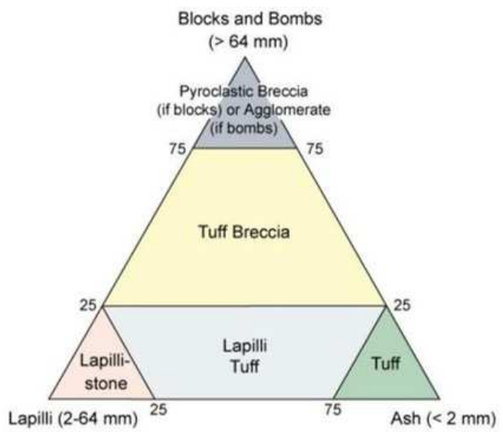


Igneous rocks: volcanics



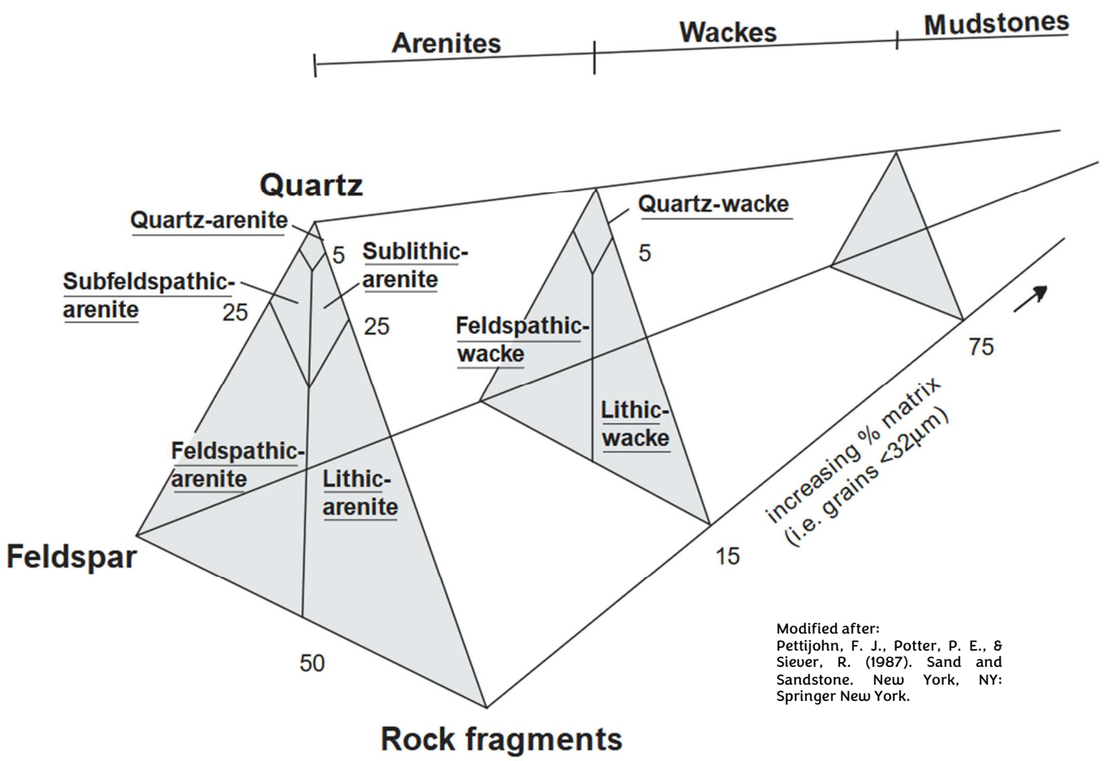
Le Maitre, R. W. (1984). A proposal by the IUGS Subcommission on the Systematics of Igneous Rocks for a chemical classification of volcanic rocks based on the total alkali silica (TAS) diagram: (on behalf of the IUGS Subcommission on the Systematics of Igneous Rocks). Australian Journal of Earth Sciences, 31(2), 243-255.

Volcanic rocks: pyroclastics



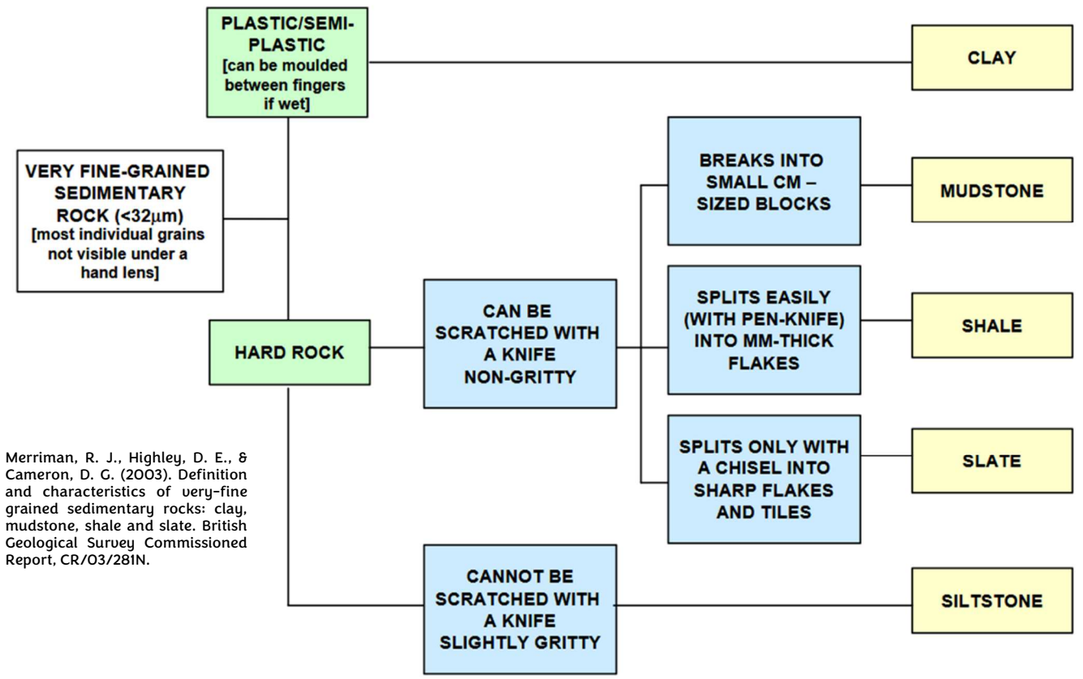
Fisher, R. V. (1966). Rocks composed of volcanic fragments and their classification. Earth-Science Reviews, 1(4), 287-298.

Sedimentary rocks: siliciclastics



Modified after:
Pettijohn, F. J., Potter, P. E., & Siever, R. (1987). Sand and Sandstone. New York, NY: Springer New York.

Flowchart to aid identification of fine-grained sedimentary rocks

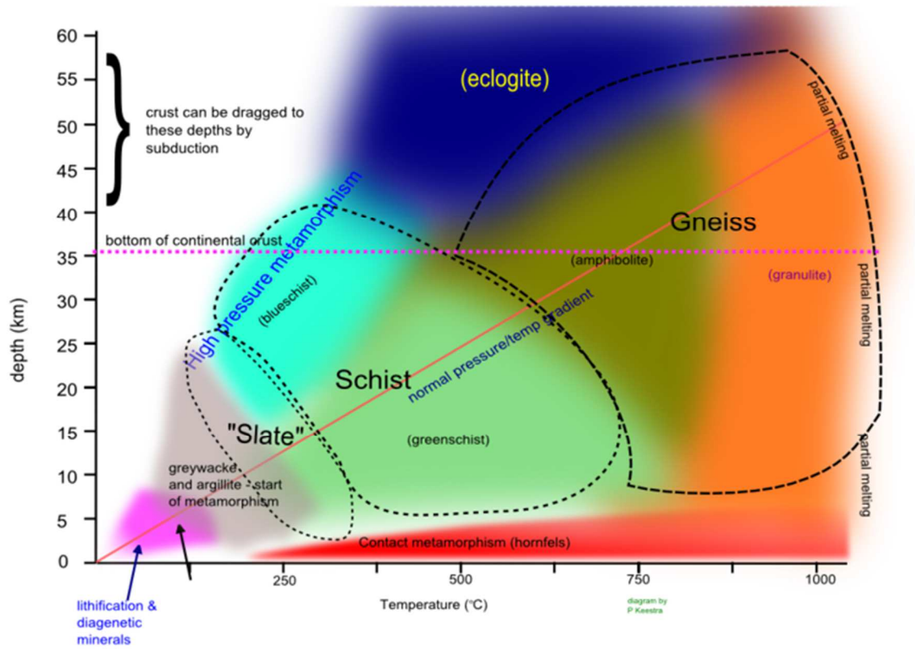


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Metamorphic rocks

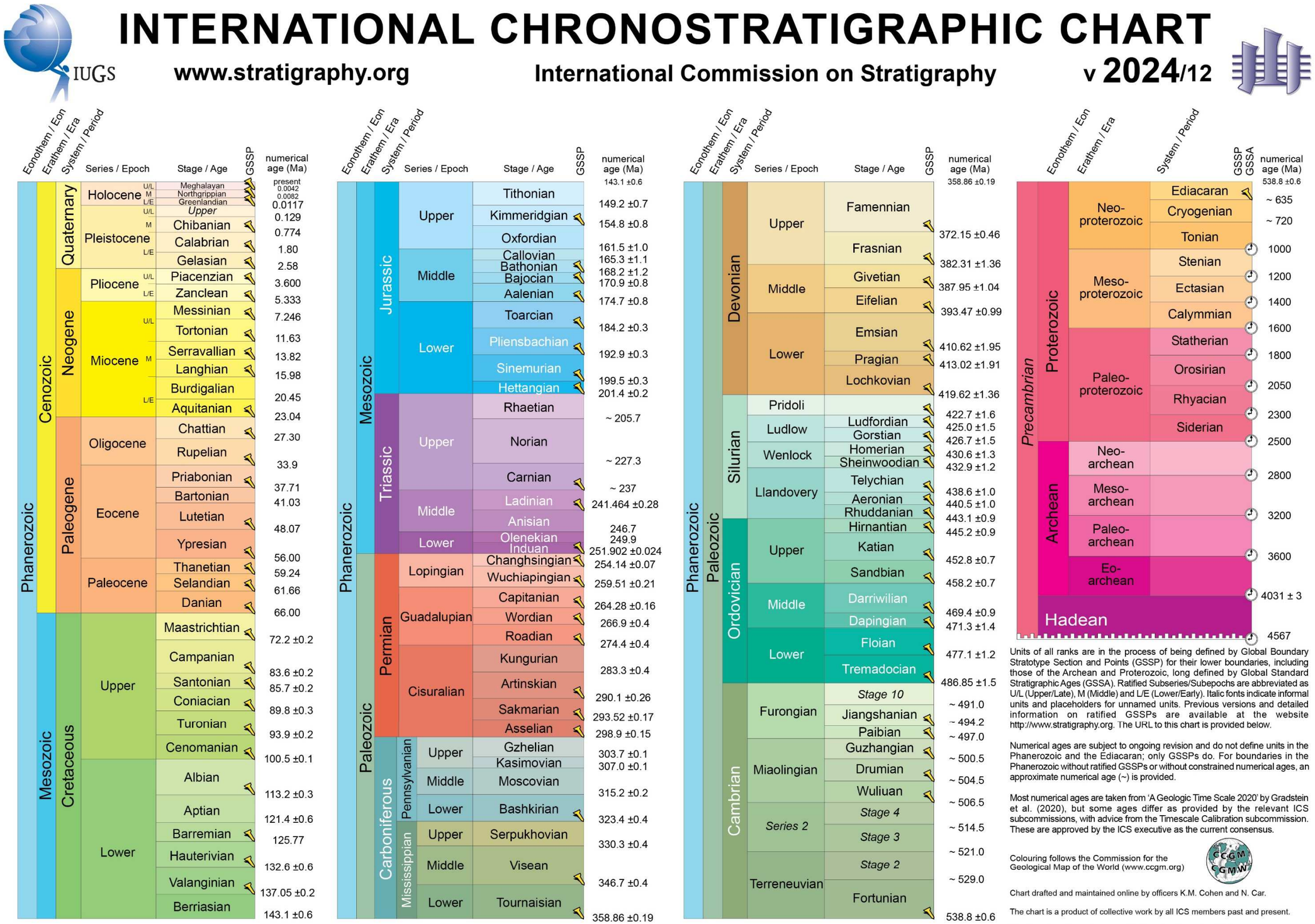
Texture		Grain size	Notes	Parent rock	Rock name
foliated		very fine	excellent cleavage, smooth dull surfaces	shale, mudstone, siltstone	**slate**
		fine	breaks along wavy surfaces, gloss sheen	slate	**phyllite**
		medium to coarse	scaly foliation, mica dominating	phyllite	**schist**
		medium to coarse	compositional banding due to mineral segregation	granitoids, schists, volcanics	**gneiss**
non-foliated		medium to coarse	interlocking calcite or colomite grains	limestone, dolostone	**marble**
		medium to coarse	massive, very hard, fused quartz grains	quartz arenite	**quartzite**

Temperature *vs.* pressure diagram of typical conditions of burial metamorphism in the continental crust, with conventional extension of the main metamorphic (greenschist, amphibolite, granulite) and diagenetic facies



Appendix 2. Nominal composition of minerals cited in the text

Albite	$Na(AlSi_3O_8)$
Amblygonite	$LiAl(PO_4)F$
Analcime	$Na(AlSi_2O_6) \cdot H_2O$ (*zeolite group*)
Andalusite	$Al_2(SiO_4)O$
Anhydrite	$CaSO_4$
Anorthite	$Ca(Al_2Si_2O_8)$
Aragonite	$CaCO_3$
Baddeleyite	ZrO_2
Barite	$BaSO_4$
Böhmite	$AlO(OH)$
Borax	$Na_2(B_4O_5)(OH)_4 \cdot 8H_2O$
Calcite	$CaCO_3$
Celestine	$SrSO_4$
Chabazite	$(Ca,K_2,Na_2)_2[Al_2Si_4O_{12}]_2 \cdot 12H_2O$ (*zeolite group*)
Chlorite	$(Mg_5,Fe^{2+})Al(AlSi_3O_{10})(OH)_8$
Chromite	$(Fe^{2+},Mg)(Cr^{3+},Al)_2O_4$
Clinoptilolite	$(Na,Ca,K)_{3\text{-}6}[Al_{6\text{-}7}Si_{29\text{-}30}O_{72}] \cdot 20H_2O$ (*zeolite group*)
Colemanite	$Ca[B_3O_4(OH)_3] \cdot H_2O$
Cordierite	$Mg_2Al_4Si_5O_{18}$
Dolomite	$CaMg(CO_3)_2$
Eucryptite	$LiAlSiO_4$
Faujasite	$(Ca,Na_2,K_2,Mg,Sr)_{3.5}[Al_7Si_{17}O_{48}] \cdot 32H_2O$ (*zeolite group*)
Fayalite	$Fe^{2+}{}_2(SiO_4)$
Forsterite	$Mg_2(SiO_4)$
Galena	PbS
Gibbsite	$Al(OH)_3$
Glauberite	$Na_2Ca(SO_4)_2$
Gypsum	$CaSO_4 \cdot 2H_2O$
Halite	$NaCl$
Halloysite	$Al_2Si_2O_5(OH)_4 \cdot n(H_2O)$
Hectorite	$Na_{0.3}(Mg,Li)_3(Si_4O_{10})(F,OH)_2$ (*smectite group*)
Heulandite	$(Na/Ca/K)_{5\text{-}6}[Al_{8\text{-}9}\ Si_{27\text{-}28}\ O_{72}] \cdot nH_2O$ (*zeolite group*)
Huntite	$CaMg_3(CO_3)_4$
Hydromagnesite	$Mg_5(CO_3)_4(OH)_2 \cdot 4H_2O$
Illite	$K_{0.65}Al_{2.0}[Al_{0.65}Si_{3.35}O_{10}](OH)_2$
Ilmenite	$Fe^{2+}TiO_3$
Jadarite	$LiNaSiB_3O_7(OH)$
Kaolinite	$Al_2(Si_2O_5)(OH)_4$
Kernite	$Na_2[B_4O_6(OH)_2] \cdot 3H_2O$
Kyanite	$Al_2(SiO_4)O$
Laumontite	$CaAl_2Si_4O_{12} \cdot 4H_2O$ (*zeolite group*)
Lepidolite	$KLi_2Al(Si_4O_{10})(F,OH)_2$ to $K(Li_{1.5}Al_{1.5})(AlSi_3O_{10})(F,OH)_2$ (*polylithionite-trilithionite*)
Leucoxene	*a fine grained alteration product of various Ti minerals (ilmenite, anatase, rutile)*
Magnesite	$MgCO_3$
Mirabilite	$Na_2SO_4 \cdot 10H_2O$
Mordenite	$(Na_2,Ca,K_2)_4(Al_8Si_{40})O_{96} \cdot 28H_2O$ (*zeolite group*)
Muscovite	$KAl_2(AlSi_3O_{10})(OH)_2$
Orthoclase-microcline	$K(AlSi_3O_8)$
Nahcolite	$NaHCO_3$
Natrolite	$Na_2Al_2Si_3O_{10} \cdot 2H_2O$ (*zeolite group*)
Palygorskite	$\square Al_2Mg_2\square_2Si_8O_{20}(OH)_2(H_2O)_4 \cdot 4H_2O$
Petalite	$LiAl(Si_4O_{10})$
Phillipsite	$(Ca_{0.5},K,Na,Ba_{0.5})_{4\text{-}7}[Al_{4\text{-}7}Si_{12\text{-}9}O_{32}] \cdot 12H_2O$ (*zeolite group*)
Pirssonite	$Na_2Ca(CO_3)_2 \cdot 2H_2O$
Priceite	$Ca_2B_5O_7(OH)_5 \cdot H_2O$
Probertite	$NaCa[B_5O_7(OH)_4] \cdot 3H_2O$
Pyrophyllite	$Al_2Si_4O_{10}(OH)_2$
Quartz	SiO_2
Rutile	TiO_2
Saponite	$Ca_{0.25}(Mg,Fe)_3((Si,Al)_4O_{10})(OH)_2 \cdot nH_2O$ (*smectite group*)
Sericite	$KAl_2(AlSi_3O_{10})(OH)_2$ (*microcrystalline muscovite*)
Sillimanite	$Al_2(SiO_4)O$
Smectite	$(Na,Ca)_{0.3}(Al,Mg,Fe)_2[(Si,Al)_4O_{10}](OH)_2 \cdot nH_2O$ (*smectite group*)
Sphalerite	ZnS
Spodumene	$LiAlSi_2O_6$
Stellerite	$Ca_4(Si_{28}Al_8)O_{72} \cdot 28H_2O$ (*zeolite group*)
Stilbite	$(Na,K,Ca)_{6\text{-}7}[Al_{8\text{-}9}Si_{27\text{-}28}O_{72}] \cdot nH_2O$ (*zeolite group*)
Talc	$Mg_3Si_4O_{10}(OH)_2$
Thenardite	Na_2SO_4
Thomsonite	$NaCa_2[Al_5Si_5O_{20}] \cdot 6H_2O$ (*zeolite group*)
Tincalconite	$Na_2(B_4O_7) \cdot 5H_2O$
Topaz	$Al_2(SiO_4)(F,OH)_2$
Trona	$Na_3H(CO_3)_2 \cdot 2H_2O$
Ulexite	$NaCa[B_5O_6(OH)_6] \cdot 5H_2O$
Wollastonite	$Ca_3(Si_3O_9)$
Zircon	$Zr(SiO_4)$


INTERNATIONAL CHRONOSTRATIGRAPHIC CHART
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International Commission on Stratigraphy
v 2024/12
Eonothem / Eon
Erathem / Era
System / Period
Series / Epoch
Stage / Age
GSSP
GSSA
numerical age (Ma)
Phanerozoic
Cenozoic
Quaternary
Holocene
Meghalayan
Northgrippian
Greenlandian
present
0.0042
0.0082
Pleistocene
Upper
Chibanian
Calabrian
Gelasian
0.0117
0.129
0.774
1.80
Neogene
Pliocene
Piacenzian
Zanclean
2.58
3.600
5.333
Miocene
Messinian
Tortonian
Serravallian
Langhian
Burdigalian
Aquitanian
7.246
11.63
13.82
15.98
20.45
23.04
Paleogene
Oligocene
Chattian
Rupelian
27.30
33.9
Eocene
Priabonian
Bartonian
Lutetian
Ypresian
37.71
41.03
48.07
56.00
Paleocene
Thanetian
Selandian
Danian
59.24
61.66
66.00
Mesozoic
Cretaceous
Upper
Maastrichtian
Campanian
Santonian
Coniacian
Turonian
Cenomanian
72.2 ±0.2
83.6 ±0.2
85.7 ±0.2
89.8 ±0.3
93.9 ±0.2
100.5 ±0.1
Lower
Albian
Aptian
Barremian
Hauterivian
Valanginian
Berriasian
113.2 ±0.3
121.4 ±0.6
125.77
132.6 ±0.6
137.05 ±0.2
143.1 ±0.6
Jurassic
Upper
Tithonian
Kimmeridgian
Oxfordian
149.2 ±0.7
154.8 ±0.8
Middle
Callovian
Bathonian
Bajocian
Aalenian
161.5 ±1.0
165.3 ±1.1
168.2 ±1.2
170.9 ±0.8
174.7 ±0.8
Lower
Toarcian
Pliensbachian
Sinemurian
Hettangian
184.2 ±0.3
192.9 ±0.3
199.5 ±0.3
201.4 ±0.2
Triassic
Upper
Rhaetian
Norian
Carnian
~ 205.7
~ 227.3
~ 237
Middle
Ladinian
Anisian
241.464 ±0.28
246.7
Lower
Olenekian
Induan
249.9
251.902 ±0.024
Paleozoic
Permian
Lopingian
Changhsingian
Wuchiapingian
254.14 ±0.07
259.51 ±0.21
Guadalupian
Capitanian
Wordian
Roadian
264.28 ±0.16
266.9 ±0.4
274.4 ±0.4
Cisuralian
Kungurian
Artinskian
Sakmarian
Asselian
283.3 ±0.4
290.1 ±0.26
293.52 ±0.17
298.9 ±0.15
Carboniferous
Pennsylvanian
Upper
Gzhelian
Kasimovian
303.7 ±0.1
307.0 ±0.1
Middle
Moscovian
315.2 ±0.2
Lower
Bashkirian
323.4 ±0.4
Mississippian
Upper
Serpukhovian
330.3 ±0.4
Middle
Visean
346.7 ±0.4
Lower
Tournaisian
358.86 ±0.19
Paleozoic
Devonian
Upper
Famennian
Frasnian
372.15 ±0.46
382.31 ±1.36
Middle
Givetian
Eifelian
387.95 ±1.04
393.47 ±0.99
Lower
Emsian
Pragian
Lochkovian
410.62 ±1.95
413.02 ±1.91
419.62 ±1.36
Silurian
Pridoli
422.7 ±1.6
Ludlow
Ludfordian
Gorstian
425.0 ±1.5
426.7 ±1.5
Wenlock
Homerian
Sheinwoodian
430.6 ±1.3
432.9 ±1.2
Llandovery
Telychian
Aeronian
Rhuddanian
438.6 ±1.0
440.5 ±1.0
443.1 ±0.9
Ordovician
Upper
Hirnantian
Katian
Sandbian
445.2 ±0.9
452.8 ±0.7
458.2 ±0.7
Middle
Darriwilian
Dapingian
469.4 ±0.9
471.3 ±1.4
Lower
Floian
Tremadocian
477.1 ±1.2
486.85 ±1.5
Cambrian
Furongian
Stage 10
Jiangshanian
Paibian
~ 491.0
~ 494.2
~ 497.0
Miaolingian
Guzhangian
Drumian
Wuliuan
~ 500.5
~ 504.5
~ 506.5
Series 2
Stage 4
Stage 3
~ 514.5
~ 521.0
Terreneuvian
Stage 2
Fortunian
~ 529.0
538.8 ±0.6
Precambrian
Proterozoic
Neo-proterozoic
Ediacaran
Cryogenian
Tonian
~ 635
~ 720
1000
Meso-proterozoic
Stenian
Ectasian
Calymmian
1200
1400
1600
Paleo-proterozoic
Statherian
Orosirian
Rhyacian
Siderian
1800
2050
2300
2500
Archean
Neo-archean
Meso-archean
Paleo-archean
Eo-archean
2800
3200
3600
4031 ± 3
Hadean
4567
Units of all ranks are in the process of being defined by Global Boundary Stratotype Section and Points (GSSP) for their lower boundaries, including those of the Archean and Proterozoic, long defined by Global Standard Stratigraphic Ages (GSSA). Ratified Subseries/Subepochs are abbreviated as U/L (Upper/Late), M (Middle) and L/E (Lower/Early). Italic fonts indicate informal units and placeholders for unnamed units. Previous versions and detailed information on ratified GSSPs are available at the website http://www.stratigraphy.org. The URL to this chart is provided below.
Numerical ages are subject to ongoing revision and do not define units in the Phanerozoic and the Ediacaran; only GSSPs do. For boundaries in the Phanerozoic without ratified GSSPs or without constrained numerical ages, an approximate numerical age (~) is provided.
Most numerical ages are taken from 'A Geologic Time Scale 2020' by Gradstein et al. (2020), but some ages differ as provided by the relevant ICS subcommissions, with advice from the Timescale Calibration subcommission. These are approved by the ICS executive as the current consensus.
Colouring follows the Commission for the Geological Map of the World (www.ccgm.org)
CCGM CGMW
Chart drafted and maintained online by officers K.M. Cohen and N. Car.
The chart is a product of collective work by all ICS members past and present.
(c) International Commission on Stratigraphy, December 2024
URL: http://www.stratigraphy.org/ICSchart/ChronostratChart2024-12.pdf
To cite: Cohen, K.M., Finney, S.C., Gibbard, P.L. & Fan, J.-X. (2013; updated) The ICS International Chronostratigraphic Chart. Episodes 36: 199-204

Appendix 3

Index of mineral deposits (and plants of alumina and soda ash)

deposit	ore	country	number	map
Aazzouniye	qs	Lebanon	15	LE-1
Abades*	qs	Spain	137	ES-5C
Abbij*	rc	Egypt	26	EG-3
Abborrselet	qz	Sweden	102	SW-4
Abhit*	rc	Egypt	78	EG-4
Abra	rc	Portugal	144	PT-5
Abramovskoe	ky	Russia	119	RU-4
Abu Dabbab	fd-li	Egypt	159	EG-7B
Abu Dahr	cr	Egypt	182	EG-8
Abu Darag	ka	Egypt	105	EG-5
Abu El-Darag	qs	Egypt	102	EG-5
Abū Khurūq	ns	Egypt	169	EG-7B
Abu Natash	ka	Egypt	118	EG-6A
Abu Qurayn	qs	Libya	21	LY-1
Abu Tarafah	rc	Jordan	17	JO-1
Abu Treifiya	ze	Egypt	101	EG-5
Abu Zneima	qs	Egypt	115	EG-6A
Abzac	rc	France	224	FR-7
Achenheim	rc	France	30	FR-3
Achlada	rc	Greece	33	GR-1
Achmer*	rc	Germany	31-32	DE-2C
Acktjärn	qz	Sweden	23	SW-3
Aclare	li	Ireland	20	IE-1
Acque	rc	Italy	494	IT-8
Adagói	li	Portugal	27	PT-2
Adamclisi	qs	Romania	11	RO-3
Adamów	sc	Poland	161	PL-3
Adancata	be-qs	Romania	12	RO-3
Addington quarry	qs	United Kingdom	107	UK-3
Adelina-Bobia	qs	Spain	40	ES-2
Adjavelia	qs	Azerbaijan	39	AZ-1
Ädnamvare	ol	Sweden	123	SW-5
Afrah	be	Morocco	17	MA-3
Aga	rc	Germany	196	DE-4
Ağaçlı	wc	Türkiye	28	TR-2A
Ağaçören-Ortaköy	fd	Türkiye	324	TR-7
Agafay	rc	Morocco	71	MA-1
Aganozerskoe	ol	Russia	48	RU-2
Agar	ka	Libya	19	LY-1
Ağdābiyā	qs	Libya	7	LY-1
Agekhush	wc	Azerbaijan	11	AZ-1A
Aggerias	be	Greece	90	GR-4
Aghios Nikolaos	al	Greece	16	GR-1
Aghireş	ka	Romania	81	RO-1
Aghireşu-Storari	ka	Romania	82	RO-1
Agia Varvara	rc	Cyprus	30	CY-1
Agios Gerasimos	be	Greece	92	GR-4
Agost*	rc	Spain	249-253	ES-7J
Agounsa	fd	Morocco	79	MA-1
A Guarda-El Rosal	ka	Spain	5	ES-2
Aguilar de la Frontera	rc	Spain	291	ES-8
Agyos Panteleimon	rc	Greece	39	GR-1
Åheim (Gusdal bruddet)	ol	NO	34	NO-4
Ahırözü	ka	Türkiye	283	TR-6
Ahmetuşağı	sr	Türkiye	523	TR-12
Aichach	rc	Germany	293	DE-6
Ai-dag	ze	Azerbaijan	6	AZ-1
Ain Al Ghazala	be	Libya	3	LY-1
Aïn Allegua	ba-sr	Tunisia	2	TN-1C
Aïn Barbar	fd	Algeria	60	DZ-3
Ain Chadjra	rc	Algeria	66	DZ-1
Ain Dara*	qs	Lebanon	16-18	LE-1C
Ain El Orak	rc	Algeria	99	DZ-1
Ain Khemouda	ka	Tunisia	57	TN-1
Ain Lahcen	rc	Morocco	6	MA-2
Ain Meznoud	rc	Morocco	3	MA-2
Aïn Nechma	rc	Algeria	54	DZ-3
Aïn Nouïssy	rc	Algeria	10	DZ-1
Aïn Séfra	qs	Algeria	100	DZ-1
Ain Tassera	rc	Algeria	77	DZ-1
Aiotsdzor Range	fd	Armenia	1	AR-1
Airum	wc	Armenia	16	AR-1
Ait El Farsi	ba	Morocco	92	MA-4
Aitik	ba	Sweden	138	SW-6
Ajakhu	rc	Georgia	1	GE-1
Ajka	al	Hungary	10	HU-1
Akça	rc	Türkiye	548	TR-12Z
Akçaalan*	cr	Türkiye	371	TR-8
Akçaşehir	rc	Türkiye	127	TR-3
Akçasu	fd	Türkiye	257	TR-6N
Åkerberg	li	Sweden	131	SW-5
Akhaltsikh	ze	Georgia	18	GE-1
Akharım	wc	Türkiye	302	TR-6
Akhasheni	rc	Georgia	29	GE-1
Akhtala	ba	Armenia	21	AR-1
Akkaya	sr	Türkiye	337	TR-7
Akouda	rc	Tunisia	40	TN-1A
Akpazar	rc	Türkiye	537	TR-12
Akşehir	ba	Türkiye	433	TR-10
Akselendi*	qs	Türkiye	228-229	TR-5
Akvirançarsak	ze	Türkiye	290	TR-6
Al Balyana	rc	Egypt	141	EG-7
Al Halfayah	rc	Egypt	80	EG-4
Al Hasa	rc	Jordan	14	JO-1
Al Khattara	rc	Egypt	209	EG-8C
Al Lago	fd	Italy	444	IT-8
Al Lawiyyah*	rc	Egypt	36	EG-3
Al Middah-Tamozrat	rc	Tunisia	15	TN-1
Al Mudawara	wc	Jordan	22	JO-1
Al Noor	rc	Tunisia	23	TN-1B
Al Shamiyah	rc	Jordan	28	JO-1
Al Sharauna	rc	Egypt	151	EG-7
Al Taufiqiya*	rc	Egypt	22	EG-3
Ala-Aunis	fd-qz	Finland	69	FI-1F
Alabalik	fd	Türkiye	158	TR-4
Alabayır	qz	Türkiye	384	TR-9
al-Abyad	na	Libya	33	LY-1
Alacalı*	wc	Türkiye	47-48	TR-2B
Aladüz	rc	Türkiye	567	TR-12
Alakaya	fd	Türkiye	420	TR-9
Alameda de la Sagra*	rc	Spain	165-166	ES-5D
Alanen	mg-tc	Finland	21	FI-1A
Alanno Scalo-Fossatello	rc	Italy	210	IT-5
Alanyolu	fd	Türkiye	230	TR-5
Al-Arish	sc	Egypt	95	EG-5
Alarup	ka	Albania	62	AL-3
Alaşehir	fd	Türkiye	348	TR-8U
Alaşehir	rc	Türkiye	349	TR-8U
Al-Atf*	rc	Egypt	38	EG-3
Alava	rc	Spain	70	ES-3
Albine	rc	France	325	FR-9
Alcañiz	rc-wc	Spain	186	ES-6E
Alcorisa	qs	Spain	197	ES-6E
Al-Dabbusah	rc	Jordan	11	JO-1
Aldea del Obispo	wo	Spain	148	ES-5
Alexandra	qz	Germany	256	DE-5
Alexandra-Svetlen	rc	Bulgaria	32	BG-1
Alexandrovo	fd	Bulgaria	68	BG-5
Alfa I-Ceclavín	fd	Spain	151	ES-5
Alfen	rc	Germany	71	DE-2
Alhabia	rc	Spain	299	ES-8O
Al-Hamidiyah	zr	Syria	3	SY-1
Ali Bayramli	be	Azerbaijan	3	AZ-1
Alicakaya*	cr	Türkiye	536	TR-12
Alican	rc	Türkiye	560	TR-12Z
Alidemirci	ka	Türkiye	191	TR-5
Alipaşa*	fd	Türkiye	409-410	TR-9
al-Jaghbūb	qs	Libya	2	LY-1
Al-Kasarat	qs	Libya	28	LY-1A
Al-Khawaliq	qs	Libya	24	LY-1A
Al-Khmies Emsihel	qs	Libya	25	LY-1A
Alkiškiai	rc	Lithuania	3	LT-1
Al-Kufrah	qs	Libya	1	LY-1
Allendorf	be	Germany	113	DE-3
Alloza	wc	Spain	184	ES-6E
Allprenaj-Virovë	rc	Albania	60	AL-3
Alluyes	qs	France	33	FR-4
Almacelles	rc	Spain	106	ES-4
Al-Manasir	qs	Libya	29	LY-1A
Al-Masara*	rc	Egypt	48	EG-3
Almenar	rc	Spain	108	ES-4
Al-Mkamen	rc	Syria	5	SY-1
Al-Munira*	rc	Egypt	12	EG-2
Almuradiel	ka	Spain	263	ES-8
Al-Nasseriya*	rc	Egypt	53	EG-3
Alne quarry	rc	United Kingdom	208	UK-4
Alonia	fd	Greece	75	GR-1
Alpeñes	qs	Spain	180	ES-6
Alpenrod	ka	Germany	106	DE-3
Alpicat	rc	Spain	107	ES-4
Al-Qaryatain	qs	Syria	6	SY-1
Al-Qutaifa	rc	Syria	7	SY-1
Al-Rawda Al-Batroneh	sc	Syria	11	SY-1A
Alruhaibat	qs	Libya	32	LY-1
Al-Sammar	rc	Tunisia	74	TN-1
Alseda	qz	Sweden	100	SW-4
Al-Shawashna	rc	Egypt	81	EG-4
Alsómocsolád	rc	Hungary	66	HU-1
Altenberg	li	Germany	226	DE-4
Altendorf	qf	Germany	187	DE-4
Altengottern	rc	Germany	84	DE-2
Altermark	tc	Norway	20	NO-3
Altintaş	fd	Türkiye	353	TR-8
Alto da Carroceira	ba	Portugal	36	PT-2
Alto da Serra Norte	ka	Portugal	171	PT-8
Alto del Carmen-Aroche	wo	Spain	279	ES-8
Alto Tâmega	li	Portugal	26	PT-2
Alvarães e Valverde	ka	Portugal	5	PT-2
Alvarrões-Seixo Amarelo	li	Portugal	82	PT-3
Al-Waslatiyah	qs	Tunisia	39	TN-1
Al-Yamaniyyah	sc	Jordan	34	JO-1
Alzenau	rc	Germany	249	DE-5
Al-Zuqara	rc	Syria	4	SY-1
Am Bürgl	mg	Austria	6	AT-1
Åmåls	rc	Sweden	50	SW-3
Ameskroud	rc	Morocco	86	MA-1
Amezmiz	rc	Morocco	73	MA-1
Amistad-Valdecastillo	qz	Spain	52	ES-2
Amizmiz	rc	Morocco	74	MA-1
Amizour	rc	Algeria	46	DZ-2
Amroun*	rc	Tunisia	18-20-21	TN-1B
Amrus	rc	Egypt	19	EG-3
Amsittene	be	Morocco	75	MA-1
Amvrosiivka	wc	Ukraine	168	UA-7
Anadol'	fd	Ukraine	177	UA-7
Ana-Las Regueras	qs	Spain	48	ES-2
Andriivka	wc	Ukraine	151	UA-7D
Andriivka-Mykolaivka Druha	fd	Ukraine	144	UA-7
Anefgou	fd	Morocco	64	MA-1
Angad	rc	Morocco	36	MA-1
Angeren	rc	Netherlands	9	NL-1B
Angervilliers	rc	France	40	FR-4
Anginaros	fd	Greece	77	GR-1
Anina	wc	Romania	35	RO-1
Ankara	sa	Türkiye	286	TR-6
Anna	rc-wc	Germany	143	DE-3E
Anna-Włodzice Małe	sc	Poland	64	PL-2
Ano Komia	be	Greece	93	GR-4
Ansbach	rc	Germany	329	DE-7
Anschede	mo	Denmark	6	DK-1A
Anshapur	wc	Azerbaijan	12	AZ-1A
Anton	rc-wc	Germany	133	DE-3E
Antoni	ka	Poland	95	PL-2
Antonio	ka-qz-fc	Spain	227	ES-6I
Anzendorf	qs	Austria	51	AT-3
Aomar*	rc	Algeria	33	DZ-2
Aouinet	wc	Tunisia	6	TN-1C
Åpartjåkkå	mg	Sweden	111	SW-5
Apfelberg	rc	Austria	99	AT-4
Appleton quarry	rc	United Kingdom	192	UK-4
Apriki	rc	Latvia	4	LV-1
Apsiou	mg	Cyprus	14	CY-1
Apsiou-Louvaras	tc	Cyprus	13	CY-1
Arabaalan	ka	Türkiye	171	TR-5G
Aracaoluk	ka	Türkiye	175	TR-5G
Aragats*	pe	Armenia	19	AR-1
Arakli	ka	Türkiye	152	TR-4
Araya	sc	Spain	209	ES-6G
Arbodas	ka	Spain	43	ES-2
Arborn	rc-wc	Germany	114	DE-3E
Arclid quarry	qs	United Kingdom	165	UK-4
Ardeşen	ka	Türkiye	156	TR-4
Ardov-Zatyshnyan	pe	Ukraine	53	UA-4C
Arenas de San Pedro	qs	Spain	287	ES-8L
Aresing	rc	Germany	296	DE-6
Argana	ba	Morocco	83	MA-1
Argenthal	qz	Germany	257	DE-5
Arghenos	ka	Greece	80	GR-1
Argiano	rc	Italy	238	IT-5
Argiolas Mannas	rc	Italy	100	IT-2
Argos Orestikos	qs	Greece	31	GR-1
Armeniş	fd	Romania	39	RO-5
Armenochori	be	Cyprus	19	CY-1
Arnauds	qs	France	297	FR-8
Arnavutköy	ka	Türkiye	26	TR-2A
Arne	wc	United Kingdom	66	UK-2E
Arneiro	rc	Portugal	172	PT-8
Arquata	rc	Italy	237	IT-5
Arroyo de los Quintanares	ka-qz-fd	Spain	240	ES-6H
Arroyo Medero	ka-qz-fd	Spain	178	ES-6F
Arsin	ka	Türkiye	153	TR-4
Artemiv'ska	wc-qs	Ukraine	141	UA-7
Artik	ze	Armenia	10	AR-1
Årum	rc	Norway	48	NO-5
Arumetsa	ec	Estonia	1	EE-1
Arzamas	rc	Russia	78	RU-3
Arzella	sc	Italy	274	IT-6
Arzew*	rc	Algeria	5	DZ-1
As Sahabi	rc	Libya	6	LY-1
Aşağısöğütönü	rc	Türkiye	266	TR-6O
Asbi'ah	qs	Libya	26	LY-1A
Åsen	ka	Sweden	5	SW-2
Aseri	rc	Estonia	6	EE-1
Ash Shaykh Muhammad	zr	Syria	2	SY-1
Ashdown quarry	rc	United Kingdom	93	UK-3
Ashmoun	rc	Egypt	11	EG-2
Ashpark quarry	rc	United Kingdom	82	UK-3
Åskagens kvartsbrott	qz	Sweden	118	SW-5
Aşkale	mg	Türkiye	512	TR-12X
Askana (Tsikhis-Ubani)	be	Georgia	7	GE-1
Åskja	qz	Sweden	48	SW-3
Askur*	rc	Egypt	70	EG-4
Aspang	tc	Austria	114	AT-4
Aspres Petres	ka	Greece	79	GR-1
Aspropyrgos	rc	Greece	4	GR-1
As-Safija*	rc	Egypt	32	EG-3
Assanha da Paz	wc	Portugal	108	PT-6
Asseiceira*	rc	Portugal	142	PT-5
Assiros	fd	Greece	53	GR-1
Aswan Airport	sc	Egypt	205	EG-8C

deposit	ore	country	number	map
Atalaya Alta	ka	Spain	215	ES-6
Atalez	rc	Belarus	10	BY-1
Atella	qs	Italy	174	IT-4
Ateni Sioni	ze	Georgia	34	GE-1
Athis	rc	France	87	FR-4
Atlas quarry	rc	United Kingdom	149	UK-4
Atsiki	ze	Greece	78	GR-1
Attatba	rc	Algeria	18	DZ-1
Aubach	rc-wc	Germany	148	DE-3E
Aubigny-Les Clouzeaux	rc	France	142	FR-5
Auby	rc	France	13	FR-2
Auerbach*	rc	Austria	11	AT-2
Aughinish Island	al	Ireland	9	IE-1
Augustdorf	qs	Germany	72	DE-2
Auradé	rc	France	314	FR-9A
Aurora-Montevive	sr	Spain	297	ES-8
Autenried	rc	Germany	285	DE-6
Avaluci	rc	Croatia	57	HR-1
Avanos	ka	Türkiye	327	TR-7S
Avanos*	rc	Türkiye	328	TR-7S
Avcıkoru*	qs	Türkiye	43-44	TR-2B
Avcıkoru*	wc	Türkiye	51-53	TR-2B
Avcılar	qs	Türkiye	5	TR-2
Ave-et-Auffe	ba	Belgium	41	BE-1
Avelar	ec	Portugal	104	PT-5
Aveleta	qs	Spain	71	ES-3
Avren*	qs	Bulgaria	53	BG-1
Awsard	ns	Morocco	105	MA-6
Axos	rc	Greece	48	GR-1
Aydındere	fd	Türkiye	144	TR-4
Ayelo de Rugat	rc	Spain	245	ES-7
Ayhanlar	rc	Türkiye	326	TR-7S
Aylesford quarry	rc	United Kingdom	104	UK-3
Ayn Al Hashim	qf	Jordan	24	JO-1
Ayn Ben Ayyad	rc	Algeria	76	DZ-1
Ayvacık	qs	Türkiye	7	TR-2
Ayvalık	ka	Türkiye	193	TR-5
Ayyadiyya	rc	Egypt	47	EG-3
Azewijn	rc	Netherlands	5	NL-1
Azghar	rc	Morocco	15	MA-1
Azov	qf	Ukraine	178	UA-7
Azza di Li Cossi	be	Italy	1	IT-2
Azzaba	rc	Algeria	58	DZ-3
az-Zallah	qs	Libya	10	LY-1
Azzouzate*	rc	Morocco	32	MA-3
Baba Ali	rc	Algeria	20	DZ-2
Babalı	rc	Türkiye	313	TR-7Q
Babino	py	North Macedonia	2	MK-1
Babolky	qs	Czechia	94	CZ-5
Bačko Petrovo Selo	rc	Serbia	9	RS-2
Bad Neustadt	rc	Germany	182	DE-3
Bad Schmiedeberg	rc	Germany	218	DE-4
Bad Wimpfern	na	Germany	274	DE-5
Bad'inskoe	be	Russia	5	RU-1
Badde Lacana	qf	Italy	29	IT-2A
Bademli	rc	Türkiye	178	TR-5
Badu e' Carru	fd	Italy	56	IT-2
Bafa	fd	Türkiye	377	TR-9
Bağarası	fd	Türkiye	372	TR-9
Baghaï	rc	Algeria	67	DZ-1
Bagnada	tc	Italy	415	IT-8V
Bagnols-sur-Cèze	qs	France	289	FR-8
Bağözü	na	Türkiye	248	TR-6
Bağyolu	ze	Türkiye	527	TR-12
Bahadırlı	ka	Türkiye	168	TR-5G
Bahşılı	rc	Türkiye	289	TR-6
Bailén El Pozuelo	rc	Spain	269	ES-8N
Bailén La Zahonera	rc	Spain	265	ES-8N
Bailén Los Lentiscares	rc	Spain	264	ES-8N
Bailén Regajo del Cura	rc	Spain	268	ES-8N
Bailén San Francisco	rc	Spain	267	ES-8N
Bailén San Jacinto	rc	Spain	266	ES-8N
Bailén San Juan	rc	Spain	270	ES-8N
Bailieborough	rc	Ireland	33	IE-1
Baindlkirch	rc	Germany	294	DE-6
Băiţa-Plai	wo	Romania	71	RO-1
Bajmok	rc	Serbia	3	RS-2
Bajoca-Almendra	fd	Portugal	43	PT-2
Bakhtin	qf	Ukraine	69	UA-4
Bakonyozlop	bx	Hungary	22	HU-1
Bakonyszentlászló	rc	Hungary	21	HU-1
Bălăbănești	rc	Moldova	14	MD-1
Balaguer*	rc	Spain	109-110	ES-4
Balakovskoe	wc	Russia	65	RU-3
Balatonszentgyörgy	rc	Hungary	6	HU-1
Bāle-Bērziņi	qs	Latvia	19	LV-1
Balka Glubokaya	fd	Ukraine	133	UA-6
Balldre	rc	Albania	27	AL-2
Ballymacadam	ka	Ireland	18	IE-1
Ballymagooly	rc	Ireland	17	IE-1
Ballynoe	ba	Ireland	8	IE-1
Bălţii	rc	Moldova	21	MD-1
Balzhausen	rc	Germany	287	DE-6
Banatsko Karađorđevo–Žitište	rc	Serbia	15	RS-2
Bani Fouda	rc	Algeria	29	DZ-2
Bankswood Quarry	rc	United Kingdom	196	UK-4
Banmossen	wo	Sweden	140	SW-6
Bannberscheid	rc-wc	Germany	147	DE-3E
Banta-Ocna Mures	be	Romania	68	RO-1
Bantry	ba	Ireland	12	IE-1
Bantysheve	qs	Ukraine	135	UA-7
Bărăbanț	rc	Romania	65	RO-1
Baranów	sc	Poland	157	PL-3
Baraq valley	rc	Israel	25	IL-2
Barašivka	fd	Ukraine	28	UA-2
Barbara	rc-wc	Germany	162	DE-3E
Barburigo	rc	Italy	229	IT-5
Barcik	rc	Poland	29	PL-1
Bardakçı	rc	Türkiye	565	TR-12
Bardüttingdorf	rc	Germany	42	DE-2A
Barega	ba	Italy	124	IT-2G
Barhult	fd	Sweden	43	SW-3
Baroševac	wc	Serbia	61	RS-3
Barranco del Baladrar	ka-qz-fc	Spain	218	ES-6I
Barranco del Salobrar	ka-qz-fc	Spain	222	ES-6I
Barranco del Tinajo	ka	Spain	213	ES-6
Barranco la Osa	ka-qz-fd	Spain	237	ES-6H
Barreira da Gracinda	rc	Portugal	135	PT-7
Barreira dos Vales	rc	Portugal	184	PT-10
Barreira Grande	rc	Portugal	166	PT-9
Barreiras Altas	wc	Portugal	101	PT-5
Barreiro das Malpicas	rc	Portugal	95	PT-3
Barreiros	rc	Spain	17	ES-2
Barreiros	fd	Spain	35	ES-2
Barriais	rc	Portugal	42	PT-2
Barrinho	wc	Portugal	62	PT-4
Barrio	rc	Portugal	98	PT-3
Barro	fd	Italy	400	IT-7
Barro Branco 6	wc	Portugal	119	PT-6
Barro Branco 8	wc	Portugal	121	PT-5
Barrocos	rc	Portugal	63	PT-4
Barroquinha	wc	Portugal	61	PT-4
Barroso-Alvão	li	Portugal	24	PT-2
Barry	rc	Belgium	13	BE-1
Bårstad	tc	Norway	36	NO-4
Bartošova Lehôtka - Okolo salaša	be	Slovakia	44	SK-4
Bartošová Lehôtka - Paseka	ze	Slovakia	49	SK-4
Bartošova Lehôtka - Veľký Háj	be-wc	Slovakia	43	SK-4
Barzana	ka	Spain	41	ES-2
Basandingen	rc	Switzerland	26	CH-1
Bascape-Landriano	qs	Italy	311	IT-6
Basconcillos del Tozo	wc	Spain	62	ES-3
Baskarp	qs	Sweden	157	SW-3
Başkışla	ba	Türkiye	453	TR-10
Baskoyak-Kuyuçak-Kipça	ba	Türkiye	440	TR-10W
Başören	be	Türkiye	275	TR-6O
Bátaszék	rc	Hungary	67	HU-1
Bateun Jeudari	ba	Morocco	62	MA-1
Bátonyterenye	rc	Hungary	36	HU-1
Batzendorf	qs	France	28	FR-3
Baurci	rc	Moldova	6	MD-1
Bavanište	rc	Serbia	39	RS-1
Bavent	rc	France	111	FR-5
Bayındır	ns	Türkiye	321	TR-7R
Bažantnica I-II	qs	Slovakia	2-3	SK-1
Bazavluk River	fd	Ukraine	122	UA-6
Bazernik	wc	North Macedonia	1	MK-1
Bazouges Cré sur Loir	rc	France	118	FR-5A
Beacon quarry	qs-rc	United Kingdom	3	UK-2
Beaulieu-le-Neuf	qs	France	55	FR-4
Beaulon/l'Hautmoucheron	wc	France	186	FR-6
Beautheil-Saints	rc	France	66	FR-4
Beauvoir	ka-li	France	193	FR-6
Bečej (Rit)	rc	Serbia	13	RS-2
Beckershaid	rc-wc	Germany	137	DE-3E
Bedekovčina	rc	Croatia	20	HR-1
Bédoin-Crans	qs	France	294	FR-8
Bédoin-Deffends	qs	France	295	FR-8
Bédoin-Menèque	qs	France	293	FR-8
Beek	rc	Netherlands	32	NL-1A
Be'eri	rc	Israel	4	IL-2
Beesel	rc	Netherlands	29	NL-1
Bega`Aleni	wo	Italy	93	IT-2
Begonte	qz	Spain	24	ES-2
Behynce	rc	Slovakia	102	SK-1
Beinmyr	fd	Norway	67	NO-5
Beiuş	rc	Romania	115	RO-1
Békéscsaba	rc	Hungary	59-60	HU-1
Bela	rc	Bulgaria	13	BG-1
Bela Stena	mg	Serbia	97	RS-5
Bela Voda	rc	Bulgaria	7	BG-1
Bele Vode	wc	Serbia	48	RS-3
Belevi	rc	Türkiye	355	TR-8
Belfuggito	rc	Italy	310	IT-6
Beli Kamen	mg	Serbia	115	RS-6
Beli Majdan	ka	Serbia	44	RS-1
Beli Plast	ze	Bulgaria	72	BG-5
Belianes	rc	Spain	112	ES-4
Belin-Béliet	qs	France	265	FR-7
Beliu	rc	Romania	59	RO-1
Bellegarde	rc	France	284	FR-8
Bellenberg	rc	Germany	284	DE-6
Bellingdon quarry	rc	United Kingdom	112	UK-3
Bellvei*	qs	Spain	114	ES-4B
Belorečki peščar	ka	Serbia	78	RS-1
Belvedere	rc	Italy	345	IT-7
Belvís de Monroy	li	Spain	156	ES-5
Ben Danoun	rc	Algeria	23	DZ-2
Ben Rahmoune*	rc	Algeria	27-28	DZ-2
Benaguasil	qs	Spain	231	ES-6
Benavila	be	Portugal	158	PT-8
Benbulbin	ba	Ireland	3	IE-1
Béni-Mansour	sr	Algeria	42	DZ-2
Béni-Snassène	ka	Morocco	34	MA-1
Benjlikh	rc	Morocco	42	MA-1
Bent Farm quarry	qs	United Kingdom	166	UK-4
Berardenga Scalo	rc	Italy	263	IT-5
Berdavan	rc	Armenia	20	AR-1
Beregovo	fd-ka	Ukraine	54	UA-4C
Bereketli	be	Türkiye	196	TR-5
Berestovenka	qs	Ukraine	42	UA-3
Berezhany	be	Ukraine	63	UA-4
Bereznikovskiy	sa	Russia	105	RU-4
Berezovka	be	Russia	100	RU-4
Berg	rc	Switzerland	30	CH-1
Bergby	li	Sweden	105	SW-4
Bergen	fd	Germany	355	DE-7
Bergheim	al	Germany	65	DE-2
Bernburg	na	Germany	209	DE-4
Bernuy de Porreros	rc	Spain	132	ES-5C
Berod	rc-wc	Germany	134	DE-3E
Beroun	fd	Czechia	24	CZ-1
Berrien	ka	France	105	FR-5
Bertolino	rc	Italy	125	IT-3
Bertozzo	ka	Italy	449	IT-8
Bērziņi	qs	Latvia	18	LV-1
Beşcam*	mg	Türkiye	273	TR-6O
Beselich	rc-wc	Germany	119	DE-3E
Beşler	be	Türkiye	317	TR-7
Bešpelj	bx	Bosnia H.	13	BH-1
Besse	be	France	275	FR-7
Bessède/Cadouin	wc	France	274	FR-7
Bessèdes	fd	France	329	FR-9B
Bessin	qs	France	110	FR-5
Běstvina	ba	Czechia	82	CZ-1
Bethenet	rc	France	178	FR-6
Betschdorf	rc	France	25	FR-3
Bettana	rc	Morocco	44	MA-1
Bettancourt-la-Longue	rc	France	91	FR-4
Beyanun	be	Syria	1	SY-1
Beyrede	al	France	308	FR-9
Bezymyannoe-Kyrpurta-Shuururta	ky	Russia	8	RU-2
Biała Góra - Wschód	qs	Poland	132	PL-3
Bidda de Nuxisi	rc	Italy	96	IT-2F
Biecz	rc	Poland	206	PL-1
Biela Hora	ka	Slovakia	150	SK-9
Biferno	rc	Italy	185	IT-4
Biga	pe	Türkiye	173	TR-5G
Bigadiç	bo-li	Türkiye	201	TR-5J
Biharia	rc	Romania	96	RO-1
Bijele Poljane	bx	Montenegro	12	ME-1A
Bijeljina	rc	Bosnia H.	69	BH-1
Bijelo polje	be	Montenegro	27	ME-1
Biklyan	be	Russia	102	RU-4
Bilalovac	wc	Bosnia H.	27	BH-1
Bilbor	tc	Romania	111	RO-1
Bil'chaky	fd	Ukraine	8	UA-2
Biliaiivka	ka	Ukraine	117	UA-6
Bilir-Kasar-Kızılkilise	ba	Türkiye	558	TR-12Z
Biljenski griči	rc	Slovenia	3	SI-1
Billinge	ka	Sweden	10	SW-2
Billy	rc	France	192	FR-6
Bilo	rc	Croatia	48	HR-1
Bilqas	rc	Egypt	49	EG-3
Biočki stan	bx	Montenegro	20	ME-1A
Bir M'Cherga	rc	Tunisia	27	TN-1
Birch Coppice stockpile	fc	United Kingdom	138	UK-4
Birkenheck	rc-wc	Germany	122	DE-3E
Birtley quarry	rc	United Kingdom	218	UK-5
Bishriyya	sw	Jordan	39	JO-1
Biyahmu*	rc	Egypt	86	EG-4
Bizeljsko	qs	Slovenia	22	SI-1
Bjelajce	bx	Bosnia H.	12	BH-1
Bjerreby	be	Denmark	29	DK-1
Bjørkedalen	ol	Norway	31	NO-4
Björkeröd	fd	Sweden	39	SW-3
Bjorvassheia vest	fd	Norway	61	NO-5
Bjusan	qz	Sweden	30	SW-3
Bjuv	wc	Sweden	13	SW-2
Blackhill	rc	United Kingdom	223	UK-5
Blackpool	ka	United Kingdom	19	UK-2A
Blacourt	rc	France	43	FR-4A
Blahodativka-Staroviriv ka	qs	Ukraine	48	UA-3
Blaise Farm quarry	qs	United Kingdom	106	UK-3
Blajan*	rc	France	309-310	FR-9
Blanca-San Benito	qz	Spain	155	ES-5
Blansko 2-Mošna	qs	Czechia	100	CZ-5
Blansko-Jezírka	qs	Czechia	101	CZ-5
Blaringhem	rc	France	6	FR-2
Blatets	rc	Bulgaria	58	BG-1
Blatoto	rc	Bulgaria	60	BG-1
Blauenthal	fd	Germany	191	DE-4
Blidet Amor	be	Algeria	95	DZ-1
Blidet Amor*	rc	Algeria	94	DZ-1
Blijuva	mg	Bosnia H.	31	BH-1
Bliketa	qf	Bulgaria	76	BG-5
Blinerie/Toumon-St-Martin	wc	France	175	FR-6A
Blinkova Varaka	fd	Russia	28	RU-2
Blockleys quarry	rc	United Kingdom	157	UK-4
Blome	qs	Latvia	24	LV-1
Bloomfleet	rc	United Kingdom	204	UK-4
Bni Bouzra	mg-cr	Morocco	11-dic	MA-2
Bni Yakhlef	rc	Morocco	47	MA-1
Bobija	ba	Serbia	69	RS-3
Bocca della Selva	bx	Italy	184	IT-4
Boccadello	sc	Italy	290	IT-6N
Bocciole	wc	Italy	395	IT-7T

deposit	ore	country	number	map
Bodrogkeresztúr	ze	Hungary	50	HU-2
Bodurlar	ka	Türkiye	161	TR-5
Boensberg	ec	Belgium	33	BE-1B
Boğaziçi	rc	Türkiye	357	TR-8
Bogdanovič	wc	Russia	115	RU-4
Bogen	rc	Germany	323	DE-6
Bognes-Tysfjord	fd	Norway	74	NO-3
Bogovina	be	Serbia	80	RS-1
Bogumiła	rc	Poland	119	PL-1
Boguszów	ba	Poland	106	PL-2
Bogutovac	mg	Serbia	93	RS-4
Bogyden	rc	Denmark	27	DK-1
Bohousová	ba	Czechia	90	CZ-1
Bois de Rentes	wc	France	245	FR-7B
Bois Feulleit	qs	France	291	FR-8
Bois-de-Gand	rc	France	159	FR-6
Boissonneau	rc	France	269	FR-7
Bojanówka	rc	Poland	167	PL-4
Boksitogorsk	bx-al	Russia	61-62	RU-3
Boksity	bx	Russia	109	RU-4
Bolduț	rc	Romania	69	RO-1
Bolechiv	rc	Ukraine	56	UA-4
Bøleråsen	qz	Norway	54	NO-5
Boleráz	rc	Slovakia	15	SK-1
Boliden	ky	Sweden	129	SW-5
Bolkar Mountains	bx	Türkiye	462	TR-11
Bolko	wc	Poland	62	PL-2
Bollène	wc	France	290	FR-8
Bollstedt	rc	Germany	85	DE-2
Bolova Brda	bx	Montenegro	22	ME-1A
Bolshoe-Brusnichnoe	fd	Russia	52	RU-2
Bolshoy Rov-Yagelurta	ky	Russia	9	RU-2
Bölücek	rc	Türkiye	276	TR-6O
Bölükçam	cr	Türkiye	483	TR-11
Bomčev Breg	ec	Slovenia	29	SI-1
Bonče	fd	North Macedonia	6	MK-1
Bonenburg	rc	Germany	74	DE-2
Bonnevault	qs	France	71	FR-4C
Bono	ze	Italy	35	IT-2
Bonrepos-Riquet	rc	France	318	FR-9
Bor	rc	Türkiye	466	TR-11
Borak	cr	Bosnia H.	41	BH-1
Bore Place	rc	United Kingdom	109	UK-3
Borgen	ec	Norway	49	NO-5
Borgonato	rc	Italy	426	IT-8
Borići	wc	Bosnia H.	56	BH-1A
Borkowice-Radestów	wc	Poland	153	PL-3
Borkowice-Radestów E	sc	Poland	154	PL-3
Borobia	mg	Spain	95	ES-3
Borovany-Ledenice	wc	Czechia	72	CZ-4
Borovoe	qs	Belarus	14	BY-1
Borovoe	py	Belarus	26	BY-1A
Borów	rc	Poland	171	PL-4
Borowe	rc	Poland	48	PL-1
Bors-de-Baignes	wc	France	244	FR-7B
Borsec	tc	Romania	112	RO-1
Borský Svätý Jur	rc	Slovakia	4	SK-2
Borzna	rc	Ukraine	34	UA-2
Bosco della Frasca	qs	Italy	176	IT-4
Boskovice-Chrudichromy	qs	Czechia	97	CZ-5
Bossea	li	Italy	347	IT-7
Bostanlı	cr	Türkiye	500	TR-12
Bostraze-Balleswidden	ka	United Kingdom	1	UK-2
Botești	wc	Romania	47	RO-1
Botro ai Marmi-Montorsi	fd	Italy	249	IT-5
Böttstein	rc	Switzerland	18	CH-1
Bou Ouzzal	ba	Morocco	57	MA-1
Bouça das Telheiras	rc	Portugal	8	PT-2
Boudkek	mg	Morocco	13	MA-2
Boudouaou*	rc	Algeria	25-26	DZ-2
Boughton	ec	United Kingdom	174	UK-4
Bouguargouh*	rc	Morocco	54	MA-1
Bouhoua	be	Morocco	22	MA-3
Bouira	qf	Algeria	34	DZ-2
Bouizrane	ba	Morocco	102	MA-4
Boukhchiba	wc	Tunisia	8	TN-1C
Boumadine	py	Morocco	95	MA-4
Boumaiz	ba	Morocco	98	MA-4
Boussaâda	rc	Algeria	82	DZ-1
Boussaâda	qz	Algeria	84	DZ-1
Boussan	rc	France	311	FR-9
Boussard	rc	France	292	FR-8
Boussés	qs	France	279	FR-7
Bov	sw	Bulgaria	88	BG-1
Bovitello	rc	Italy	130	IT-3
Boxitet e Volijakut	bx	Kosovo	5	KS-1
Božičany	ka	Czechia	11	CZ-2
Božičany-Osmosa-jih	be	Czechia	10	CZ-2
Bozluk*	cr	Türkiye	472	TR-11
Bozooğulları	rc	Türkiye	547	TR-12Z
Bózsva	pe	Hungary	42	HU-2
Boztepe	rc	Türkiye	323	TR-7
Brach	rc	France	261	FR-7
Bradashesh	rc	Albania	57	AL-3
Bramaterra	ka	Italy	385	IT-7S
Braňany-Černý vrch	be	Czechia	47	CZ-3
Brandis	rc	Germany	220	DE-4
Brănești	wc	Romania	55	RO-1
Branis*	rc	Algeria	86-87	DZ-1
Bras	ka	Belgium	44	BE-1
Brashlyanitsa	rc	Bulgaria	27	BG-2
Braszowice	mg	Poland	109	PL-1
Bratca	bx	Romania	85	RO-6
Bratca-Lorau	wc	Romania	86	RO-6
Bratčice	fd	Czechia	113	CZ-6
Bratkovec	be	Croatia	23	HR-1
Bratronice	rc	Czechia	36	CZ-1
Brecciarola	rc	Italy	211	IT-5
Brechen	ka-qs	Germany	170	DE-3
Brechen	rc	Germany	171	DE-3
Brécy	qs	France	64	FR-4B
Bredsand	rc	Sweden	73	SW-4
Bregenz	rc	Austria	1	AT-1
Brehos	fd	Greece	76	GR-1
Brehov	fd-wc	Slovakia	158	SK-10
Breitenau	mg	Austria	94	AT-4
Breitensee	qs	Austria	74	AT-3
Brejo e Abolembra	ka	Portugal	47	PT-3
Brekkebekkdalen	tc	NO	27	NO-4
Brenk	ns	Germany	101	DE-3
Brétou/Fumel	wc	France	276	FR-7
Brezaci	wc	Serbia	53	RS-3
Brezak	mg	Serbia	84	RS-4
Brezina - Kuzmice	be	Slovakia	154	SK-10
Březinka	wc	Czechia	80	CZ-1
Breznička	ka	Slovakia	79	SK-5
Breznička-Červeň	rc	Slovakia	81	SK-5
Bric Carledà - Crose	ol	Italy	364	IT-7
Bricco Toni	qs	Italy	335	IT-7
Brickworth quarry	qs	United Kingdom	73	UK-2
Britannia quarry	rc	United Kingdom	197	UK-4
Brittheim	qz	Germany	279	DE-1
Briuchske	wc	Ukraine	158	UA-7D
Brkovec	rc	Croatia	12	HR-1A
Brník	wc	Czechia	62	CZ-1
Bro	qz	Sweden	46	SW-3
Broadway	wc	United Kingdom	46	UK-2C
Broby	qs	Sweden	158	SW-4
Brocēni	rc	Latvia	7	LV-1
Bröderhausen	rc	Germany	46	DE-2A
Brogården	qs	Sweden	159	SW-4
Bromleys quarry	rc	United Kingdom	194	UK-4
Brookhurst Wood quarry	rc	United Kingdom	86	UK-3
Brrar	rc	Albania	51	AL-2
Bršno	bx	Montenegro	15	ME-1A
Brüggen	rc	Germany	63	DE-2
Bruncu de Murdegus	wc	Italy	82	IT-2
Brunssum	rc	Netherlands	33	NL-1A
Brusada-Ponticelli	tc	Italy	416	IT-8V
Brusartsi	qs	Bulgaria	12	BG-1
Brusnik	ka	Bosnia H.	19	BH-1
Bryant's Lane quarry*	qs	United Kingdom	118	UK-3
Bryggja	ol	NO	35	NO-4
Brynkino Ust'e	wc	Russia	66	RU-3
Brzostów	rc	Poland	41	PL-1
Bubano	rc	Italy	273	IT-6
Bubuieci	rc	Moldova	13	MD-1
Buch am Erlbach	rc	Germany	307	DE-6
Buchberg	rc	Switzerland	22	CH-1
Buchholz	rc	Germany	4	DE-1
Buchin-Nemanu	qz	Romania	43	RO-5
Buchkirchen	rc	Austria	36	AT-2
Buchwäldchen	rc	Germany	236	DE-4
Budiš	fd	Slovakia	35	SK-1
Budureasa	mg	Romania	74	RO-1
Budy Mszczonowskie	ec	Poland	28	PL-1
Bühl	rc	Germany	345	DE-7
Bujanovac	fd	Serbia	114	RS-6
Bukcha	be	Belarus	23	BY-1A
Bukinje	qs	Bosnia H.	63	BH-1
Bukovik	rc	Serbia	64	RS-3
Bukowno	qs	Poland	126	PL-1
Bukowo	ec	Poland	8	PL-1
Bukulja	fd	Serbia	66	RS-3
Buldan	fd	Türkiye	354	TR-8
Buldern	rc	Germany	58	DE-2
Bulgarovo	ns	Bulgaria	56	BG-1
Bulhary	sw	Slovakia	98	SK-1
Bulmer quarry	rc	United Kingdom	115	UK-3
Bulqizë	cr	Albania	43	AL-2
Buraccio - La Crocetta	fd	Italy	253	IT-5L
Burger/Luftenberg	qs	Austria	42	AT-2
Burligo	rc	Italy	406	IT-8
Burovica	wc	Serbia	46	RS-3
Burrowine Moor quarry	qs	United Kingdom	228	UK-5
Burtnieki	qs	Latvia	31	LV-1
Burwell quarry	rc	United Kingdom	122	UK-4
Burythorpe quarry	qs	United Kingdom	207	UK-4
Busachi	be	Italy	60	IT-2
Bușilia	be	Moldova	17	MD-1
Busiri	rc	Egypt	55	EG-3
Bustelo	rc	Portugal	64	PT-4
Büthalja	rc	Algeria	63	DZ-3
Butovo	rc	Bulgaria	30	BG-1
Butten	rc	France	19	FR-3
Buttenheim	ec	Germany	346	DE-7
Buttenwiesen	rc	Germany	290	DE-6
Büvetli	qs	Türkiye	556	TR-12Z
Buxungeröd	qz	Sweden	26	SW-3
Buyukkizilcik	ba	Türkiye	481	TR-11
Büyükocak	ka	Türkiye	128	TR-3
Büyüktepe	ka	Türkiye	170	TR-5G
Büyükyaka*	cr	Türkiye	356	TR-8
Buzlukdağ	wo	Türkiye	320	TR-7R
Byšta	pe	Slovakia	153	SK-10
Bystré	rc	Slovakia	141	SK-1
Cabanas de Chãos	rc	Portugal	161	PT-8
Cabasse	rc	France	302	FR-8
Cabeço da Argemela	fd-li	Portugal	88	PT-3
Cabeço de Medeiros	cr	Portugal	33	PT-2
Caberfakılı*	qs	Türkiye	350-352	TR-8U
Cabitzudu	rc	Italy	99	IT-2
Cacciano	fd	Italy	376	IT-7R
Cádabo	ka	Spain	37	ES-2
Ca' del Monte	sc	Italy	293	IT-6N
Caferbey*	rc	Türkiye	347	TR-8
Çağış	be	Türkiye	197	TR-5J
Çakallı	rc	Türkiye	497	TR-11
Çakmak*	cr	Türkiye	203	TR-5I
Çakmaklı	cr	Türkiye	518	TR-12
Çakmaktepe	wc	Türkiye	244	TR-5
Calaf	rc	Spain	113	ES-4
Çalatlı	rc	Türkiye	310	TR-7Q
Çaldere	be	Türkiye	198	TR-5J
Calea Clujului	rc	Romania	94	RO-1
Çallı	fd-qz	Türkiye	401-402	TR-9
Callosa d'En Serrà	rc	Spain	246	ES-7
Çaltı	ka-wc	Türkiye	258	TR-6N
Çaltıkara	ka	Türkiye	166	TR-5G
Çaltılıdere	ze	Türkiye	571	TR-5G
Cà Lucaione	rc	Italy	268	IT-5
Çamaklar	be	Türkiye	459	TR-11
Çamalan*	mg	Türkiye	209	TR-5I
Caminau	ka	Germany	245	DE-4
Camino de los Hontanares	ka	Spain	212	ES-6
Çamlıbel*	cr	Türkiye	470	TR-11
Çamlıca-Gökçeiçi	qs	Türkiye	163	TR-5
Cammeri	fd	Italy	147	IT-3H
Campados	ka	Portugal	10	PT-2
Campians quarry	rc	United Kingdom	142	UK-4
Campillo Bajo	wc	Spain	182	ES-6E
Campimaglia	ze	Italy	225	IT-5
Campions Wood quarry	rc	United Kingdom	143	UK-4
Campitello	rc	Italy	302	IT-6
Campo di Cristo	rc	Italy	206	IT-5
Campo Felice	bx	Italy	214	IT-5
Campo S'Arenazzu	qs	Italy	115	IT-2G
Campolungo	rc	Italy	341	IT-7
Campolungo-Lugagnano V.A.	rc	Italy	308	IT-6
Campu Genna Ilixi	wc	Italy	73	IT-2D
Campulung	rc	Romania	17	RO-1
Çamtaşı	cr	Türkiye	552	TR-12Z
Canale Montegiordano	rc	Italy	167	IT-4
Cañaveral	li	Spain	152	ES-5
Canaveri-Vicoforte	rc	Italy	343	IT-7
Canè	fd	Italy	433	IT-8
Cañete la Real	qs	Spain	294	ES-8
Čanište	fd	North Macedonia	5	MK-1
Canitz	ka	Germany	223	DE-4
Çankaya	rc	Türkiye	285	TR-6
Cannemenda	qs	Italy	121	IT-2G
Canova	be	Italy	479	IT-8W
Cantois	rc	France	268	FR-7
Cantoru Ena	qf	Italy	20	IT-2A
Cap de Trois Fourches	be	Morocco	16	MA-3
Cape Vani	ba	Greece	104	GR-4
Capillas	wc	Spain	200	ES-6E
Capiterlina	rc	Italy	468	IT-8W
Capo Bianco aplite	li	Italy	252	IT-5L
Capocroce	ns	Italy	216	IT-5
Căpușu Mic	be	Romania	79	RO-1
Carantano-Casatisma	rc	Italy	315	IT-6O
Carbean	ka	United Kingdom	22	UK-2A
Carbonera de Frentes	qs	Spain	81	ES-3
Carboneras de Guadazaón	ka-qz-fd	Spain	235	ES-6H
Carchinargios	fd	Italy	54	IT-2
Carcoselle-Possagno	rc	Italy	495	IT-8X
Čardačište-Kruhari	rc	Bosnia H.	7	BH-1
Carlton Main quarry	rc	United Kingdom	199	UK-4
Carmazan	wc	Romania	88	RO-6
Carmen y Pura	wc	Spain	198	ES-6E
Cărpiniș	rc	Romania	56	RO-1
Carrascál del Rio	fd-qf	Spain	102	ES-3+5
Carrasqueira	fd	Portugal	50	PT-3
Carregueira N1	rc	Portugal	140	PT-7
Carreiro	ka	Portugal	13	PT-2
Carrickmacross	rc	Ireland	35	IE-1
Carrock Fell	li	United Kingdom	212	UK-5
Carru	fd	France	333	FR-9B
Carscallan quarry	rc	United Kingdom	226	UK-5
Çarşı	rc	Türkiye	517	TR-12
Casais do Rio	rc	Portugal	151	PT-5
Casal do Frade	qf	Portugal	91	PT-3
Casal dos Braçais	ka	Portugal	150	PT-5
Casalone	rc	Italy	277	IT-6
Casanuova	rc	Italy	265	IT-5
Casateia	tc	Italy	441	IT-8
Cascina Belvedere	rc	Italy	369	IT-7R
Cascina Borino	fd	Italy	375	IT-7R
Cascina Bronzina	rc	Italy	314	IT-6O
Cascina Castagnola	rc	Italy	318	IT-6O
Cascina Cerrato	rc	Italy	334	IT-7
Cascina Coppette-Poirino	rc	Italy	336	IT-7
Cascina Gallino-Alba	rc	Italy	338	IT-7
Cascina Goretta	rc	Italy	361	IT-7
Cascina Groppello	rc	Italy	329	IT-6
Cascina Mario	rc	Italy	323	IT-6O

deposit	ore	country	number	map
Cascina Montorio	rc	Italy	372	IT-7R
Cascina S. Giuseppe	rc	Italy	365	IT-7
Cascina Sorte	rc	Italy	371	IT-7R
Cascina Talpone	rc	Italy	360	IT-7
Cascina Vota	rc	Italy	370	IT-7R
Casconho	wc	Portugal	99	PT-5
Caselette/Morano	sc	Italy	285	IT-6N
Casette	rc	Italy	470	IT-8W
Casino Neri - Bagnarola	rc	Italy	270	IT-6
Časiv Jar	wc-qs	Ukraine	140	UA-7
Caslecomer	rc	Ireland	24	IE-1
Castagna Morera	fd	Italy	397	IT-7T
Castanho	fd-li	Portugal	84	PT-3
Castelletto Sette Laghi	rc	Italy	313	IT-6O
Castello di Dragoni	bx	Italy	181	IT-4
Castillejo de Dos Casas	fd-li	Spain	149	ES-5
Castromil	ka	Portugal	19	PT-2
Castroncello	rc	Italy	239	IT-5
Časy	rc	Czechia	87	CZ-1
Çatak	qs	Türkiye	79	TR-3
Çataksu	mg	Türkiye	514	TR-12X
Ca' Talami	sc	Italy	294	IT-6N
Çatalca*	qs	Türkiye	9	TR-2
Çatpınar	rc	Türkiye	94	TR-3C
Cattybrook quarry	rc	United Kingdom	75	UK-2
Cauchy-à-la-Tour	rc	France	9	FR-2
Caughley	rc	United Kingdom	155	UK-4
Cava Serredi	rc	Italy	257	IT-5
Cavan	rc	Ireland	32	IE-1
Čavka	rc	Bosnia H.	26	BH-1
Čavlovac	mg	Serbia	91	RS-4
Çavuşköy-Yenice	be	Türkiye	24	TR-2
Çavuşlar	rc	Türkiye	64	TR-2
Çaycuma	rc	Türkiye	72	TR-3
Cayeux-sur-Mer	qs	France	1	FR-2
Çayırhan	na	Türkiye	249	TR-6
Cazaclia	rc	Moldova	4	MD-1
Cazalla de la Sierra	fd	Spain	277	ES-8
Cea Sa Pira	be	Italy	76	IT-2D
Ceadîr-Lunga	rc	Moldova	5	MD-1
Čekai	rc	Lithuania	2	LT-1
Čelarevo	rc	Serbia	20	RS-2
Çeltik-Beyciler	qs	Türkiye	12	TR-2
Čemerné	rc	Slovakia	143	SK-9
Centeais	wc	Portugal	74	PT-4
Centralne	wc	Ukraine	159	UA-7D
Çepni*	rc	Türkiye	104	TR-3
Çerçin	mg	Türkiye	429	TR-10
Çerenec	rc	Albania	40	AL-2
Ceresei	wc	Italy	386	IT-7S
Čerević	rc	Serbia	21	RS-2
Cerezo del Río Tirón	na	Spain	68	ES-3
Cerişor	tc	Romania	49	RO-1
Cerje Tužno	rc	Croatia	28	HR-1B
Cerna	rc	Croatia	54	HR-1
Černivci	rc	Ukraine	75	UA-4
Černomorskij	be	Russia	154	RU-1
Cerro de Carija	wo	Spain	274	ES-8
Cerro Madroño	ka	Spain	221	ES-6I
Cerro-Barracão	wc	Portugal	120	PT-6
Cervo-Jove	ka	Spain	33	ES-2A
Český Dub	rc	Czechia	56	CZ-1
Cesny-aux-Vignes	rc	France	113	FR-5
Cevizdere	fd	Türkiye	408	TR-9
Chagny	rc	France	162	FR-6
Chaib Ras	ba	Morocco	99	MA-4
Chailey quarry	rc	United Kingdom	92	UK-3
Chajęty	rc	Poland	25	PL-1
Chalain-le-Comtal	rc	France	201	FR-6
Chalastra*	rc	Greece	43-44	GR-1
Chalautre-la-Petite	wc	France	78	FR-4D
Chalkidona	rc	Greece	46	GR-1
Chalou	rc	France	117	FR-5A
Chanakia	rc	Greece	2	GR-1
Chanteloupe	li	France	226	FR-7
Chão	ka	Portugal	92	PT-3
Chapet-Les Mureaux	rc	France	41	FR-4
Chardakhli	wc	Azerbaijan	14	AZ-1A
Charnequinha	rc	Portugal	176	PT-8
Charnwood quarry	rc	United Kingdom	129	UK-4
Chasseneuil	rc	France	177	FR-6
Chbika	be	Tunisia	68	TN-1
Chèdeville	li	France	228	FR-7
Cheira Lakka	mg	Greece	9	GR-3
Chekfa	ka	Algeria	51	DZ-3
Chełsty	rc	Poland	139	PL-3
Cheminon	rc	France	93	FR-4
Cheremukhovo	bx	Russia	106	RU-4
Cherves-Châtelars	rc	France	235	FR-7A
Chervurta	ky	Russia	10	RU-2
Chierzac	wc	France	248	FR-7B
Chinchilla-las Rozas	rc	Spain	256	ES-8
Chinchilla-Rubiales	rc	Spain	257	ES-8
Chirca	rc	Moldova	11	MD-1
Chkalovskoe	fd	Russia	32	RU-2
Chkherimela River	ze	Georgia	32	GE-1
Chlumčany-Dnešice	ka	Czechia	29	CZ-1
Chmielów	rc	Poland	177	PL-4
Chocalhão II	rc	Portugal	136	PT-7
Chopovyci	an	Ukraine	20	UA-2B
Chorchana	tc	Georgia	17	GE-1
Chordi	ba	Georgia	15	GE-1
Chornivka	rc	Ukraine	74	UA-4
Chortoryia	rc	Ukraine	77	UA-4
Chouaifet El Qoubbeh	rc	Lebanon	12	LE-1
Chouamekh	rc	Tunisia	56	TN-1
Chouichiat	py	Morocco	90	MA-1
Christel	rc-wc	Germany	164	DE-3E
Chuchura	rc	Bulgaria	26	BG-2
Chudleigh Knighton	wc	United Kingdom	55	UK-2C
Chulilla	sc	Spain	229	ES-6I
Chumakov	rc	Russia	151	RU-1
Churchways quarry*	qs	United Kingdom	119	UK-3
Chwalimierz	rc	Poland	83	PL-2
Chwaliszowice	wc	Poland	46	PL-1
Ciano	fd	Italy	148	IT-3H
Çiçekdağı	rc	Türkiye	316	TR-7
Cienia	rc	Poland	36	PL-1
Çiftalan	wc	Türkiye	29	TR-2A
Çilbayır	ba	Türkiye	460	TR-11
Cima Bocchese	ba	Italy	477	IT-8W
Çimenli	qs	Türkiye	546	TR-12
Çınarlı-Kutay	fd	Türkiye	421	TR-9
Cinobaňa	ka	Slovakia	89	SK-5
Cínovec	li	Czechia	48	CZ-3
Cires-lès-Mello	rc	France	51	FR-4
Cīruļi	qs	Latvia	20	LV-1
Cişmichioi	rc	Moldova	1	MD-1
Cistérniga	rc	Spain	97	ES-3+5
Ciucaru Mare - Mraconia	cr	Romania	31	RO-4
Çivili*	cr	Türkiye	182-183	TR-5H
Claudia-Arguisuelas	qs	Spain	238	ES-6H
Claughton Moor quarry	rc	United Kingdom	210	UK-4
Clay Lane	wc	United Kingdom	53	UK-2C
Clee Hill quarry	sw	United Kingdom	163	UK-4
Clérigos	ba	Portugal	129	PT-5
Closehouse	ba	United Kingdom	214	UK-5
Çobanköy	wc	Türkiye	214	TR-5I
Çobanlar*	fd-qz	Türkiye	389-390	TR-9
Cobeja	rc	Spain	164	ES-5D
Coccola	wc	Italy	388	IT-7S
Coccola-Rolleja	wc	Italy	389	IT-7S
Coderotte	rc	Italy	275	IT-6
Coesfeld	qs	Germany	57	DE-2
Col de la Basella	sc	Spain	207	ES-6G
Colibași	rc	Moldova	3	MD-1
Colle Costantino (Sorbo)	fd	Italy	159	IT-3
Colle Morrone	fd	Italy	150	IT-3H
Colle Pagliarone	be	Italy	200	IT-4K
Colle Stoppione	rc	Italy	232	IT-5
Collo	fd	Algeria	55	DZ-3
Colmenar de Oreja	na	Spain	175	ES-5
Colombara	qf	Italy	281	IT-6
Colomiers	rc	France	316	FR-9A
Combiers	qs	France	241	FR-7
Comiziano	ze	Italy	179	IT-4
Commenaille	rc	France	160	FR-6
Condado da Tor	rc	Portugal	153	PT-8
Condessinha	zr	Portugal	156	PT-8
Congaz	rc	Moldova	7	MD-1
Contrada Bordea	rc	Italy	126	IT-3
Contrada Campo	rc	Italy	154	IT-3
Contrada Cardellicchia	rc	Italy	136	IT-3
Contrada Coccetta	ec	Italy	201	IT-4
Contrada Contrasto	rc	Italy	135	IT-3
Contrada Crisura	rc	Italy	153	IT-3
Contrada Grada	rc	Italy	131	IT-3
Contrada Liparano	rc	Italy	137	IT-3I
Contrada Piano Gatta	rc	Italy	127	IT-3
Contrada Riparossa	rc	Italy	213	IT-5
Contrada Serragiumenta	rc	Italy	161	IT-3
Contrada Timoniere	rc	Italy	138	IT-3I
Contrada Truncafilo	rc	Italy	133	IT-3
Contrada Vasì	rc	Italy	143	IT-3
Conțu-Negovanu	fd-li	Romania	24	RO-1
Cophurst quarry	rc	United Kingdom	159	UK-4
Coppa d'Oro-Dogliani	rc	Italy	339	IT-7
Coppa Rossa	rc	Italy	190	IT-4J
Coppine	rc	Italy	482	IT-8W
Coralici	rc	Bosnia H.	2	BH-1
Corbigny	rc	France	157	FR-6
Corbu	rc	Moldova	27	MD-1
Corçà	rc	Spain	123	ES-4
Corcelles-près-Payerne	rc	Switzerland	3	CH-1
Cornaita	ka	Romania	107	RO-1
Cornelia-Hagendorf	li	Germany	342	DE-7
Corneşti	ka	Romania	80	RO-1
Cornet	bx	Romania	75	RO-1
Cornu	fd	Romania	76	RO-1
Corona Sa Craba	ba	Italy	114	IT-2G
Corona Sa Guardia	be-wc	Italy	65	IT-2D
Coronas Arrubias	ka	Italy	88	IT-2E
Corongiu	fd	Italy	97	IT-2
Corrales del Vino	rc	Spain	129	ES-5
Cortelu-Somova	ba	Romania	2	RO-2
Cortijo de Archidona	be	Spain	302	ES-8O
Corvera de Asturias	qs	Spain	49	ES-2
Cosăuți	fd	Moldova	24	MD-1
Costa Benedetta	wc	Italy	450	IT-8
Costa Ciranda	wc	Portugal	69	PT-4
Costa S. Severo	rc	Italy	193	IT-4J
Costalunga & Menegazzo	rc	Italy	497	IT-8X
Costarvine-Ciarumannu	fd	Italy	46	IT-2C
Costeira	rc	Portugal	59	PT-4
Coția	fd-qz	Romania	51	RO-1
Covão	fd	Portugal	81	PT-3
Cowie	sw	United Kingdom	227	UK-5
Crasto	ka	Portugal	16	PT-2
Crasto	wc	Portugal	124	PT-5
Creech Meadow	wc	United Kingdom	69	UK-2E
Crépy-en-Valois	qs	France	56	FR-4
Crespos	wc	Portugal	112	PT-6
Čret	rc	Croatia	27	HR-1B
Creussen	ka-qz	Germany	344	DE-7
Crimmitschau	rc	Germany	193	DE-4
Crinitz	rc	Germany	235	DE-4
Crissier	rc	Switzerland	1	CH-1
Crivillén	wc	Spain	188	ES-6E
Crn Vrv	qz	North Macedonia	18	MK-1
Crna Dolina*	ka-wc	Bosnia H.	8	BH-1
Črna na Koroškem	fd	Slovenia	9	SI-1
Črna pri Kamniku	ka	Slovenia	8	SI-1
Crna rijeka	mg	Bosnia H.	33	BH-1
Crne Rovine	wc	Serbia	116	RS-1
Črnomerec	rc	Croatia	17	HR-1
Croce di Popi - Cerealto	rc	Italy	459	IT-8W
Crocella	be	Italy	195	IT-4K
Crohy Head	tc	Ireland	2	IE-1
Croix des Landelles	ka	France	124	FR-5
Cronton quarry	rc	United Kingdom	182	UK-4
Crosetto	tc	Italy	356	IT-7Q
Croso del Sasso	wc	Italy	387	IT-7S
Crossgeo quarry	tc	United Kingdom	236	UK-5
Crowborough quarry	rc	United Kingdom	94	UK-3
Cruceiro	qz	Spain	19	ES-2
Cruxeiras	qz	Spain	9	ES-2
Cruz do Campo	rc	Portugal	159	PT-8
Crvena Kita	bx	Montenegro	10	ME-1
Crvene Stijene-Poljane	bx	Bosnia H.	14	BH-1
Crveni pijesci-Plece	bx	Bosnia H.	47	BH-1
Crvenka	rc	Serbia	10	RS-2
Csabrendek	bx	Hungary	8	HU-1
Cserszegtomaj	tc	Hungary	7	HU-1
Csorna	rc	Hungary	17	HU-1
Cubillo del Campo	qs	Spain	65	ES-3
Cuccuriba	rc	Italy	91	IT-2
Čučuge	wc	Serbia	57	RS-3
Cueva del Cojo	ka	Spain	217	ES-6I
Cukavec	rc	Croatia	31	HR-1B
Çukurkent	rc	Türkiye	444	TR-10W
Cumieira	ka	Portugal	12	PT-2
Cumiona	wc	Italy	398	IT-7T
Cunha	ka	Portugal	14	PT-2
Cunnersdorf	ka	Germany	239	DE-4
Curgies	rc	France	15	FR-2
Curogna	rc	Italy	500	IT-8X
Currila	rc	Albania	53	AL-2
Curry quarry	rc	United Kingdom	113	UK-3
Cuza Vodă	wc	Romania	10	RO-3
Czajcze	rc	Poland	11	PL-1
Czarkowy	sr	Poland	187	PL-4
Czerwona Woda	ka-wc	Poland	54	PL-2
Czerwone Osiedle	rc	Poland	115	PL-1
Da Ribeira	rc	Portugal	175	PT-8
Dab'a	rc	Jordan	10	JO-1
Dąbrowa Duża	rc	Poland	35	PL-1
Dąbrówka Strumiany	rc	Poland	33	PL-1
Dadağlı	ba	Türkiye	482	TR-11
Daday	qz	Türkiye	81	TR-3
Dağküplü	cr	Türkiye	250	TR-6
Dahikyya	qs	Jordan	40	JO-1
Daimouss*	rc	Morocco	4	MA-2
Dali	rc	Cyprus	32	CY-1
Dalton quarry	rc	United Kingdom	184	UK-4
Dambludi	wc	Georgia	24	GE-1
Damiș-Rosia-Albioara	wc	Romania	87	RO-6
Danamandıra-Gümüşpınar*	qs	Türkiye	11	TR-2
Danayeri	wc	Azerbaijan	10	AZ-1A
Danika	rc	Greece	1	GR-1
Daqahlah	rc	Egypt	46	EG-3
Dar Chaabane Al Fehri	rc	Tunisia	19	TN-1B
Darbazi	wc	Georgia	22	GE-1
Dardhë	bx	Albania	78	AL-3
Darhib-Abu Gurdi	tc	Egypt	176	EG-8
Darkveti	qf	Georgia	14	GE-1
Daş Salahlı	be	Azerbaijan	4	AZ-1
Dashukivka	be	Ukraine	87	UA-5
Daugėliai	rc	Lithuania	8	LT-1
Davraz	rc	Türkiye	428	TR-10
Davulga	tc	Türkiye	291	TR-6
Dealul Cernei	qz	Romania	6	RO-2
Debeljača	rc	Serbia	29	RS-2
Dedovka	ka	Belarus	19	BY-1A
Deest	rc	Netherlands	18	NL-1B
Defcea	wc	Romania	9	RO-3
Değirmenli	bo-li	Türkiye	200	TR-5J
Dehibat	qs	Tunisia	78	TN-1
Deinham	qs	Austria	29	AT-2
Deir Abul Hegif	be	Egypt	2	EG-2
Deir El Baramous	be	Egypt	6	EG-2
Deir El Harrah	be	Egypt	3	EG-2
Deir El Moreir	be	Egypt	1	EG-2
Deiselkühn	rc	Germany	328	DE-7
Deli Jovan	cr	Serbia	75	RS-1
Delikipos*	rc	Cyprus	25-26	CY-1
Deliktaş-Demirtaş	pe	Türkiye	224	TR-5
Demasia	wc	Spain	183	ES-6E

deposit	ore	country	number	map
Demirci	be	Türkiye	147	TR-4
Demirkan	rc	Cyprus	35	CY-1
Demirtaş	ba	Türkiye	456	TR-10
Demiševci	rc	Bosnia H.	6	BH-1
Den Hout	rc	Belgium	31	BE-1B
Denistone Pit	wc	United Kingdom	47	UK-2C
Dereköy	tc	Türkiye	63	TR-2
Derinköy	rc	Türkiye	159	TR-4
Derladove	wc	Ukraine	105	UA-6
Derreennalomane	ba	Ireland	13	IE-1
Derryginagh	ba	Ireland	10	IE-1
Derventa	bx	Bosnia H.	55	BH-1A
Desford quarry	rc	United Kingdom	131	UK-4
Deštná-Dolní Smržov	qs	Czechia	93	CZ-5
Devë	cr	Kosovo	3	KS-1
Devecser	rc	Hungary	11	HU-1
Devilla quarry	qs	United Kingdom	229	UK-5
Devínska Nová Ves	rc	Slovakia	1	SK-1
Devletlibaba	ka	Türkiye	222	TR-5K
Devnya	na	Bulgaria	51	BG-1
Dhainaut	rc	France	14	FR-2
Dhour el-Aabadiye	qs	Lebanon	14	LE-1
Diar Ben Salem	rc	Tunisia	16	TN-1B
Dickenberg (Westermann)	rc	Germany	22	DE-2B
Dicle	cr	Türkiye	544	TR-12
Đidovi	ka	Bosnia H.	21	BH-1
Didydis Raustas	rc	Lithuania	18	LT-1
Dietersdorf	qs	Austria	66	AT-3
Dimishli	rc	Egypt	17	EG-3
Dimitrovgrad	be	Bulgaria	65	BG-1
Dingle Bank quarry	qs	United Kingdom	168	UK-4
Dingstetten	rc	Germany	318	DE-6
Diorios	rc	Cyprus	16	CY-1
Diou/les Charbonnières	wc	France	187	FR-6
Dipsizgöl	sr	Türkiye	524	TR-12
Dirshabah*	rc	Egypt	35	EG-3
Divouno	tc	Greece	55	GR-1
Djakovo	rc	Croatia	53	HR-1
Djebel Dabbagh	ka	Algeria	64	DZ-3
Djelfa*	rc	Algeria	81	DZ-1
Djerma	rc	Algeria	71	DZ-1
Djimla-Tamantout	sc	Algeria	49	DZ-3
Djursnäs	qz	Sweden	133	SW-6
Dkhissa*	rc	Morocco	43	MA-1
Dmytrivka	fd	Ukraine	172	UA-7
Dněšice	be	Czechia	28	CZ-1
Dobra	li	Ukraine	100	UA-5
Dobritzer	fd	Germany	224	DE-4
Dobrodo	rc	Serbia	87	RS-4
Dobrohorščа	rc	Ukraine	70	UA-4
Dobropilske	wc	Ukraine	157	UA-7D
Doğanbey	be	Türkiye	445	TR-10
Doğanbeyli	qz	Türkiye	479	TR-11
Doğancılı*	wc	Türkiye	45-46	TR-2B
Doğanhisar	wc	Türkiye	439	TR-10
Doğankuzu-Mortaş	bx	Türkiye	450	TR-10
Dohoshisht	rc	Albania	35	AL-2
Doicești	rc	Romania	16	RO-1
Doklanky	rc	Czechia	49	CZ-3
Dokmir	wc	Serbia	58	RS-3
Doktor Yosifovo	qs	Bulgaria	11	BG-1
Dolgi hrib	rc	Slovenia	1	SI-1
Dolná Ves	be-wc	Slovakia	38	SK-4
Dolní Bukovsko	rc	Czechia	68	CZ-4
Dolno Dupeni	fd	North Macedonia	3	MK-1
Doluca*	cr	Türkiye	513	TR-12X
Dolyns'ke	fd	Ukraine	119	UA-6
Domaine de la Poste	wc-rc	France	249-250	FR-7B
Doman	wc	Romania	37	RO-1
Dombasle-sur-Meurthe	sa	France	342	FR-1
Dombóvár	rc	Hungary	65	HU-1
Domen	rc	Albania	9	AL-2
Dominguizo	rc	Portugal	87	PT-3
Dominkovica	rc	Croatia	43	HR-1
Domokos Fthiotida	cr	Greece	20	GR-1
Don Paolo	rc	Italy	164	IT-4
Döngelce	qs	Türkiye	78	TR-3
Donigazza	ka	Italy	39	IT-2B
Donington Island	rc	United Kingdom	135	UK-4
Donja Bela Reka	ka	Serbia	77	RS-1
Donja Bukovica	be	Montenegro	9	ME-1
Donja Čemernica	rc	Croatia	11	HR-1A
Donja Rečica	rc	Serbia	105	RS-1
Donje Karaçevë	ka	Kosovo	22	KS-1
Donje Korminjane	rc	Kosovo	21	KS-1
Donje Lipovo	rc	Montenegro	8	ME-1
Donnington quarry	rc	United Kingdom	158	UK-4
Donskoye-Shevchenko	ns	Ukraine	173	UA-7
Dörentrup-Bock	rc	Germany	51	DE-2
Dorey's	wc	United Kingdom	64	UK-2E
Dorfen	rc	Germany	310	DE-6
Dorkett quarry	rc	United Kingdom	170	UK-4
Dorkovo	mg	Bulgaria	2	BG-1
Dorno-Zinasco	qs	Italy	312	IT-6
Dorothy	ka	United Kingdom	15	UK-2A
Dorsten	qs	Germany	61	DE-2
Dörtyol	bx	Türkiye	495	TR-11
Dosson-Casier	rc	Italy	490	IT-8
Douar Ouailia	rc	Algeria	13	DZ-1
Douiret	qs	Tunisia	75	TN-1
Douiret	rc	Tunisia	75	TN-1
Doyrantsi*	ka	Bulgaria	47-48	BG-4
Draâ Ben Khedda	rc	Algeria	37	DZ-2
Draa El Mizane	fd	Algeria	35	DZ-2
Dragalj	bx	Montenegro	25	ME-1
Drăgoiasa	tc	Romania	110	RO-1
Draïssa	qs-ba	Algeria	102-103	DZ-1
Drakelands	ka	United Kingdom	40	UK-2B
Dreislar	ba	Germany	69	DE-2
Dreistetten	bx	Austria	77	AT-4
Dren	rc	Croatia	55	HR-1
Dren	wc	Serbia	42	RS-1
Drienov	rc	Slovakia	131	SK-1
Drisht	rc	Albania	10	AL-2
Drmno	be	Serbia	41	RS-1
Drochtersen (Rusch)	rc	Germany	7	DE-1
Drömgruvan	fd	Sweden	59	SW-3
Drösing/Waltersdorf	qs	Austria	70	AT-3
Drugnia	rc	Poland	184	PL-4
Drugnia Rządowa	be	Poland	182	PL-4
Druzhkivka	wc	Ukraine	147	UA-7D
Držovice na Moravě	rc	Czechia	124	CZ-1
Dublje-Svilajnac	rc	Serbia	76	RS-1
Duboka	wo	Serbia	100	RS-5
Duboštica	cr	Bosnia H.	42	BH-1
Dubravë	be	Kosovo	13	KS-1
Dubrivka	ka	Ukraine	13	UA-2A
Dubrynych	fd	Ukraine	55	UA-4
Duderstadt (Jacobi)	rc	Germany	88	DE-2
Düdingen	rc	Switzerland	5	CH-1
Duingen	qs	Germany	50	DE-2
Dujici zapad	rc	Croatia	4	HR-1
Dukata	fd	Bulgaria	10	BG-1
Dulovo	ka	Bulgaria	42	BG-1
Duman	ka	Türkiye	167	TR-5G
Dumanoglu	mg	Türkiye	506	TR-12X
Dumluca*	cr	Türkiye	525	TR-12
Dümrekorta	tc	Türkiye	207	TR-5I
Dunarobba	rc	Italy	233	IT-5
Duneen	ba	Ireland	16	IE-1
Dunino	ka	Poland	77	PL-2
Duntanlich Mine	ba	United Kingdom	232	UK-5
Đurakov	bx	Montenegro	19	ME-1A
Durance	qs	France	278	FR-7
Đurdevac	qs	Croatia	41	HR-1
Đurđevićev Brijeg	wc	Croatia	21	HR-1
Durmuşlu	ns	Türkiye	319	TR-7R
Dürnkrut	qs	Austria	71	AT-3
Durtal-la Carrière	rc	France	116	FR-5A
Durtal-la Petite Pâquerie	rc	France	115	FR-5A
Dušanovac	rc	Serbia	73	RS-1
Dutluca-Nemli*	mg	Türkiye	268	TR-6O
Düvertepe-Moren*	ka	Türkiye	220-221	TR-5K
Duvnica	mg	Bosnia H.	51	BH-1
Dvarviečiai	rc	Lithuania	11	LT-1
Dvory nad Lužnicí	fd	Czechia	77	CZ-4
Dydland	rc	NO	69	NO-5
Dylągówka-Zapady	be	Poland	204	PL-1
Dypingdal	mg	NO	46	NO-4
Dysart Glebe	rc	Ireland	23	IE-1
Dysna	rc	Lithuania	27	LT-1
Džebe	rc	Bosnia H.	30	BH-1
Dzegvi	ze	Georgia	26	GE-1
Dzhebel	pe	Bulgaria	86	BG-1
East Edfu	qs	Egypt	153	EG-7
East Winch quarry	qs	United Kingdom	125	UK-4
Eastry	rc	United Kingdom	100	UK-3
Eaton Hall quarry	qs	United Kingdom	167	UK-4
Echteld	rc	Netherlands	19	NL-1
Eckldorf-Sinzinger	rc	Austria	10	AT-2
Edge Farm stockpile	rc	United Kingdom	225	UK-5
Edgeworthstown	ba	Ireland	29	IE-1
Ediğe	mg	Türkiye	288	TR-6
Edineț I	rc	Moldova	26	MD-1
Edire-Gümüşgöze	rc	Türkiye	154	TR-4
Edree	qs	Libya	18	LY-1
Edtbauer/Oberaching	qs	Austria	21	AT-2
Edwin Richards quarry	rc	United Kingdom	150	UK-4
Eferding	qs	Austria	28	AT-2
Eficacia-Arcones	qs	Spain	104	ES-3+5
Egem	rc	Belgium	8	BE-1
Eggersdorf	be	Germany	306	DE-6
Eğlencederesi*	fd	Türkiye	397-400	TR-9
Egyházaskesző	be	Hungary	18	HU-1
Eii	ns	Morocco	108	MA-6
Ein El Bayda	qs	Jordan	35	JO-1
Ein El-Baida	be	Jordan	41	JO-1
Ein Gedi	rc	Israel	5	IL-2
Ein Hatseva	rc	Israel	13	IL-2
Ein Yahav	be	Israel	14	IL-2
Eintracht	rc-wc	Germany	156	DE-3E
Eisenberg	ka	Germany	268	DE-5
Eiserne Hose	bx	Germany	177	DE-3
Eiterelvdalen	qz	NO	12	NO-3
Ejerslev	mo	Denmark	5	DK-1
Ekiztaş N	fd	Türkiye	423	TR-9
Ekiztaş S	fd	Türkiye	422	TR-9
El Alamillo	qs	Spain	289	ES-8L
El Anasser	rc	Algeria	78	DZ-1
El Badrashein*	rc	Egypt	13	EG-2
El Barkan	be	Egypt	5	EG-2
El Barrancon	qs	Spain	82	ES-3
El Borjine	rc	Tunisia	45	TN-1A
El Cabril	fd	Spain	276	ES-8
El Castillo	qz	Spain	12	ES-2
El Cerrillo	qs	Spain	101	ES-3+5
El Djorf-Ouled Derradj	rc	Algeria	85	DZ-1
El Gnater	be	Tunisia	55	TN-1
El Granal	qs	Spain	285	ES-8K
El Hamma	rc	Tunisia	73	TN-1
El Hcharef	rc	Algeria	62	DZ-3
El Khitmin	rc	Tunisia	11	TN-1
El Ksour	rc	Tunisia	38	TN-1
El Menia	be	Algeria	98	DZ-1
El Minervo	qs	Spain	283	ES-8K
El Olmo-Molinos	qs	Spain	196	ES-6E
El Oued	qz	Algeria	93	DZ-1
El Pinarete	qs	Spain	258	ES-8
El Pino-Los Montecillos	qs	Spain	63	ES-3
El Royuelo-El Arenal	qs	Spain	288	ES-8L
El Salegar	qs	Spain	80	ES-3
El Salmerón	qs	Spain	306	ES-8
El Toconar	ka-qz	Spain	214	ES-6
El Trasquilón	li	Spain	154	ES-5
El Truquet	ka-qz-fc	Spain	223	ES-6I
El Vellón	fd	Spain	142	ES-5
El-Allia	qf	Algeria	56	DZ-3
El-Aouana	qz	Algeria	47	DZ-3
El-Arish	zr	Egypt	94	EG-5
Elata	be	North Macedonia	23	MK-1
El-Bardawil Lake	zr	Egypt	93	EG-5
El-Barramiya	cr-mg-ol-tc	Egypt	154	EG-7
Elbbach	rc-wc	Germany	128	DE-3E
Elbingerode	rc	Germany	78	DE-2
Eldon quarry	rc	United Kingdom	215	UK-5
Elena	wc	Spain	191	ES-6E
El-Galala	cr	Egypt	180	EG-8
El-Gatrun	na	Libya	34	LY-1
El-Gedida	ba	Egypt	136	EG-1
El-Gezira	ns	Egypt	192	EG-8
El-Gunna	qs	Egypt	121	EG-6
El-Hudi	fd	Egypt	204	EG-8
Elin Pelin	qs	Bulgaria	18	BG-1
El-Kahfa	ns	Egypt	175	EG-8
Elke	mo	Denmark	7	DK-1A
Ellel Crag quarry	rc	United Kingdom	209	UK-4
Ellistown quarry	rc	United Kingdom	132	UK-4
Ellweiler	fd	Germany	263	DE-5
Elmaağacı*	mg	Türkiye	210	TR-5I
El-Madi	qs	Egypt	15	EG-2
Elmalı*	mg	Türkiye	212	TR-5I
Elmalık	qs	Türkiye	58	TR-2
El-Mansouri	ns	Egypt	193	EG-8
Elmaslar*	cr	Türkiye	362	TR-8V
El-Naga	ns	Egypt	190	EG-8
El-Saf*	rc	Egypt	14	EG-2
Elvergården	mo	Denmark	8	DK-1A
Elvington	rc	United Kingdom	99	UK-3
El-Wadi El-Geded	qs	Egypt	139	EG-1
Emael	qs	Belgium	52	BE-1A
Embalse de Santolea	wc	Spain	201	ES-6E
Embid-Calatayud	qs	Spain	87	ES-3
Emircik*	mg	Türkiye	280	TR-6
Emmes	li	Finland	22	FI-1B
Empeaux	rc	France	313	FR-9A
Ena Elittu	qf	Italy	19	IT-2A
Enchetz	be	Bulgaria	83	BG-5
Episcopia Bihor	rc	Romania	95	RO-1
Erbaa*	rc	Türkiye	98-99	TR-3
Erdek	tc	Türkiye	177	TR-5
Erdemli*	cr	Türkiye	463	TR-11
Eretria	rc	Greece	7	GR-1
Eretria	cr	Greece	21	GR-1
Erfoud	qs	Morocco	96	MA-4
Ergeneçiftliği*	wc	Türkiye	30-31	TR-2A
Erlach	rc	Austria	80	AT-4
Erlecom	rc	Netherlands	11	NL-1B
Érsekvadkert	rc	Hungary	34	HU-1
Escavada	rc	Portugal	182	PT-10
Escúzar	sr	Spain	296	ES-8
Esela	ka	Egypt	112	EG-6A
Eskice	be	Türkiye	112	TR-3D
Eskiköy	ba	Türkiye	528	TR-12
Espey	bo-li	Türkiye	217	TR-5
Espirdo-Basardilla	qs	Spain	133	ES-5C
Esquivias (Illescas-Yuncos)	be	Spain	174	ES-5
Essidhi	rc	Tunisia	17	TN-1B
Essljung	li	Sweden	37	SW-3
Estercuel	wc	Spain	190	ES-6E
Esther	rc-wc	Germany	144	DE-3E
Etang des Grandes Couées	rc	France	94	FR-4
Éteignières	rc	France	16	FR-2
Eteläkylä	ka	Finland	43	FI-1D
Etili	wo	Türkiye	169	TR-5G
Etropole	rc	Bulgaria	21	BG-1
Ettling	rc	Germany	300	DE-6
Eugui	mg	Spain	74	ES-3
Evbeyli	pe	Türkiye	563	TR-12
Ewhurst quarry	rc	United Kingdom	84	UK-3
Eygelshoven	rc	Netherlands	37	NL-1A
Ezousa	rc	Cyprus	41	CY-1
Fabbrega	rc	Italy	462	IT-8W
Fabbruciano	rc	Italy	231	IT-5
Fabianka	rc	Slovakia	97	SK-1
Faias	rc	Portugal	180	PT-8
Faidallo	ba	Italy	408	IT-8

deposit	ore	country	number	map
Fakıbeyli	rc	Türkiye	311	TR-7Q
Fanipol'	rc	Belarus	8	BY-1
Far Shay Clay Pit	rc	United Kingdom	190	UK-4
Fara d'Olivo	ze	Italy	175	IT-4
Faraya	qs	Lebanon	8	LE-1B
Farbani Potok	ka	Kosovo	16	KS-1
Farkhana	ka	Morocco	18	MA-3
Fasangarten/Deinham	qs	Austria	30	AT-2
Fasola	rc	Italy	467	IT-8W
Fatih	qs	Türkiye	6	TR-2
Faulbach	ka	Germany	91	DE-2
Fehérvárcsurgó	qs	Hungary	25	HU-1
Felahiye	ka	Türkiye	331	TR-7
Felsőcsatár	tc	Hungary	12	HU-1
Felsőpetény	be-wc	Hungary	33	HU-1
Fenili Belasi	rc	Italy	424	IT-8
Fenkina Lampi	qz	Russia	44	RU-2
Fenoughil	rc	Algeria	104	DZ-1
Feres	be-ze	Greece	74	GR-1
Ferizaj	rc	Kosovo	12	KS-1
Ferna	rc	Germany	86	DE-2
Ferrere-Cairo Montenotte	rc	Italy	340	IT-7
Ferrone Manetti	rc	Italy	261	IT-5
Fertőszéplak	rc	Hungary	16	HU-1
Feteira III	rc	Portugal	174	PT-8
Fiagdon	qs	Russia	157	RU-1
Figarba	wc	Italy	74	IT-2D
Fighille	rc	Italy	266	IT-5
Figueiras Vastas	rc	Portugal	145	PT-5
Filari	rc	Italy	141	IT-3I
Filfila	fd	Algeria	57	DZ-3
Filipy	rc	Poland	145	PL-3
Fındıklı	ka	Türkiye	157	TR-4
Finero	ol	Italy	404	IT-7
Finklham-Graben	rc	Austria	33	AT-2
Fischbeck	rc	Germany	49	DE-2
Fisibach	rc	Switzerland	21	CH-1
Fitore	rc	Albania	69	AL-3
Fjelie-Lomma	rc	Sweden	1	SW-2
Flakaberget	qz	Sweden	98	SW-4
Flatberget	li	Sweden	97	SW-4
Flåtungebyn/Ämnebyn	qz	Sweden	51	SW-3
Flerzheim	qs	Germany	96	DE-3
Fleurus	ba	Belgium	25	BE-1
Flintgruvan	qz	Sweden	64	SW-4
Flintgruvan	qz	Sweden	99	SW-4
Flintsjön	qz	Sweden	17	SW-3
Florești	qs	Moldova	22	MD-1
Flumentepido	rc	Italy	116	IT-2G
Foglizzo	rc	Italy	362	IT-7
Fohnsdorf	rc	Austria	98	AT-4
Fohosh	pe	Ukraine	52	UA-4C
Fondarella	rc	Spain	111	ES-4
Fondo Beverara	rc	Italy	278	IT-6
Fongen-Hyllingen	ky	Norway	72	NO-4
Fontaine-la-Guyon	rc	France	34	FR-4
Fontanelle	qs	Italy	488	IT-8W
Fontanheira	wc	Portugal	103	PT-5
Fontanone	be	Italy	480	IT-8W
Fonte da Cal	fd-li-qz	Portugal	85	PT-3
Fontenoy	rc	France	89	FR-4
Foradas de S`Arenas	rc	Italy	98	IT-2
Forcel Rosso	li	Italy	429	IT-8
Former Whittle quarry	rc	United Kingdom	222	UK-5
Formigoso	qs	Portugal	2	PT-2
Fornaccio	ka	Italy	382	IT-7S
Fornaccio-Ca` del Bosco	wc	Italy	381	IT-7S
Fornace Cotignola	rc	Italy	272	IT-6
Fornace di Pederobba	rc	Italy	501	IT-8X
Fornaci-Castel Viscardo	rc	Italy	230	IT-5
Forshammar/Limbergsbo	fd	Sweden	83	SW-4
Fortuna	rc	Spain	254	ES-7
Fortunatello	rc	Italy	158	IT-3
Fosdondo	rc	Italy	299	IT-6
Foss Mine	ba	United Kingdom	231	UK-5
Fossanigo	rc	Italy	464	IT-8W
Foum Zguid	ba	Morocco	89	MA-1
Fourkovouni	ba	Greece	103	GR-4
Fournès	rc	France	287	FR-8
Fourteen Acres quarry	rc	United Kingdom	96	UK-3
Frabosa Sottana	qz	Italy	346	IT-7
Frades	rc	Spain	21	ES-2
Frades	qz	Spain	20	ES-2
Fraguiças	fd	Portugal	21	PT-2
Frampol	rc	Poland	196	PL-4
Francischettu*	rc	Italy	94-95	IT-2F
Frechen	qs	Germany	66	DE-2
Fredelsloh	rc	Germany	76	DE-2
Freha	rc	Algeria	40	DZ-2
Freihungsand	rc-qs	Germany	336-337	DE-7
Freimüller-Wels	rc	Austria	38	AT-2
Freshfield Lane quarry	rc	United Kingdom	91	UK-3
Freudenstein	rc	Austria	31	AT-2
Frick	rc	Switzerland	17	CH-1
Friedland	rc	Germany	90	DE-2
Friedland	rc	Germany	1	DE-1
Fritscheshof	qs	Germany	2	DE-1
Frohnsdorf	ka	Germany	214	DE-4
Fronteira	fd-qz	Portugal	157	PT-8
Frösvidal	wo	Sweden	74	SW-4
Fuglunda	qs	Sweden	156	SW-2
Funtana Piroi	wc	Italy	83	IT-2
Funtana Tenesoli	fd	Italy	57	IT-2
Funtanamela	wc	Italy	64	IT-2D
Fürstenzell	rc	Germany	317	DE-6
Furuhovden	ol	Norway	33	NO-4
Furzeyground	wc	United Kingdom	68	UK-2E
Fusharë	cr	Albania	12	AL-2
Fushë Krujë	rc	Albania	28	AL-2
Fushë Preze	rc	Albania	49	AL-2
Füzérkajata	ka	Hungary	44	HU-2
Füzérradvány	wc	Hungary	73	HU-1
Füzesgyarmat	rc	Hungary	56	HU-1
Fyriplaka	pe	Greece	99	GR-4
Gabajeva Greda	qs	Croatia	40	HR-1
Gabal El-Minsherah	qs	Egypt	98	EG-5
Gabal Hamza	be	Egypt	16	EG-2
Gabal Homrit Waggat	qf	Egypt	157	EG-7B
Gabal Umm Shaghir	fd	Egypt	147	EG-7
Gabella	qs	Italy	377	IT-7R
Gabrielli	fd	Italy	144	IT-3
Gaggio-Marcon	rc	Italy	491	IT-8
Gahlen	rc	Germany	60	DE-2
Gaianello La Zavattona	qf	Italy	283	IT-6
Gaidukovka	rc	Belarus	5	BY-1
Gaißing	rc	Germany	322	DE-6
Gajrep	cr	Albania	8	AL-2
Galana	ba	Greece	107	GR-4
Galvanese	rc	Italy	191	IT-4J
Galve	sc	Spain	203	ES-6
Gamasa	rc	Egypt	43	EG-3
Gamasnes (Elkem Tana)	qz	Norway	3	NO-2
Gambach	qs	Germany	248	DE-5
Gammelsdorf	be	Germany	305	DE-6
Gandrup	rc	Denmark	14	DK-1
Ganja	rc	Azerbaijan	8	AZ-1
Ganja	al	Azerbaijan	9	AZ-1
Gara El Hamra	ns	Egypt	198	EG-8
Gardabani	rc	Georgia	27	GE-1
Gardanne	al	France	300	FR-8
Garešnica	rc	Croatia	45	HR-1
Garmishte	rc	Bulgaria	9	BG-1
Garni-Goght	ze	Armenia	17	AR-1
Garrycam	ba	Ireland	28	IE-1
Garrymoore	rc	Ireland	31	IE-1
Gāršas	rc	Latvia	21	LV-1
Garvanovo	pe	Bulgaria	69	BG-5
Gasser	rc	Italy	442	IT-8
Gavardo Fornaci	rc	Italy	425	IT-8
Gavurdağ-Sivritepe	rc	Türkiye	435	TR-10
Gbely	rc	Slovakia	12	SK-2
Gdyel	rc	Algeria	4	DZ-1
Gebel Abu Siayil	cr	Egypt	181	EG-8
Gebel Admar	ns	Morocco	110	MA-6
Gebel Arays	cr-mg	Egypt	178	EG-8
Gebel Belamhandeit	cr	Egypt	179	EG-8
Gebel El-Halal	qs	Egypt	97	EG-5
Gebel El-Maiyit	mg	Egypt	160	EG-7B
Gebel El-Maiyit	tc	Egypt	162	EG-7B
Gebel El-Manzoor	qs	Egypt	96	EG-5
Gebel El-Rabshi	cr	Egypt	145	EG-7
Gebel El-Rubshi	mg	Egypt	144	EG-7
Gebel Katherina	ns	Egypt	122	EG-6
Gebel Rueikna-Gebel Salia	ka	Egypt	107	EG-6A
Gebel Umm Thagar	cr	Egypt	183	EG-8
Gebel Yalk	qs	Egypt	100	EG-5
Gebenbach*	qs	Germany	335	DE-7
Gebze	qs	Türkiye	56	TR-2
Gediz	ka	Türkiye	242	TR-5L
Geigenflur	rc-wc	Germany	151	DE-3E
Gelendost	ol	Türkiye	431	TR-10
Gelgaudiškis	rc	Lithuania	14	LT-1
Gemerská Poloma	tc	Slovakia	117	SK-1
Gemerská Ves	ba	Slovakia	103	SK-1
Genböle	wo	Finland	71	FI-1F
Genç	rc	Türkiye	541	TR-12
Gendt en Rossum	rc	Netherlands	10	NL-1B
Genna Tres Montis	ba	Italy	85	IT-2
Genzile	tc	Türkiye	382	TR-9
Geokmalin	qs	Azerbaijan	32	AZ-1B
Gerakini-Ormylia	cr-mg-ol	Greece	38	GR-1
Geran-galasi	bx	Azerbaijan	23	AZ-1
Gerasa	tc	Cyprus	11	CY-1
Gerasdorf	qs	Austria	72	AT-3
Gerbole	rc	Italy	363	IT-7
Geresgoppi	qz	Norway	2	NO-2
Gerlebogk	ka	Germany	208	DE-4
Gerola	rc	Italy	304	IT-6
Gersheim	rc	Germany	267	DE-5
Geruliai	rc	Lithuania	6	LT-1
Gesteig	rc	Germany	314	DE-6
Getamech	rc	Armenia	2	AR-1
Gevrekseydi	ka	Türkiye	271	TR-6O
Geydara	cr	Azerbaijan	21	AZ-1
Geyikdere	ze	Türkiye	60	TR-2
Ghaboun-Sebaal	qs	Lebanon	13	LE-1
Ghani	qs	Libya	9	LY-1
Gharian	qs	Libya	27	LY-1A
Gharyan	rc	Libya	31	LY-1
Gherla	rc	Romania	100	RO-1
Ghor-Kabid	ka	Jordan	38	JO-1
Ghvedi	ba	Georgia	8	GE-1
Giani	be	Italy	474	IT-8W
Giarella-Momperone	rc	Italy	327	IT-6
Ginovci	be	North Macedonia	17	MK-1
Girifalco	rc	Italy	168	IT-4
Girininkai	rc	Lithuania	21	LT-1
Girod	rc-wc	Germany	161	DE-3E
Gironde-sur-Dropt	rc	France	270	FR-7
Gispersleben	rc	Germany	83	DE-2
Gistel	rc	Belgium	3	BE-1
Giustino	fd	Italy	435	IT-8
Givors	rc	France	199	FR-6
Glamsland	fd	Norway	66	NO-5
Glandore	ba	Ireland	15	IE-1
Glavanak	ka	Bulgaria	79	BG-5
Glen Buchat-Glen Gairn	li	United Kingdom	233	UK-5
Gliwice	rc	Poland	124	PL-1
Globoko	wc	Slovenia	20	SI-1
Globoko	qs	Slovenia	21	SI-1
Glockenschächte	rc-wc	Germany	104	DE-3
Glomel	ky	France	103	FR-5
Glos	rc	France	114	FR-5
Glückstadt	rc	Germany	6	DE-1
Glushkevichi	wo	Belarus	24	BY-1A
Glynn Valley-Park	ka	United Kingdom	35	UK-2
Gnaszyn	rc	Poland	120	PL-1
Gniew	ec	Poland	18	PL-1
Gniewków	fd	Poland	104	PL-2
Göbü	be	Türkiye	129	TR-4
Göçbeyli	wc	Türkiye	55	TR-2
Göcenek	cr	Türkiye	539	TR-12
Göcenoluk	bo	Türkiye	277	TR-6O
Goddert	rc-wc	Germany	105	DE-3
Goirle	qs	Netherlands	26	NL-1
Gökçeler	rc	Türkiye	71	TR-3
Goła	ka	Poland	93	PL-2
Göldamı*	cr	Türkiye	139	TR-4
Golemantsi	ze	Bulgaria	73	BG-5
Goleš	mg	Kosovo	8	KS-1
Golo brdo	rc	Bosnia H.	22	BH-1
Golobradovo	pe	Bulgaria	80	BG-5
Gololobovskiy	rc	Russia	81	RU-3
Golpejas	fd-ka-li	Spain	146	ES-5
Göltepe	rc	Türkiye	491	TR-11
Golubinci	rc	Serbia	33	RS-2
Gomsiqe*	mg-ka	Albania	20-21	AL-2
Gonçalo Sul	fd-li-qz	Portugal	83	PT-3
Goole	ec	United Kingdom	202	UK-4
Goonbarrow*	ka	United Kingdom	29-30	UK-2A
Goonvean-Trethosa	ka	United Kingdom	9	UK-2A
Goorkensdreef	rc	Belgium	34	BE-1
Góra Sośnia	fd	Poland	71	PL-2
Gorday/Pongautron	wc	France	281	FR-8
Gordinești	rc	Moldova	25	MD-1
Gordonnière	qs	France	72	FR-4C
Gorica	qs	Slovenia	27	SI-1
Górki	be	Poland	173	PL-4
Gorna Brca-Rakovec	be	North Macedonia	10	MK-1
Gorna Krepost	ze	Bulgaria	74	BG-5
Gorners	qs	Spain	122	ES-4
Gornje Karaçevë	ka	Kosovo	23	KS-1
Gornji Moranjci	rc	Bosnia H.	39	BH-1
Gornji Vrtogos	ka	Serbia	111	RS-6
Gorodishche	rc	Russia	93	RU-3
Gorodno	qs	Belarus	1	BY-1
Gorodok	rc	Belarus	30	BY-1
Goset Abu Khashier	rc	Egypt	135	EG-1
Gossendorf	be	Austria	109	AT-4
Gotul	wc	Azerbaijan	15	AZ-1
Goundacha	fd	Morocco	82	MA-1
Govajdia	tc	Romania	48	RO-1
Göyçay	rc	Azerbaijan	27	AZ-1
Gözbaba	fd	Türkiye	312	TR-7Q
Gozdnica	rc	Poland	49	PL-1
Gözsüzlü	rc	Türkiye	292	TR-6
Grab	qs	Bosnia H.	48	BH-1
Grabowo-Kołaczkowo	ec	Poland	39	PL-1
Gračanica	rc	Bosnia H.	23	BH-1
Gradešnica	pe	North Macedonia	4	MK-1
Gradina	bx	Bosnia H.	10	BH-1
Gralheira	fd	Portugal	52	PT-3
Gram	rc	Tunisia	29	TN-1
Grametten	ka	Austria	61	AT-3
Grana	ka	Germany	199	DE-4
Grancare	be	Italy	452	IT-8
Grandcourt	qs	United Kingdom	124	UK-4
Gräne	qz	Sweden	25	SW-3
Grangegeeth	rc	Ireland	37	IE-1
Graniczna	fd	Poland	100	PL-2
Gransmoor quarry	rc	United Kingdom	130	UK-4
Graschach	rc	Austria	105	AT-4
Grasten	rc	Denmark	24	DK-1
Graticelle	ba	Italy	427	IT-8
Gratkorn St. Stefan	rc	Austria	107	AT-4
Great Carclaze	ka	United Kingdom	32	UK-2A
Great Longstone	ka	United Kingdom	20	UK-2A
Grebenici	bx	Montenegro	23	ME-1
Grebnik	bx	Kosovo	25	KS-1
Greci	qz	Romania	3	RO-2
Greensplat	ka	United Kingdom	26	UK-2A
Gregorova Vieska	wc	Slovakia	94	SK-5
Gregorovce	wc	Slovakia	129	SK-1
Greifing	rc	Austria	15	AT-2
Grepiac	rc	France	319	FR-9
Grevena	ol	Greece	24	GR-1
Grevenbrück	rc	Germany	67	DE-2

deposit	ore	country	number	map
Grézieux-le-Fromental	be	France	202	FR-6
Gribskov-Fredensborg	rc	Denmark	31	DK-1
Grikë Nokë	qz	Albania	33	AL-2
Grisolles	qs	France	63	FR-4B
Gríva	ka	Greece	51	GR-1
Grochów	mg	Poland	108	PL-1
Grodzanów	rc	Poland	82	PL-2
Grombalia	rc	Tunisia	24	TN-1
Gröppendorf	ka	Germany	222	DE-4
Großbellhofen	rc	Germany	332	DE-7
Großheirath	rc	Germany	351	DE-7
Grossouvre	rc	France	166	FR-6
Grotta del Sole	ze	Italy	180	IT-4
Grottarione	tc	Italy	254	IT-5L
Grube Clara	ba	Germany	277	DE-1
Gryka e zeze	rc	Albania	29	AL-2
Guadalcanal	wc	Spain	278	ES-8
Guadassuar	rc	Spain	243	ES-7
Guardia Predicasu	rc	Italy	101	IT-2
Guazzino	rc	Italy	240	IT-5
Guberevac	rc	Serbia	109	RS-1
Gubkinskoe	qs	Russia	92	RU-3
Güdesweiler	fd	Germany	266	DE-5
Guenfouda	py	Morocco	112	MA-1
Guinicio	qs	Spain	69	ES-3
Guizza	be	Italy	461	IT-8W
Gukovo	rc	Russia	147	RU-1
Gullsteinberget	ky	Norway	38	NO-4
Gülövşə	rc	Azerbaijan	26	AZ-1
Gulsen	mg-ol	Austria	97	AT-4
Gültepe	rc	Türkiye	549	TR-12Z
Gumbra	be	Georgia	10	GE-1
Gümeli	tc	Türkiye	194	TR-5
Gümüşdere	wc	Türkiye	32	TR-2A
Gümüşköy	wc	Türkiye	215	TR-5
Gunashli	rc	Azerbaijan	36	AZ-1B
Güneş	rc	Türkiye	101	TR-3
Guneycik	be	Türkiye	132	TR-4
Gunheath	ka	United Kingdom	28	UK-2A
Gunjaci	bx	Bosnia H.	53	BH-1A
Gupta	ze	Georgia	33	GE-1
Gura Ocnitei	rc	Romania	15	RO-1
Gurasada	be	Romania	52	RO-1
Guri i Derdhur	qz	Albania	17	AL-2
Guri I Zi	fd	Albania	19	AL-2
Guroneddu	be	Italy	120	IT-2G
Gürün	na	Türkiye	334	TR-7
Gürün*	cr	Türkiye	335	TR-7
Guščerovec	rc	Croatia	36	HR-1
Gushicë	be	Kosovo	15	KS-1
Gus-Khrustalny	rc	Russia	77	RU-3
Guşteriţa	rc	Romania	22	RO-1
Gusternhain	rc-wc	Germany	111	DE-3D
Guterborn	rc-wc	Germany	145	DE-3E
Guttau	rc	Germany	246	DE-4
Güvemli	ba	Türkiye	148	TR-4
Güvenlik	be	Türkiye	134	TR-4F
Güzelyurt	ka	Türkiye	467	TR-11
Güznüt	rc	Azerbaijan	24	AZ-1
Gwythian	qs	United Kingdom	2	UK-2
G'zhel	rc	Russia	79	RU-3
Haaften	rc	Netherlands	22	NL-1
Haalderen	rc	Netherlands	12	NL-1B
Haapaluoma	fd-qz	Finland	49	FI-1E
Hacıahmetli	rc	Türkiye	87	TR-3C
Hacıbayramlar	fd-qz	Türkiye	391	TR-9
Hacıdere	rc	Türkiye	65	TR-2
Hacılar	rc	Türkiye	100	TR-3
Hacine	rc	Algeria	9	DZ-1
Hacıveliler	fd-qz	Türkiye	395	TR-9
Hadath el-Jebbe*	qs	Lebanon	2-3	LE-1A
Hadayib	ns	Egypt	196	EG-8
Hadj Ali	ka	Algeria	52	DZ-3
Hadjipavlou	cr	Cyprus	6	CY-1
Hadtoun	rc	Lebanon	5	LE-1
Hadykówka	rc	Poland	191	PL-4

deposit	ore	country	number	map
Hagen	rc	Germany	17	DE-1
Hai Oued Rehane	rc	Algeria	16	DZ-1
Haida-Strauch	qs	Germany	232	DE-4
Haiding (Krenglbach)	rc	Austria	32	AT-2
Hainstadt	rc	Germany	251	DE-5
Hainstadt	rc	Germany	275	DE-5
Hajdúszoboszló	rc	Hungary	53	HU-1
Hajnáčka	rc	Slovakia	101	SK-1
Håkonhals	qz	Norway	15	NO-3
Halámky	fd	Czechia	78	CZ-4
Halde Richardschacht	rc	Austria	78	AT-4
Halič - Kopáň	wc	Slovakia	92	SK-5
Halimba	bx	Hungary	9	HU-1
Hallaçlar	ka	Türkiye	306	TR-6
Hällekishamn	sw	Sweden	54	SW-3
Hallembaye	be	Belgium	53	BE-1A
Hålsjöberg	ky	Sweden	96	SW-4
Haltern am See	qs	Germany	59	DE-2
Halutsa	rc	Israel	7	IL-2
Halveliyan	ky	Türkiye	543	TR-12
Halveliyan	py	Türkiye	543	TR-12
Hamata-Atshan	tc	Egypt	174	EG-8
Hambergsflur	rc-wc	Germany	154	DE-3E
Hamit	ns	Türkiye	318	TR-7R
Hammam Boughrara	be	Algeria	15	DZ-1
Hammam Jedidi	ba	Tunisia	31	TN-1
Hammam Zriba	ba	Tunisia	32	TN-1
Hammanen	fd	Sweden	135	SW-6
Hammershøj	rc	Denmark	20	DK-1
Hanches nord	qs	France	36	FR-4
Hanches sud	qs	France	35	FR-4
Hançılı	be	Türkiye	122	TR-3E
Handöl/Gunnarslåtten	tc	Sweden	147	SW-6
Hankavan	fd	Armenia	11	AR-1
Hanlı	rc	Türkiye	336	TR-7
Haouch El Amirette	rc	Algeria	21	DZ-2
Harami	be	Greece	26	GR-1
Harasiuki	rc	Poland	195	PL-4
Hardeška šuma	rc	Slovenia	25	SI-1
Harımcık	fd-qz	Türkiye	387	TR-9
Harmanli	qs	Bulgaria	67	BG-5
Härsbacka	qz	Sweden	21	SW-3
Hârşova	rc	Romania	7	RO-1
Hartberg	rc	Austria	34	AT-2
Hartberg	rc	Austria	104	AT-4
Hartennes-et-Taux	qs	France	57	FR-4B
Hartung-Pottäng	ba	Sweden	110	SW-5
Haruniye	mg	Türkiye	487	TR-11
Harwood quarry	rc	United Kingdom	185	UK-4
Hasancık	rc	Türkiye	530	TR-12
Hasbar	ka	Egypt	117	EG-6A
Haselbach	rc	Germany	201	DE-4
Haskovo	rc	Bulgaria	70	BG-5
Haspolat	rc	Cyprus	34	CY-1
Haßbach	qs	Austria	81	AT-4
Hasselholt Nørre	rc	Denmark	12	DK-1
Hässleholm	sw	Sweden	8	SW-2
Hatira	rc	Israel	9	IL-2
Hatten	qs	France	24	FR-3
Haus Marianne	rc-wc	Germany	109	DE-3D
Haute-Rivoire	rc	France	200	FR-6
Haut-Fays	ka	Belgium	39	BE-1
Havuzdere	ze	Türkiye	59	TR-2
Hawkpost	wc	United Kingdom	70	UK-2E
Hawkwell Green Quarry	rc	United Kingdom	77	UK-2
Hayon valley	be	Israel	23	IL-2
Hayrat'Ali	be	Morocco	28	MA-3
Hazel Lane quarry	fc	United Kingdom	156	UK-4
Headon	ka	United Kingdom	41	UK-2B
Hebbariye	rc	Lebanon	21	LE-1
Hebbersberget	qz	Sweden	124	SW-5
Hedikhuizen	rc	Netherlands	24	NL-1
Heerenweg	qs	Netherlands	35	NL-1A
Heerlerheide	qs	Netherlands	34	NL-1A
Heikinkangas	fd-li-qz	Finland	45	FI-1E
Heinigstetten	qs	Austria	58	AT-3
Heiz	sc	Egypt	138	EG-1

deposit	ore	country	number	map
Hellheia midte	fd	Norway	64	NO-5
Hellheia søndre	fd	Norway	65	NO-5
Helligso (Hurup Thy)	rc	Denmark	1	DK-1
Hellvik	an	Norway	70	NO-5
Hem	rc	Türkiye	542	TR-12
Hemer	rc	Germany	68	DE-2
Hemingbrough quarry	rc	United Kingdom	203	UK-4
Hempstead House quarry	rc	United Kingdom	101	UK-3
Henau	qz	Germany	258	DE-5
Hendra-Fanfire	ka	United Kingdom	12	UK-2A
Hennersdorf	rc	Austria	76	AT-3
Henperch quarry	rc	United Kingdom	195	UK-4
Herdade da Barrosinha	rc	Portugal	178	PT-8
Hermannsdorf	rc	Germany	327	DE-7
Hermitage quarry	qs	United Kingdom	105	UK-3
Herrera*	rc	Spain	292-293	ES-8
Herzogenrath	qs	Germany	64	DE-2
Hesslingen	rc	Germany	48	DE-2
Heteren*	rc	Netherlands	13-14	NL-1B
Hetolambina	fd	Russia	29	RU-2
Hevlín	rc	Czechia	108	CZ-1
Heylen	rc	Belgium	49	BE-1A
Hiekkamäki	qz	Finland	30	FI-1
High Greenscow quarry	rc	United Kingdom	211	UK-4
Highfield South quarry	rc	United Kingdom	147	UK-4
Hilten	rc	Germany	20	DE-2
Himlaberget	fd	Sweden	76	SW-4
Hinojosa del Duque	ka	Spain	271	ES-8
Hintermeilingen	rc-wc	Germany	121	DE-3E
Hirschau-Schnaitterberg	ka-fd-qz	Germany	339	DE-7
Hirschkofen	rc	Germany	320	DE-6
Hirvikallio	li-qz	Finland	61	FI-1
Hisarardı*	fd-qz	Türkiye	392-394	TR-9
Hisarcik	be	Türkiye	121	TR-3E
Hisarcık	bo-li	Türkiye	236	TR-5
Hisarlı	be	Türkiye	23	TR-2
Hissat Abar*	rc	Egypt	27	EG-3
Hiswa	wc	Jordan	23	JO-1
Hizovaara	ky	Russia	35	RU-2
Hjulbynäs	qz	Sweden	149	SW-6
Hlevakha	rc	Ukraine	31	UA-2
Hliník nad Hronom	be	Slovakia	60,62	SK-4
Hlukhivtsi*	ka	Ukraine	81,83	UA-5
Hlynjany	rc	Ukraine	64	UA-4
Hmrat El Sorwhyia	fd	Egypt	133	EG-6
Hnúšťa - Mútnik	tc-mg	Slovakia	106-107	SK-6
Hobbs Copse quarry	rc	United Kingdom	83	UK-3
Hobita	qz	Romania	29	RO-1
Hoceïnia	rc	Algeria	17	DZ-1
Hochdorf	rc	Switzerland	19	CH-1
Hochgroessen	cr	Austria	86	AT-4
Hodkovce	wc	Slovakia	134	SK-8
Hodonín	rc	Czechia	121	CZ-1
Höganäs	wc	Sweden	15	SW-2
Hoginești	rc	Moldova	18	MD-1
Högsbo	fd	Sweden	29	SW-3
Hohe Kreuzspitze	li	Italy	440	IT-8
Hohen Vogelsberg	fd	Germany	181	DE-3
Hohenbocka	qs	Germany	238	DE-4
Hohenrain-Waldi	rc	Switzerland	28	CH-1
Hohentauern/Sunk	mg	Austria	88	AT-4
Hohenwart	li	Austria	87	AT-4
Hohnstädt-Grimma	ka	Germany	221	DE-4
Höjderna	fd	Sweden	84	SW-4
Højslev	rc	Denmark	18	DK-1
Hökensås	ky	Sweden	28	SW-3
Holany	qs	Czechia	52	CZ-3
Holešov	rc	Czechia	123	CZ-1
Holice	rc	Czechia	88	CZ-1
Hollage	rc	Germany	36	DE-2C
Hollybank quarry	rc	United Kingdom	145	UK-4
Holme	wc	United Kingdom	65	UK-2E
Holmehus	be	Denmark	17	DK-1
Holsen	rc	Germany	45	DE-2A
Hölzbach	rc-wc	Germany	124	DE-3E
Hom	wc	Slovenia	10	SI-1
Homberg	qs	Germany	179	DE-3

deposit	ore	country	number	map
Homokbánya	tc	Hungary	15	HU-1
Hopukka	qz	Sweden	70	SW-4
Horná Prievrana	ka	Slovakia	77	SK-5
Horní Bříza	ka	Czechia	32	CZ-1
Horní Slavkov	li	Czechia	9	CZ-2
Hörningsholm-Norra Kärr	ns	Sweden	27	SW-3
Horodenka	rc	Ukraine	79	UA-4
Horodnyavka-Novaky	fd	Ukraine	14	UA-2A
Horsmanaho	mg-tc	Finland	35	FI-1C
Horta de Sant Joan	wc	Spain	105	ES-4+6
Horzum	qz	Türkiye	475	TR-11
Hostalets de Pierola*	rc	Spain	118-119	ES-4
Hostenerbach	rc-wc	Germany	150	DE-3E
Hostie	qz	Slovakia	27	SK-3
Housseras	rc	France	31	FR-3
Howley Park quarry	rc	United Kingdom	198	UK-4
Høydalen	fd	Norway	51	NO-5
Høyviken gruber	tc	Norway	44	NO-4
Hrabovo	qs	Slovakia	82	SK-5
Hrajel	qs	Lebanon	7	LE-1B
Hranice	rc	Czechia	127	CZ-1
Hrochoť	be	Slovakia	71	SK-1
Hrodna	rc	Belarus	12	BY-1
Hrušovany	fd	Czechia	115	CZ-6
Hruzlyvets	fd	Ukraine	16	UA-2
Hrybova Rudnya	qs	Ukraine	33	UA-2
Hryhorivka	be	Ukraine	183	UA-1
Hub	rc-wc	Germany	153	DE-3E
Huda jama	rc	Slovenia	11	SI-1
Hulegården	be	Sweden	53	SW-3
Huljaipole	fd	Ukraine	127	UA-6
Hullerhill quarry	qs	United Kingdom	224	UK-5
Hulta-Gruvor	wo	Sweden	79	SW-4
Humpolec	fd	Czechia	79	CZ-1
Humulești	ec	Moldova	12	MD-1
Huncoat quarry	rc	United Kingdom	189	UK-4
Hundøyron	tc	Norway	24	NO-3
Huneberg	rc	Germany	77	DE-2
Hürmüz	ky-py	Türkiye	554	TR-12Z
Husarivka	qs	Ukraine	134	UA-7
Hüttengrund	rc	Germany	354	DE-7
Hüyük	ba-rc	Türkiye	441-442	TR-10W
Ibourardhain	be	Morocco	29	MA-3
İbrahimşeyh	be	Türkiye	138	TR-4F
Ibstock quarry	rc	United Kingdom	133	UK-4
İdişdağı	ns	Türkiye	329	TR-7S
Idoš	rc	Serbia	6	RS-2
Idsättragruvan	fd	Sweden	71	SW-4
Iğdirdağ	ka	Türkiye	142	TR-4
Ighil Mhenni	rc	Algeria	41	DZ-2
Ignoila	tc	Russia	50	RU-2
Igny	rc	France	65	FR-4
Igreja Velha	wc	Portugal	122	PT-5
Igroš	ze	Serbia	117	RS-1
Ihalainen	wo	Finland	55	FI-1
Ihammachène	be	Morocco	23	MA-3
Iivaara	ns	Finland	8	FI-1
Ikasmeouène	be	Morocco	20	MA-3
Il Colle	qs	Italy	204	IT-5M
Il Lamino	tc	Italy	307	IT-6
Ilava	rc	Slovakia	18	SK-1
Ilçe	fd	Türkiye	85	TR-3
Ilgin	fd	Türkiye	436	TR-10
Iliescas*	rc	Spain	172-173	ES-5D
Ilikdere*	cr	Türkiye	369	TR-8
Ilirska Bistrica	rc	Slovenia	5	SI-1
Ilova	qz	Romania	42	RO-5
İlyasgeçidi	qz	Türkiye	76	TR-3
İmranlı-Akıncılar*	cr	Türkiye	521	TR-12
Inbdi	fd	Morocco	80	MA-1
Incesu	rc	Türkiye	330	TR-7
İncirli	cr	Türkiye	488	TR-11
Inđija	rc	Serbia	32	RS-2
Ineia	mg	Cyprus	2	CY-1
Ingalsbo	qz	Sweden	24	SW-3
Ingelsbo	fd	Sweden	22	SW-3

deposit	ore	country	number	map
Ingridstorp	qz	Sweden	31	SW-3
Inguejem	cr	Morocco	78	MA-1
Inhisar	ka-wc	Türkiye	255	TR-6
Inishbofin	tc	Ireland	5	IE-1
Inowroclaw	na	Poland	15	PL-1
Intergennas	ba	Italy	61	IT-2
Intrachercu	fd	Italy	55	IT-2
Iphigenie	rc-wc	Germany	110	DE-3D
Irdjen	rc	Algeria	38	DZ-2
Irshansk	an	Ukraine	23	UA-2B
Is Paduleddas	tc-fd	Italy	47	IT-2C
Is Porcillis	be	Italy	72	IT-2D
Isabelita	qs	Spain	286	ES-8K
Ischia	rc	Italy	437	IT-8
Isen	rc	Germany	309	DE-6
Ishaklar*	tc	Türkiye	205-206	TR-5I
Işıkeli	ka	Türkiye	172	TR-5G
Işiklar	fd	Türkiye	424	TR-9
Işıklar	rc	Türkiye	27	TR-2A
Işıklar*	rc	Türkiye	293-296	TR-6
Isk n'Oudadène	py	Morocco	94	MA-4
Iskar	qf	Bulgaria	23	BG-1
İslihisar	rc	Türkiye	451	TR-10
Ismakaevo	mg	Russia	135	RU-4
İsmayıllı	rc	Azerbaijan	28	AZ-1
Iso Sormus	ol	Sweden	136	SW-6
İstasyon*	rc	Türkiye	19-20	TR-2
Istenmezeje	be	Hungary	38	HU-1
Istighofen-Rohren	rc	Switzerland	29	CH-1
Isturitz	fd	France	304	FR-9
Isums	rc	Germany	11	DE-1
Ivančice	fd	Czechia	111	CZ-6
Ivančice-Réna	be	Czechia	112	CZ-6
Ivön	ka	Sweden	6	SW-2
Ivošević Gaj	wc	Croatia	10	HR-1A
Ivrindi	ka	Türkiye	192	TR-5
Izarrouan	rc	Morocco	21	MA-3
Izbat Abu Naurah*	rc	Egypt	79	EG-4
Izbat Ad Daramalli	rc	Egypt	33	EG-3
Izbat Ad Dayris	rc	Egypt	54	EG-3
Izbat Al Jabal*	rc	Egypt	89	EG-4
Izbat Bahnasi*	rc	Egypt	40	EG-3
Izbat Halfah	rc	Egypt	88	EG-4
Izbat Harfush	rc	Egypt	85	EG-4
Izbat Jabal Sad	rc	Egypt	82	EG-4
Izbat Radi Al Qibliyyah*	rc	Egypt	83	EG-4
Izbat Simaydah*	rc	Egypt	39	EG-3
Izbat Zanati Khlifah*	rc	Egypt	69	EG-3
Izhberdino	be	Russia	138	RU-4
Izvor	tc	North Macedonia	9	MK-1
Jabal Abu Al Ghoufran	fd	Jordan	26	JO-1
Jabal Al Aritayn	ze	Jordan	6	JO-1
Jabal al Sis	ze	Syria	15	SY-1
Jabal Al-Harad	wc	Jordan	21	JO-1
Jabal Ashqaf	ze	Jordan	4	JO-1
Jabal Hannoun	ze	Jordan	3	JO-1
Jabal Moqsim	ol	Egypt	194	EG-8
Jabal Qarārah	ec	Egypt	134	EG-1
Jabal Shilman	ol	Egypt	191	EG-8
Jabal Tarboush	ze	Jordan	2	JO-1
Jabalah	rc	Egypt	76	EG-4
Jablanica	ze	Serbia	118	RS-1
Jadar	li-bo	Serbia	45	RS-3
Jadidat Yabus	sc	Syria	10	SY-1A
Jaklovce	ba	Slovakia	128	SK-1
Jakubów	wc	Poland	151	PL-3
Jalo	qs	Libya	5	LY-1
Janežovci	rc	Slovenia	24	SI-1
Janikowo	na	Poland	14	PL-1
Janina	wc	Poland	66	PL-2
Janiszów	rc	Poland	172	PL-4
Jaram	wo	Serbia	99	RS-5
Jardol	rc	Bosnia H.	24	BH-1
Järkvissle	li	Sweden	117	SW-5
Jasenica	bx	Bosnia H.	4	BH-1
Jasień	rc	Poland	45	PL-1

deposit	ore	country	number	map
Jasienica Rosielna	rc	Poland	205	PL-1
Jasikovac	rc	Montenegro	7	ME-1
Jasov	rc	Slovakia	138	SK-8
Jastrabá	pe	Slovakia	45	SK-4
Jawor	be	Poland	131	PL-1
Jawor-Męcinka	be	Poland	76	PL-2
Jazirat Nikla*	rc	Egypt	28	EG-3
Jbel Boufounas	fd	Morocco	81	MA-1
Jbel Kifane	sr	Morocco	111	MA-1
Jbel Rhassoul	be	Morocco	59	MA-1
Jbel Sidi Abdallah	ba	Morocco	14	MA-2
Jebel Ad-Darin	qs	Tunisia	63	TN-1
Jebel Aïdoudi	be	Tunisia	71	TN-1
Jebel Ammar	rc	Tunisia	12	TN-1
Jebel Attaf	qf	Tunisia	66	TN-1
Jebel Bargou	rc	Tunisia	34	TN-1
Jebel Berda	be	Tunisia	69	TN-1
Jebel Bou Arada	rc	Tunisia	30	TN-1
Jebel Boudinar	rc	Tunisia	59	TN-1
Jebel Bouhedma	qf-rc	Tunisia	64	TN-1
Jebel er Rouis	rc	Tunisia	37	TN-1
Jebel Hamadi	be	Tunisia	67	TN-1
Jebel Kharrou	wc	Morocco	65	MA-1
Jebel Meloussi	qf-rc	Tunisia	61	TN-1
Jebel Ouaddada	qf-rc	Tunisia	58	TN-1
Jebel Oust	rc	Tunisia	26	TN-1
Jebel Sidi Aïch	qf-rc	Tunisia	60	TN-1
Jebel Slata	rc	Tunisia	36	TN-1
Jebel Zimlet El Beida	rc	Tunisia	70	TN-1
Jedľové Kostoľany	wc	Slovakia	28	SK-3
Jędrzychowice	qz	Poland	50	PL-1
Jehnědno	wc	Czechia	65	CZ-4
Jelenec	qz	Slovakia	21	SK-3
Jelenkovac-Zaplanje	be	Serbia	106	RS-1
Jelšava	mg	Slovakia	113	SK-6
Jelšava - Dúbravský	mg	Slovakia	114	SK-6
Jemmal	rc	Tunisia	47	TN-1D
Jerli Sadovina	be	Kosovo	14	KS-1
Jerovec	qs	Croatia	26	HR-1B
Jesenice	rc	Czechia	63	CZ-1
Jessnitz	ka	Germany	243	DE-4
Jezernice	rc	Czechia	126	CZ-1
Jezza	qs	Tunisia	35	TN-1
Jimbolia	rc	Romania	57	RO-1
Jimlíkov	ka	Czechia	13	CZ-2
Jirzah	be	Egypt	71	EG-4
John Acres Lane Pit	wc	United Kingdom	48	UK-2C
Jöllenbeck	rc	Germany	44	DE-2A
Jordalsnuten	an	NO	42	NO-4
Jormua	tc	Finland	16	FI-1A
Jouret el-Termos	qs	Lebanon	6	LE-1
Joutsenenlampi	an	Finland	7	FI-1
Jovanovića Brdo	wc	Serbia	49	RS-3
Juarros de Riomoros*	qs	Spain	135	ES-5C
Jüdenberg	rc	Germany	216	DE-4
Jungbecker	be	Germany	112	DE-3D
Junget	mo	Denmark	11	DK-1A
Junsterklumpen	ol	Sweden	125	SW-5
Juurakko	fd-li-qz	Finland	52	FI-1
Južnonikopole	bx	Ukraine	121	UA-6
Jvari	wc	Georgia	38	GE-1
Jvarisa-Tkibuli	wc	Georgia	12	GE-1
Kaatiala	fd-li-qz	Finland	48	FI-1E
Kabaki	rc	Belarus	16	BY-1
Kabalar	fd-qz	Türkiye	388	TR-9
Kać	rc	Serbia	19	RS-2
Kačer	mg	Serbia	90	RS-4
Kachanivka	rc	Ukraine	68	UA-4
Kadabora-Abou Dob	fd	Egypt	164	EG-7B
Kadılar	fd-qz	Türkiye	396	TR-9
Kadınhanı	rc	Türkiye	437	TR-10
Kadrina	rc	Estonia	4	EE-1
Kafr Al-Battih	rc	Egypt	41	EG-3
Kafr Al-Zaiyat*	rc	Egypt	23	EG-3
Kafr El-Arab*	rc	Egypt	44	EG-3
Kafr El-Hag Dawoud	rc	Egypt	63	EG-3

deposit	ore	country	number	map
Kafr El-Mandara	rc	Egypt	56	EG-3
Kafr El-Shaikh Ali*	rc	Egypt	25	EG-3
Kafr Ibrahim*	rc	Egypt	34	EG-3
Kafr Izin*	rc	Egypt	21	EG-3
Kafr Mit Al Abasi*	rc	Egypt	67	EG-3
Kafr Mit El-Ezz*	rc	Egypt	66	EG-3
Kafr Mogahed*	rc	Egypt	24	EG-3
Kafr Suleiman Al Bahari*	rc	Egypt	42	EG-3
Kafr Sunbat*	rc	Egypt	58	EG-3
Kafrquq	rc	Syria	12	SY-1A
Kahdeksaisiensuo	ka	Finland	39	FI-1D
Kâhta	rc	Türkiye	531	TR-12
Kaiģi	rc	Latvia	11	LV-1
Kaihtula	wo	Finland	54	FI-1
Kakavadzor	rc	Armenia	5	AR-1
Kakrinje-Kobiljača	rc	Bosnia H.	29	BH-1
Kaku	qs	Estonia	9	EE-1
Kalamos	pe	Greece	98	GR-4
Kälberberg*	rc	Germany	23-25	DE-2B
Kalimash	cr	Albania	14	AL-2
Kalinovo	ka-wc	Slovakia	84	SK-5
Kalinovo - Briežky	wc	Slovakia	86	SK-5
Kalinovo - Močiar	wc	Slovakia	85	SK-5
Kalinovo - Zlámanec	qz	Slovakia	87	SK-5
Kalkrieser Berg	rc	Germany	34	DE-2C
Kallavere	rc	Estonia	3	EE-1
Kallaxön	fd	Sweden	132	SW-5
Kallenhardt	rc	Germany	70	DE-2
Kallipoli	rc	Greece	50	GR-1
Kal'mius'ke	fd	Ukraine	169	UA-7
Kalnciems	rc	Latvia	10	LV-1
Kalnivtsi	rc	Ukraine	76	UA-4
Kalo Chorio	rc	Cyprus	12	CY-1
Kalochori	qz	Greece	23	GR-1
Kaltenhouse	qs	France	27	FR-3
Kalussia	ba	Greece	64	GR-1
Kal'ya	bx	Russia	107	RU-4
Kaman	rc	Türkiye	75	TR-3
Kamensk-Uralsky	al	Russia	118	RU-4
Kamienica Mała	fd	Poland	69	PL-2
Kammuniyah	rc	Syria	16	SY-1
Kämpetorp	mg	Sweden	145	SW-6
Kamsdorf	rc	Germany	185	DE-4
Kam'yanets'-Podil's'kyi	rc	Ukraine	71	UA-4
Kandilli	qz	Türkiye	66	TR-3
Kanjiža	rc	Serbia	2	RS-2
Kännätsalo	fd	Finland	56	FI-1
Kannaviou	be	Cyprus	4	CY-1
Kannoures	cr	Cyprus	8	CY-1
Kanouat	rc	Morocco	5	MA-2
Kaolinovo*	ka	Bulgaria	43-46	BG-4
Kapaklı	rc	Türkiye	434	TR-10
Kapitanivka	cr	Ukraine	90	UA-5
Kapoňa	qs	Slovakia	163	SK-1
Kapteeninautio	ky	Finland	33	FI-1C
Kara Michal	ka	Bulgaria	41	BG-1
Karaarslan*	rc	Türkiye	297-300	TR-6
Karabaš	ky	Russia	122	RU-4
Karacaderbent	ze	Türkiye	240	TR-5L
Karacaören	ba	Türkiye	143	TR-4
Karacaören*	rc	Türkiye	92	TR-3C
Karaçay-İmirli	be	Türkiye	308	TR-7
Karaçayır	ka	Türkiye	245	TR-5
Karadere	fd	Türkiye	415	TR-9
Karahamzalı	rc	Türkiye	284	TR-6
Karahüyük	be	Türkiye	246	TR-6
Karahüyük	rc	Türkiye	490	TR-11
Karain	ze	Türkiye	570	TR-7
Karaisalı*	cr	Türkiye	471	TR-11
Karakaya*	qz	Türkiye	373-374	TR-9
Karakiraz	qs	Türkiye	34	TR-2B
Karaköy	fd	Türkiye	254	TR-6
Karaköy-Yesilköy	wo	Türkiye	165	TR-5G
Karakuyu	rc	Türkiye	561	TR-12Z
Karalar	ba	Türkiye	457	TR-10
Karamanlar-Orhan	bx	Türkiye	454	TR-10
Karamanlı*	cr	Türkiye	360	TR-8

deposit	ore	country	number	map
Kara-Merad	wc	Azerbaijan	17	AZ-1
Karapinar	pe	Türkiye	325	TR-7
Karapınar	rc	Türkiye	427	TR-10
Karapınar	bo	Türkiye	458	TR-11
Karaqeva	be	Kosovo	24	KS-1
Karasapaça	rc	Türkiye	107	TR-3
Karataş	py	Türkiye	535	TR-12Y
Karavukovo	rc	Serbia	16	RS-2
Karayakuplu	rc	Türkiye	57	TR-2
Karayatak	be	Türkiye	119	TR-3E
Karčiupis	rc	Lithuania	20	LT-1
Kargi	cr	Türkiye	367	TR-8
Karl	rc-wc	Germany	118	DE-3E
Karliköy-Mercan	wc	Türkiye	21	TR-2
Karlovacki vinogradi	rc	Serbia	25	RS-2
Karlovasi basin	bo-ze	Greece	83	GR-1
Karlstetten	qs	Austria	57	AT-3
Karnukkapuro	tc	Finland	34	FI-1C
Karpen-Metalle	rc	Albania	52	AL-2
Karpniki	fd	Poland	73	PL-2
Karpuzlu-Çukurköy	qz	Türkiye	425	TR-9
Karpuzlu-Kuşcamii	qz	Türkiye	378	TR-9
Karsıyaka	rc	Türkiye	532	TR-12
Karşıyaka	rc	Cyprus	17	CY-1
Kasharaj	rc	Albania	61	AL-3
Kaspi	rc	Georgia	25	GE-1
Kastbjerg	rc	Denmark	16	DK-1
Kastriani	ka	Greece	94	GR-4
Kastriot	rc	Albania	37	AL-2
Katalenac	ze	Serbia	110	RS-6
Katerini	rc	Greece	34	GR-1
Katerynivka	ka	Ukraine	175	UA-7
Katherine-Newbie road	qs	Egypt	120	EG-6
Katjel	cr	Albania	58	AL-3
Katlanovo	rc	North Macedonia	12	MK-1
Kato Koutrafas	rc	Cyprus	38	CY-1
Kato Moni	be	Cyprus	15	CY-1
Kattstensgruvan	qz	Sweden	81	SW-4
Kąty Wrocławskie	rc	Poland	87	PL-2
Katzenholz	ka	Czechia	14	CZ-2
Kavaclar	be	Türkiye	131	TR-4
Kavak	rc	Türkiye	95	TR-3
Kavakbaşi	rc	Türkiye	557	TR-12Z
Kavşıt	qz	Türkiye	380	TR-9
Kayabaşı	ka	Türkiye	187	TR-5H
Kayadibi*	cr	Türkiye	368	TR-8
Kazan	na	Türkiye	125	TR-3
Kazancı*	qs	Türkiye	251-252	TR-6
Kazimierz	ka	Poland	101	PL-2
Kazımkarabekir	mg	Türkiye	452	TR-10
Kaznějov-jih	ka	Czechia	33	CZ-1
Kęblowo Nowowiejskie	rc	Poland	2	PL-1
Kechaldag	pe	Azerbaijan	22	AZ-1
Keçiborlu	rc	Türkiye	430	TR-10
Keçiköy	rc	Türkiye	105	TR-3
Kečkovac	wc	Bosnia H.	35	BH-1
Keele quarry	rc	United Kingdom	161	UK-4
Kefalos	ka	Greece	85	GR-1
Kemerburgaz	wc	Türkiye	33	TR-2A
Kemerli	ze	Azerbaijan	2	AZ-1
Kemi	cr	Finland	6	FI-1
Kepenek	qs	Türkiye	559	TR-12Z
Kerbrient	ka	France	101	FR-5
Keremidkite	qf	Bulgaria	77	BG-5
Kerkrade	rc	Netherlands	38	NL-1A
Kernick	ka	United Kingdom	8	UK-2A
Kerrnaje	qz	Albania	1	AL-2
Kerrouet	ka	France	107	FR-5
Kerzenheim	rc	Germany	269	DE-5
Kessel	rc	Netherlands	40	NL-1
Kesseldorf	rc	France	23	FR-3
Kestelek	bo	Türkiye	186	TR-5H
Ketelberg	rc	Belgium	10	BE-1
Ketley quarry	rc	United Kingdom	152	UK-4
Kettenbach	rc-ka	Germany	168-169	DE-3
Keymer	rc	United Kingdom	89	UK-3
Kfardebian	qs	Lebanon	10	LE-1B

deposit	ore	country	number	map
Kfer Yabous	sc	Syria	9	SY-1A
Khaboba	ka	Egypt	114	EG-6A
Khaishi	ba	Georgia	3	GE-1
Khalilovo	rc	Russia	142	RU-4
Kheel	ka	Egypt	109	EG-6A
Khekordzula	ze	Georgia	31	GE-1
Khibina	ns	Russia	17	RU-2
Khiyarat Danun	rc	Syria	13	SY-1
Khledia	rc	Tunisia	25	TN-1
Kholm	rc	Russia	70	RU-3
Khorol	rc	Ukraine	38	UA-3
Khorosheve	qs	Ukraine	45	UA-3
Khotynets	ze	Russia	88	RU-3
Khoylinskoye	ba	Russia	1	RU-1
Khvarbeti	rc	Georgia	5	GE-1
Khyrdalan	qs	Azerbaijan	33	AZ-1B
Kidasi	be	Cyprus	5	CY-1
Kiełmina	rc	Poland	31	PL-1
Kiembaevsk	ka	Russia	145	RU-4
Kietyönmäki	li-qz	Finland	60	FI-1
Kihnami	qz	Finland	29	FI-1
Kijfwaard-Pannerden	rc	Netherlands	8	NL-1B
Kikinda	rc	Serbia	7	RS-2
Kiledere	pe	Türkiye	468	TR-11
Kilik-Kaspichan	rc	Bulgaria	50	BG-1
Kilyos	fd	Türkiye	73	TR-3
Kimeria	wo	Greece	64	GR-1
Kincsesbánya	qs	Hungary	23	HU-1
Kinets'pil'	ka	Ukraine	101	UA-5
Kingsbury quarry	rc	United Kingdom	136	UK-4
Kingscourt	rc	Ireland	34	IE-1
Kingsley quarry	rc	United Kingdom	160	UK-4
Kınık	rc	Türkiye	253	TR-6
Kıraman	tc	Türkiye	461	TR-11
Kiran	ze	Türkiye	231	TR-5
Kirazören-Dereli	ba	Türkiye	146	TR-4
Kirchkimmen	rc	Germany	15	DE-1
Kireç	fd	Türkiye	202	TR-5
Kireçköyü*	mg	Türkiye	262	TR-6
Kırka	bo	Türkiye	278	TR-6O
Kirkmaklin	qs	Azerbaijan	34	AZ-1B
Kirovo-Chepetsk	rc	Russia	104	RU-4
Kirrberg	rc	Germany	288	DE-6
Kirton quarry	rc	United Kingdom	173	UK-4
Kirvakar	py	Azerbaijan	16	AZ-1
Kisela Voda	wc	Serbia	54	RS-3
Kiselevo	rc	Russia	148	RU-1
Kışlacık	cr	Türkiye	568	TR-12
Kisújszállás	rc	Hungary	55	HU-1
Kittelfjäll	ol	Sweden	142	SW-6
Kivisuo	ky	Finland	20	FI-1A
Kıyakdede	rc	Türkiye	443	TR-10W
Kizil Hajily	be	Azerbaijan	5	AZ-1
Kızılcaköy	wc	Türkiye	50	TR-2B
Kızılcaören	ba	Türkiye	572	TR-6
Kızılcıklı	ze	Türkiye	62	TR-2
Kızılçukur	wc	Türkiye	238	TR-5L
Kızıldağ	ol	Türkiye	449	TR-10
Kızıldağ*	cr	Türkiye	498	TR-11
Kızıleniş*	cr	Türkiye	520	TR-12
Kızılibrik	be	Türkiye	113	TR-3D
Kizilkaya	be	Türkiye	130	TR-4
Kızılyer	qz	Türkiye	477	TR-11
Kızılyüksek*	cr	Türkiye	473	TR-11
Kızkapan	ze	Türkiye	22	TR-2
Kjøpsvik	qz	Norway	13	NO-3
Kladanj	mg	Bosnia H.	45	BH-1
Kläden	qs	Germany	18	DE-1
Klardorf	wc	Germany	326	DE-7
Klefstadlykkja	tc	Norway	37	NO-4
Kleine Spouwen	rc	Belgium	47	BE-1A
Kleinfeistritz	tc	Austria	100	AT-4
Klementowice	ec	Poland	162	PL-1
Klijtberg Bellegem	rc	Belgium	9	BE-1
Klikov	ka	Czechia	75	CZ-4
Klinë e Poshtme	rc	Kosovo	7	KS-1
Klisura	rc	Bulgaria	5	BG-1
Klokot	rc	Bosnia H.	1	BH-1
Kloštar	qs	Croatia	42	HR-1
Klosterbeuren	rc	Germany	282	DE-6
Klumpliddklumpen	tc	Sweden	122	SW-5
Knightmill-Huntly	ky	United Kingdom	235	UK-5
Knoll Manor quarry	rc	United Kingdom	72	UK-2
Knottingley, Burton Salmon	ec	United Kingdom	201	UK-4
Knowlesands quarry	rc	United Kingdom	154	UK-4
Knuthöjden	qz	Sweden	87	SW-4
Knutton quarry	rc	United Kingdom	162	UK-4
Kobaš	ka	Bosnia H.	20	BH-1
Kocapınar	pe	Türkiye	564	TR-12
Koçcağız	bx	Türkiye	493	TR-11
Koçoğlu	cr	Türkiye	501	TR-12
Koçyatağı*	cr	Türkiye	519	TR-12
Kodra e Noçit	qz	Albania	26	AL-2
Koitelainen	cr	Finland	1	FI-1
Kokaksu	bx	Türkiye	69	TR-3
Kokava nad Rimavicou	tc	Slovakia	105	SK-6
Kokkinorotsos	cr	Cyprus	7	CY-1
Kokurdan	qz	Türkiye	70	TR-3
Kölaberget	ky	Sweden	109	SW-5
Kolbuszowa-Kupno	rc	Poland	192	PL-4
Köleli	qz	Türkiye	476	TR-11
Kolence	ka	Czechia	71	CZ-4
Kolgaküla	rc	Estonia	14	EE-1
Kollovoz	qz	Albania	16	AL-2
Kolmozero	li	Russia	13	RU-2
Kolodenka	qs	Ukraine	5	UA-2
Kolomyia	rc	Ukraine	80	UA-4
Kolsva	fd	Sweden	78	SW-4
Kolubara	qs	Serbia	60	RS-3
Kolyadichi	qs	Belarus	13	BY-1
Kolyugino	rc	Russia	75	RU-3
Kom Oshim	be	Egypt	72	EG-4
Kömeç	qs	Türkiye	77	TR-3
Komprachcice	rc	Poland	113	PL-1
Konak Tarla	rc	Bulgaria	57	BG-1
Königsdorf	rc	Austria	111	AT-4
Königshausen	rc	Germany	289	DE-6
Königshofen	rc	Germany	198	DE-4
Konoplianske	qs	Ukraine	110	UA-6
Konrádovce	sw	Slovakia	99	SK-1
Kontaros	ka	Greece	105	GR-4
Kop Krom E*	cr	Türkiye	510	TR-12X
Kop Krom W*	cr	Türkiye	511	TR-12X
Kopaniec	fd	Poland	70	PL-2
Kopdağı*	cr	Türkiye	507-509	TR-12X
Kopernica	be-wc	Slovakia	40	SK-4
Kopernica	qz	Slovakia	37	SK-4
Kopernica - Slobodné	be	Slovakia	39	SK-4
Kopernica III	be	Slovakia	41	SK-4
Kopli	rc	Estonia	13	EE-1
Kopparhult	fd	Sweden	44	SW-3
Köppern	qz	Germany	174	DE-3
Köprüalan	bx	Türkiye	375	TR-9
Köprübaşı	rc	Türkiye	93	TR-3C
Korçe	rc	Albania	66	AL-3
Kordun-Banija	rc	Croatia	8	HR-1A
Koretin	be	Kosovo	19	KS-1
Korets	fd	Ukraine	9	UA-2
Koria	rc	Finland	58	FI-1
Köriakup (Kaşpınar)	be	Türkiye	136	TR-4F
Kornjica	qs	Serbia	70	RS-1
Korosten'	an	Ukraine	19	UA-2B
Korostyšiv	rc	Ukraine	30	UA-2
Körpe*	cr	Türkiye	269	TR-6O
Korsnäs	qz	Finland	50	FI-1
Kortemark	rc	Belgium	4	BE-1
Košarno	wc	Serbia	68	RS-3
Kösedağ	ka	Türkiye	522	TR-12
Košice	mg	Slovakia	133	SK-8
Kostelec na Orlici	rc	Czechia	89	CZ-1
Kostiantynivka	wc	Ukraine	142	UA-7
Kostolac basin	wc	Serbia	40	RS-1
Kostomuksha	fd	Russia	38	RU-2
Kosturi	bx	Bosnia H.	52	BH-1A
Kőszeg	rc	Hungary	13	HU-1
Kotary	rc	Poland	117	PL-1
Kotlik	ka	Russia	134	RU-4
Kotsyubyntsi	rc	Ukraine	72	UA-4
Kousba	rc	Lebanon	1	LE-1
Koutzi, Prokopi	mg	Greece	13	GR-3
Kouvola	ec	Finland	57	FI-1
Kovačica	rc	Serbia	28	RS-2
Kovanj	wc	Bosnia H.	50	BH-1
Kovdor	zr	Russia	21	RU-2
Kovdor North	ol	Russia	20	RU-2
Koviljača	mg	Serbia	81	RS-4
Kovirevo	wc	Croatia	9	HR-1A
Kovrai	rc	Ukraine	89	UA-5
Kowalska Gora	fd	Poland	84	PL-2
Koyakçi Tepe-Çayırbagı	mg	Türkiye	447	TR-10
Koyunbaba	qs	Türkiye	4	TR-2
Kozłowo	rc	Poland	16	PL-1
Kozlu	qz	Türkiye	68	TR-3
Kozluk	rc	Türkiye	550	TR-12Z
Kozów	sc	Poland	144	PL-3
Kraaienhorst	rc	Belgium	29	BE-1B
Krabonoš	fd	Czechia	74	CZ-4
Královský Chlmec	qs	Slovakia	162	SK-10
Kraniec	sc	Poland	85	PL-2
Kraps	rc	Albania	65	AL-3
Krasnivka	fd	Ukraine	176	UA-7
Krásno	fd	Czechia	8	CZ-2
Krasnoe Pole	ka	Russia	129	RU-4
Krasnoivanivka	qs	Ukraine	106	UA-6
Krasnokutsk	zr	Ukraine	41	UA-3
Krasnoperekops'k	sa	Ukraine	181	UA-1
Krasnotur'insk	al	Russia	110	RU-4
Krásný Dvůr	ka	Czechia	23	CZ-2
Krastë	cr	Albania	46	AL-2
Kraubath-Mitterberg	cr	Austria	95	AT-4
Kreco-Loen	qs	Belgium	51	BE-1A
Krejdavyja	qs	Belarus	15	BY-1
Krekëz	rc	Albania	64	AL-3
Kremenkul'	fd	Russia	128	RU-4
Kreminotsi	ba	Bulgaria	17	BG-1
Kremna	mg	Serbia	89	RS-4
Krempelbauer/St. Georgen	qs	Austria	44	AT-2
Kresna	rc	Bulgaria	1	BG-1
Kriechbaum	fd-ka-qz	Austria	46	AT-2
Kristoni	rc	Greece	54	GR-1
Krivaja-Konjuh	mg	Bosnia H.	43	BH-1
Krive strane	mg	Serbia	88	RS-4
Křižanovice	ba	Czechia	83	CZ-1
Kroksjön	cr	Sweden	113	SW-5
Kropyvnytskyi	rc	Ukraine	93	UA-5
Krotoszyn	rc	Poland	42	PL-1
Kruibeke	ec	Belgium	22	BE-1
Krupeiskii Sad	rc	Belarus	32	BY-1
Kruta Balka	li	Ukraine	179	UA-1
Kryzmanówka	wc	Poland	149	PL-3
Krzeniów	be	Poland	74	PL-2
Krzeszówek	qs	Poland	107	PL-2
Kucak	pe	Türkiye	562	TR-12
Kucheriv Yar	wc	Ukraine	153	UA-7D
Kučín	ze	Slovakia	145	SK-9
Kučín-Pusté Čemerné	ze	Slovakia	147	SK-9
Küçük Evren	qs	Türkiye	25	TR-2
Küçükçamlık Tepe-Savran	bx	Türkiye	426	TR-9
Küçükhacıbey	be	Türkiye	120	TR-3E
Küçüksu	rc	Türkiye	82	TR-3
Kudrinskoe	be	Ukraine	182	UA-1
Kukavicji vrh	rc	Montenegro	6	ME-1
Kukljaš-Našice	rc	Croatia	51	HR-1
Kuksos	rc	Lithuania	26	LT-1
Kul'-Yurt-Tau	py	Russia	137	RU-4
Kula	rc	Serbia	11	RS-2
Külcü	fd	Türkiye	219	TR-5
Külső-Gombási út	be	Hungary	32	HU-1
Kuluncak*	cr	Türkiye	526	TR-12
Kumak	wc	Russia	144	RU-4
Kumistavi	be	Georgia	9	GE-1
Kunda	rc	Estonia	5	EE-1
Kunice E	rc	Poland	80	PL-2
Kunice W	rc	Poland	79	PL-2
Kunilovo-Dashkovo	be	Russia	72	RU-3
Kuniškiai-Anykščiai	qs	Lithuania	30	LT-1
Kunszentmárton	rc	Hungary	58	HU-1
Kuovila	wo	Finland	63	FI-1
Kuprava	rc	Latvia	26	LV-1
Küre*	fd-ec	Türkiye	259	TR-6N
Kurianivske-Nahorianske	mg-tc	Ukraine	18	UA-2
Kurilar	wo	Türkiye	176	TR-5G
Kurkur	be	Egypt	200	EG-8
Kurna	wc	Türkiye	35	TR-2B
Kurnaköy*	qs	Türkiye	37	TR-2B
Kuršėnai	rc	Lithuania	7	LT-1
Kurşunlu	wc	Türkiye	164	TR-5
Kurtdere-Saklar	wc	Türkiye	237	TR-5L
Kurudağ	bx	Türkiye	494	TR-11
Kurudere	ba	Türkiye	489	TR-11
Kurudere	ka	Türkiye	540	TR-12
Kuruköprü (Kaşpınar)	be	Türkiye	135	TR-4F
Kuruköy	qz	Türkiye	386	TR-9
Kuru-Vaara	fd	Russia	19	RU-2
Kuryala	fd	Russia	51	RU-2
Kuşçam	fd	Türkiye	405	TR-9
Kuşçular	pe	Türkiye	126	TR-3
Kuşluk	ze	Türkiye	232	TR-5
Kuštanovci	qs	Slovenia	28	SI-1
Kutki-Kuşluk	rc	Türkiye	566	TR-12
Kutsko Brdo	bx	Montenegro	18	ME-1A
Küttigen*	rc	Switzerland	15-16	CH-1
Kuzköy*	cr	Türkiye	339	TR-7
Kuzmin	rc	Serbia	30	RS-2
Kvaisa	ba	Georgia	16	GE-1
Kvareli	rc	Georgia	30	GE-1
Kvarnvreten	qz	Sweden	55	SW-3
Kvemo Teleti	rc	Georgia	40	GE-1
Kypec	qz	Slovakia	47	SK-4
Kyrkoberget	fd-qz	Finland	65	FI-1F
Kyšice-Ejpovice	wc	Czechia	31	CZ-1
Kyštym*	ka	Russia	120-121	RU-4
Kz'iot	be	Israel	8	IL-2
La Balandière	rc	France	137	FR-5B
La Baravelle	wc	France	167	FR-6
La Bathie	al	France	197	FR-6
La Baudre	wc	France	182	FR-6
La Bifomoine	rc	France	138	FR-5B
La Bordellerie/Lureuil	wc	France	171	FR-6A
La Boscarasse	qs	France	282	FR-8
La Boulinière	rc	France	152	FR-5
La Bretaudière	rc	France	143	FR-5
La Cabane	wc	France	172	FR-6A
La Cañada de Verich	wc	Spain	199	ES-6E
La Caradière	rc	France	129	FR-5B
La Cecosa-Casei Gerola	rc	Italy	326	IT-6O
La Chapelle-la-Reine	qs	France	69	FR-4C
La Chavola-Almazan	qs	Spain	83	ES-3
La Colassière	rc	France	134	FR-5B
La Croix-sur-Ourcq	qs	France	62	FR-4B
La Escandella	rc	Spain	248	ES-7J
La Estanca-Calahorra	rc	Spain	94	ES-3
La Fregeneda	fd-li	Spain	147	ES-5
La Ghirotta	rc	Italy	276	IT-6
La Gornal*	qs	Spain	116	ES-4B
La Grange Guillaume	wc	France	81	FR-4E
La Grenouille	rc	France	238	FR-7A
La Malinière	rc	France	149	FR-5
La Martrie	ka	France	125	FR-5
La Mas-Moreau	rc	France	230	FR-7A
La Mata de los Olmos	wc	Spain	194	ES-6E
La Moderna	rc	Italy	139	IT-3I
La Monclova	qs	Spain	290	ES-8L
La Motte-Bonnin	wc	France	253	FR-7B
La Nadulle	fd	France	334	FR-9B
La Oliva	qs	Spain	282	ES-8
La Parrilla	qs	Spain	281	ES-8

deposit	ore	country	number	map
La Pera	rc	Spain	124	ES-4
La Perrière	wc	France	323	FR-9
La Peyrière	wc	France	255	FR-7B
La Pianazza-Vallurbana	sc	Italy	296	IT-6N
La Plana	qs	Spain	77	ES-3
La Pomarède	rc	France	322	FR-9
La Poterie	rc	France	109	FR-5
La Provvidenza	ka	Italy	219	IT-5
La Réchassière	rc	France	161	FR-6
La Remaudière	rc	France	132	FR-5B
La Roche-sur-Yon	rc	France	141	FR-5
La Saulsotte	wc	France	80	FR-4E
La Séguinière	rc	France	136	FR-5B
La Solana	ka-qz-fc	Spain	228	ES-6I
La Touche	rc	France	133	FR-5B
La Tuilerie	rc	France	267	FR-7
Laa an der Thaya	rc	Austria	67	AT-3
Laaouama	rc	Morocco	2	MA-2
Labove	rc	Albania	75	AL-3
Labucka	bo-li	Bosnia H.	66	BH-1
Lachy	wc	France	85	FR-4
Lackendorf*	qs	Austria	118-121	AT-4
Ladice	wc	Slovakia	22	SK-3
Ladik	qz	Türkiye	96	TR-3
Lafelt	rc	Belgium	48	BE-1A
Laghoualem	qs	Morocco	50	MA-1
Lago	ka	Spain	30	ES-2A
Lagoa Seca	rc	Portugal	132	PT-7
Lagorce	wc	France	257	FR-7B
Lagos*	rc	Portugal	133	PT-7
Laguna	sw	Greece	110	GR-1
Laguna (Poveda de la Sierra)	ka-qz-fd	Spain	179	ES-6F
Lahnaslampi	tc	Finland	18	FI-1A
Lajthizë	cr	Albania	25	AL-2
Łąka	rc	Poland	125	PL-1
Lakavica	qz	North Macedonia	16	MK-1
Lake Dolgoe	fd	Russia	31	RU-2
Laknas	rc	Albania	79	AL-2
Lakšárska Nová Ves	qs	Slovakia	6	SK-2
Lalin-Forcarei	fd-li	Spain	11	ES-2
Lambs Pitsham	rc	United Kingdom	81	UK-3
Lämmersberg	rc-wc	Germany	149	DE-3E
Lamstedt	rc	Germany	9	DE-1
Lamuç	rc	Albania	55	AL-2+3
Landemont	rc	France	131	FR-5B
Landovice	rc	Kosovo	6	KS-1
Landquart	rc	Switzerland	31	CH-1
Lane Wood quarry	rc	United Kingdom	95	UK-3
Laneuveville-devant-Nancy	sa	France	341	FR-1
Langadas	rc	Greece	42	GR-1
Langen	qs	Germany	253	DE-5
Langenaubach	rc-wc	Germany	108	DE-3D
Langenorla	qf	Germany	186	DE-4
Langenreichen	rc	Germany	291	DE-6
Langenzenn*	rc	Germany	330-331	DE-7
Långgruvan	fd	Sweden	35	SW-3
Långsjökullen	qz	Sweden	47	SW-3
Langstögen	qs	Austria	24	AT-2
Langweiden	rc-wc	Germany	120	DE-3E
Lansac	fd	France	337	FR-9B
Lantenne-Vertière	rc	France	158	FR-6
Länttä	li-qz	Finland	27	FI-1B
Lanvrian	ka	France	102	FR-5
Lapinlahti	an	Finland	28	FI-1
Laplaud	rc	France	229	FR-7A
Laracha	rc	Spain	18	ES-2
Larba Nait Irathen	fd	Algeria	39	DZ-2
Larchant	rc	France	70	FR-4C
Largone Superiore	tc	Italy	419	IT-8V
Lărguța	be	Moldova	9	MD-1
Larmont	li	France	227	FR-7
Larnage	fd-ka	France	214	FR-6
Laroche Trandon	rc	France	207	FR-6
Las Arenas-Atapuerca*	qs	Spain	66	ES-3
Las Arenosas	qs	Spain	284	ES-8K
Las Monjas-Arevalo	qz	Spain	131	ES-5
Las Parejas	ka-qz-fd	Spain	236	ES-6H
Laschamp	rc	France	194	FR-6
Lassing	mg-tc	Austria	85	AT-4
Laste-Revine Lago	qz	Italy	504	IT-8
Lastovce	rc	Slovakia	156	SK-10
Latilly	qs	France	60	FR-4B
Látky	qz	Slovakia	72	SK-1
Latnaya	wc	Russia	90	RU-3
Laufen	rc	Switzerland	11	CH-1
Lausen	rc	Switzerland	13	CH-1
Lausitz	fd	Germany	242	DE-4
Lausnitz	qs	Germany	188	DE-4
Laussnitz	qs	Germany	231	DE-4
Lauttakoski	tc	Sweden	148	SW-6
Lauvrak	fd	Norway	63	NO-5
Laval	rc	France	327	FR-9
Laxe	ka	Spain	16	ES-2
Laybrook quarry	rc	United Kingdom	87	UK-3
Laža	rc	Latvia	3	LV-1
Lazine	wc	Serbia	65	RS-3
Le Barp	qs	France	264	FR-7
Le Baudières	rc	France	97	FR-4
Le Breuil	rc	France	236	FR-7A
Le Buté	rc	France	130	FR-5B
Le Chatelet/Louan	wc	France	83	FR-4E
Le Chevalier	wc	France	256	FR-7B
Le Chiuse	rc	Italy	264	IT-5
Le Crocette-Ceresole d'Alba	rc	Italy	337	IT-7
Le Donjon	rc	France	191	FR-6
Le Hourdel	qs	France	2	FR-2
Le Jarculet	rc	France	251	FR-7B
Le Midi de la Croix	wc	France	75	FR-4D
Le Musse - Castelli*	rc	Italy	498-499	IT-8X
Le Perget	rc	France	317	FR-9A
Le Planton	wc	France	247	FR-7B
Le Salde	sc	Italy	287	IT-6N
Le Thieulin	qs	France	32	FR-4
Le Thoronet	rc	France	303	FR-8
Le Touquet	rc	Belgium	1	BE-1
Le Val-Saint-Germain*	rc	France	38-39	FR-4
Lebedyn	rc	Ukraine	36	UA-3
Lębork	rc	Poland	1	PL-1
Lechuaf	ns	Morocco	109	MA-6
Ledce	fd	Czechia	114	CZ-6
Ledčice	rc	Czechia	43	CZ-1
Lēdurga	qs	Latvia	17	LV-1
Lee Moor*	ka	United Kingdom	38,42,43	UK-2B
Leers	rc	France	11	FR-2
Lefkada-Neirada	mg	Greece	30	GR-1
Łęgajny	ec	Poland	20	PL-1
Legnica-pole Wschodnie	rc	Poland	78	PL-2
Léguevin	rc	France	315	FR-9A
Lehôtka pod Brehmi	pe	Slovakia	59	SK-4
Lehôtka pod Brehmi - Bralo	pe	Slovakia	58	SK-4
Leipijärvi	cr	Sweden	139	SW-6
Lejargruvan	cr	Sweden	108	SW-5
Lekkhoyla	cr	Russia	2	RU-1
Łęknica	wc	Poland	47	PL-1
Lelese	tc	Romania	50	RO-1
Lembach	ka	Germany	95	DE-2
Lemnäs-Lemnästräsk	fd-qz	Finland	68	FI-1F
Lenartowice	rc	Poland	38	PL-1
Lenindar	qs	Belarus	31	BY-1
Lentiszombathely	rc	Hungary	2	HU-1
Leogra	rc	Italy	466	IT-8W
Leonardów	rc	Poland	32	PL-1
L'Epinette	rc	France	139	FR-5B
Lervik	fd	Sweden	68	SW-4
Les Baraques	rc	France	188	FR-6
Les Cartaud/Guizengeard	wc	France	243	FR-7B
Les Combes	wc	France	252	FR-7B
Les Combes/Hostun	ka	France	217	FR-6B
Les Eaux Ouïes	rc	France	45	FR-4A
Les Fontainettes	rc	France	48	FR-4A
Les Fontaneilles Hautes	fd	France	331	FR-9B
Les Gloitre/Villenauxe-la-Grande	wc	France	82	FR-4E
Les Landrons	rc	France	46	FR-4A
Les Landrons Est	rc	France	47	FR-4A
Les Merles/Hostun	ka	France	219	FR-6B
Les Milles	rc	France	299	FR-8
Les Rairies	rc	France	120	FR-5A
Les Rairies-Jugé	rc	France	119	FR-5A
Les Tampards/Hostun	ka	France	218	FR-6B
Lesjhurrungane	tc	Norway	28	NO-4
Lesná	pe	Slovakia	61	SK-4
Lesnaya Varaka	ol	Russia	18	RU-2
Lesonice	rc	Czechia	110	CZ-6
Leştioara-Hălmagiu	wc	Romania	61	RO-1
L'Estoret	rc	Spain	126	ES-4
Lesyuat	ns	Morocco	107	MA-6
Leszkowice	qs	Poland	164	PL-1
L'Etablère	rc	France	140	FR-5B
Letnitsa	rc	Bulgaria	29	BG-1
Lettental	qs	Austria	48	AT-2
Leukogia	ka	Greece	57	GR-1
Leveäniemi	wc	Sweden	150	SW-6
Leviäkangas	li	Finland	26	FI-1B
Lëvrushku	mg	Albania	11	AL-2
Lewkowo Stare	rc	Poland	21	PL-1
Leziate quarry	qs	United Kingdom	126	UK-4
Li	fd	Norway	68	NO-5
Libin (Arfaye)	ka	Belgium	43	BE-1
Libochovice	rc	Czechia	42	CZ-1
Libramont	ka	Belgium	45	BE-1
Lichterfeld	rc	Germany	234	DE-4
Liebertwolkwitz	rc	Germany	219	DE-4
Lielauce	rc	Latvia	9	LV-1
Liepa (Straumeni)	rc	Latvia	22	LV-1
Lieskovec	be	Slovakia	68	SK-1
Ligny-le-Ribault	rc	France	100	FR-4
Ligurni	fd	Italy	145	IT-3H
Lilla Kettstaka	qz	Sweden	120	SW-5
Lille Leirpollen	qz	Norway	4	NO-2
Lillebukt	ns	Norway	10	NO-2
Limni Triadas	mg	Greece	8	GR-3
Lindforst	rc	Germany	321	DE-6
Linnajavri nordfelt	tc	Norway	16	NO-3
Linnajavri sørfelt	tc	Norway	17	NO-3
Linnavaara	fd	Russia	53	RU-2
Linthe	qs	Germany	212	DE-4
Lipasvaara	tc	Finland	32	FI-1C
Lisobuda	an	Ukraine	26	UA-2B
Lison	rc	France	108	FR-5
Lista dei Narcisi	qz	Italy	503	IT-8
Líšťany	wc	Czechia	39	CZ-1
Litangen	qz	Norway	53	NO-5
Litmanen	ka	Finland	41	FI-1D
Littlejohns	ka	United Kingdom	16	UK-2A
Littlethorpe	rc	United Kingdom	121	UK-4
Liverovići	bx	Montenegro	16	ME-1A
Lješljani	be	Bosnia H.	5	BH-1
Llançá	fd	Spain	125	ES-4
Llazarevë	rc	Kosovo	10	KS-1
Lliria	rc	Spain	230	ES-6
Località S. Maria	rc	Italy	155	IT-3
Locchera-Castello di Bonvei	ka	Italy	37	IT-2B
Lochaline Mine	qs	United Kingdom	230	UK-5
Logarovci	rc	Slovenia	26	SI-1
Lohrheim	ka	Germany	166	DE-3
Lomas del Acebuche	qs	Spain	301	ES-8O
Lomme	rc	France	10	FR-2
Lomnička u Plesné	qs	Czechia	7	CZ-2
Lomnička-Kaznějov	ka	Czechia	34	CZ-1
Lomno	be	Slovenia	19	SI-1
Longmarsh	wc	United Kingdom	51	UK-2C
Longstone	ka	United Kingdom	18	UK-2A
Loosi	qs	Estonia	8	EE-1
Loosu	rc	Estonia	12	EE-1
Loqueffret	ka	France	104	FR-5
Los Almendros	qs	Spain	300	ES-8O
Los Ángeles	rc	Spain	141	ES-5C
Los Blanquizales	qs	Spain	85	ES-3
Los Majuelos	wc	Spain	181	ES-6E
Los Murcianos	be-ze	Spain	303	ES-8O
Los Olmos	wc	Spain	195	ES-6E
Los Rancajales El Jaralón	fd	Spain	143	ES-5
Los Trancos	be	Spain	305	ES-8O
Los Yebenes	rc	Spain	159	ES-5
Łosie	rc	Poland	26	PL-1
Louata	rc	Tunisia	9	TN-1
Louette-Saint-Pierre	ka	Belgium	37	BE-1
Lough Sheelin	ba	Ireland	30	IE-1
Louroux-Bourbonnais	rc	France	183	FR-6
Lousas	li	Portugal	22	PT-2
Louta	rc	Morocco	31	MA-3
Lovaro	sc	Italy	291	IT-6N
Lövböle	fd-qz	Finland	67	FI-1F
Lubenik	mg	Slovakia	111	SK-6
Lubná-Marta	wc	Czechia	37	CZ-1
Ludbreski vinogradi	rc	Croatia	35	HR-1
Ludwigshafen	al	Germany	271	DE-5
Lugberg	bx	Austria	9	AT-1
Lugnet	fd	Sweden	62	SW-4
Lugoj	rc	Romania	46	RO-1
Lugu i Zanit	cr	Albania	5	AL-2
Lukavac	na	Bosnia H.	61	BH-1
Lukavec	rc	Croatia	29	HR-1B
Luke Poljanske	be	Croatia	22	HR-1
Lukoml'	wc	Belarus	2	BY-1
Lukovit	rc	Bulgaria	22	BG-1
Lum Zi	pe	Albania	22	AL-2
Lumbach	rc	Germany	301	DE-6
Lundby	rc	Denmark	30	DK-1
Lunde	rc	Norway	50	NO-5
Lunnom	wc	Sweden	12	SW-2
Lupikko	fd	Russia	54	RU-2
Lusina-Udanin	wc	Poland	99	PL-2
Lutila	be-wc	Slovakia	50	SK-4
Lutila	qz	Slovakia	53	SK-4
Lützensömmern	rc	Germany	82	DE-2
Luvi	be	Italy	457	IT-8W
Luxor	rc	Egypt	150	EG-7
Luženičky	fd	Czechia	26	CZ-1
Luzhë	rc	Albania	4	AL-2
Luzzara	rc	Italy	300	IT-6
Lyaskovets	ze	Bulgaria	78	BG-5
Lyudenevichi	ka	Belarus	21	BY-1A
Maailmankorpi	tc	Finland	12	FI-1A
Maaseik	rc	Belgium	55	BE-1
Maasmechelen	rc	Belgium	54	BE-1
Maastricht	rc	Netherlands	39	NL-1A
Maazer valley	be	Israel	22	IL-2
Mably	rc	France	195	FR-6
Macchia di Lenza	be	Italy	197	IT-4K
Macchia Escafrullina	mg	Italy	256	IT-5
Macchie	ka	Italy	182	IT-4
Macelj	ze	Croatia	60	HR-1
Macharula	wc	Georgia	37	GE-1
Machorro	rc	Portugal	90	PT-3
Machowinko	ec	Poland	4	PL-1
Machulince	rc	Slovakia	26	SK-3
Maciejowa	fd	Poland	72	PL-2
Mád	ka	Hungary	48	HU-2
Madanlar*	cr	Türkiye	208	TR-5I
Madenli	be	Türkiye	115	TR-3D
Madeo-Rossano	rc	Italy	160	IT-3
Madesimo	qz	Italy	410	IT-8
Madneuli	ba	Georgia	23	GE-1
Madorna-Andrés	wc	Portugal	115	PT-6
Mád-Suba	ze	Hungary	49	HU-2
Magán	be	Spain	161	ES-5D
Măgura	bx	Romania	72	RO-1
Mahada	rc	Algeria	22	DZ-2
Mahalah Ahmed*	rc	Egypt	20	EG-3
Mahallat Diyay*	rc	Egypt	31	EG-3
Mahallat Inshaq	rc	Egypt	50	EG-3
Mahis	ka	Jordan	37	JO-1
Mahmutlar	fd	Türkiye	234	TR-5
Maia e Theknës	cr	Albania	47	AL-2
Maienburg	rc-wc	Germany	117	DE-3E
Mainflingen	rc	Germany	250	DE-5

deposit	ore	country	number	map
Maisse	qs	France	67	FR-4
Majdalena	fd	Czechia	73	CZ-4
Majerovce	ze	Slovakia	144	SK-9
Majków	sc	Poland	159	PL-3
Makhtesh	rc	Israel	12	IL-2
Makhtesh Hatira	qs	Israel	10	IL-2
Makhtesh Hatsera	qs	Israel	11	IL-2
Makthar	rc	Tunisia	33	TN-1
Makvaneti	wc	Georgia	6	GE-1
Malá Bara	pe	Slovakia	157	SK-10
Malá Tresná-Svratka	fd	Czechia	81	CZ-1
Maladob	ns	Egypt	188	EG-8
Malaryta	sw	Belarus	33	BY-1
Mälby	fd	Sweden	88	SW-4
Maldan-Vil'skoe	wc	Ukraine	10	UA-2A
Malenovice	rc	Czechia	122	CZ-1
Malešić	qz	Bosnia H.	65	BH-1
Malga Ofra	ka	Italy	476	IT-8W
Malinovetskoe	wc	Russia	68	RU-3
Malintoppo	rc	Italy	243	IT-5
Maljevac	rc	Montenegro	4	ME-1
Malkara	rc	Türkiye	18	TR-2
Malko Tarnovo	qf	Bulgaria	61	BG-1
Mallersbach	ka	Austria	62	AT-3
Malo Grim	mg	Egypt	185	EG-8
Maloarkhangel'skoe	sc	Russia	98	RU-4
Małomice	wc	Poland	44	PL-1
Malsch	qs	Germany	276	DE-1
Malschenberg	rc	Germany	272	DE-5
Maltby quarry	rc	United Kingdom	176	UK-4
Malvoisin	ka	Belgium	38	BE-1
Mályi	rc	Hungary	41	HU-1
Malyn*	an	Ukraine	21-22	UA-2B
Malynivka	qs	Ukraine	46	UA-3
Malyshev	fd	Russia	114	RU-4
Malyshevske	zr-ky-qs	Ukraine	109	UA-6
Manastirac	ze	Serbia	22	RS-2
Mandrilli	bx	Italy	208	IT-5
Mandrò	rc	Italy	163	IT-4
Mångfallberget	ky	Sweden	128	SW-5
Mantoudi	mg	Greece	14	GR-3
Manuilivka	zr	Ukraine	167	UA-7
Manyuk	ky	Russia	6	RU-2
Manzano	rc	Italy	506	IT-8
Maoče	rc	Montenegro	5	ME-1
Maočići	bx	Montenegro	11	ME-1
Maradah	qs	Libya	8	LY-1
Mărcești	wc	Romania	89	RO-6
Marchegg	qs	Austria	73	AT-3
Marcheprime	qs	France	263	FR-7
Marcognac	wc	France	239	FR-7
Marello	ka	Italy	396	IT-7T
Marganec'	rc	Ukraine	120	UA-6
Marga-Vojslova	tc	Romania	45	RO-1
Marginone	rc	Italy	260	IT-5
Maria	rc-wc	Germany	139	DE-3E
Maria I*	qs	Spain	115	ES-4B
Maria III	ka	Poland	59	PL-2
Mariagruvan	fd	Sweden	34	SW-3
Mariahütte	rc	Germany	262	DE-5
Marigole-Pice	ba	Italy	428	IT-8
Markelo	qs	Netherlands	2	NL-1
Markin	rc	Russia	149	RU-1
Marklkofen	rc	Germany	315	DE-6
Markova Reka	qs	North Macedonia	13	MK-1
Markovskoe	be	Belarus	27	BY-1A
Markowicze	rc	Poland	200	PL-4
Marks Tey quarry	rc	United Kingdom	114	UK-3
Markušovce	ba	Slovakia	124	SK-7
Marland	wc	United Kingdom	60	UK-2D
Mårnes	qz	Norway	18	NO-3
Maroni	sr	Cyprus	27	CY-1
Marquinet	rc	Albania	50	AL-2
Marsciano	rc	Italy	235	IT-5
Mārsnēni	qs	Latvia	23	LV-1
Maršov	be	Czechia	64	CZ-4
Martin	rc	Slovakia	64	SK-1
Martinė	rc	Italy	483	IT-8W
Martiniana	fd	Italy	351	IT-7P
Martizay (les Hautes-Maisons)	wc	France	170	FR-6A
Maruf	rc	Türkiye	118	TR-3
Maruffa	be	Italy	473	IT-8W
Marx-Barge	qs	Germany	12	DE-1
Mas Vell	sc	Spain	210	ES-6G
Maşatdağ	bx	Türkiye	455	TR-10
Mashal	rc	Egypt	29	EG-3
Mastabbia e Lago	tc	Italy	411	IT-8V
Måstatkaise	mg	Sweden	143	SW-6
Mata da Galinheira	fd-qz	Portugal	4	PT-2
Mataschenfeld	rc	Austria	110	AT-4
Matosinhos	ka	Portugal	17	PT-2
Matoutinho	rc	Portugal	173	PT-8
Mátraderecske	rc	Hungary	37	HU-1
Mauléon-d'Armagnac	qs	France	280	FR-7
Maurupt-le-Montois	rc	France	92	FR-4
Mautern	tc	Austria	91	AT-4
Mavrokolympos	rc	Cyprus	43	CY-1
Mayrouba	qs	Lebanon	9	LE-1B
Mayskoe	qz	Russia	25	RU-2
Mazdour	rc	Tunisia	44	TN-1A
Mazières	rc	France	234	FR-7A
Mazin	py	Croatia	3	HR-1
Mazinghem	rc	France	8	FR-2
Mazraat Yachouh	rc	Lebanon	11	LE-1
Meadham Farm quarry	rc	United Kingdom	111	UK-3
Measham quarry	rc	United Kingdom	134	UK-4
Mechroha	rc	Algeria	65	DZ-3
Mechtat Bir Smar	rc	Algeria	75	DZ-1
Mečji	be	Serbia	96	RS-1
Međeđe	bx	Montenegro	14	ME-1A
Medjana	rc	Algeria	79	DZ-1
Medrissa	rc	Algeria	14	DZ-1
Meeth	wc	United Kingdom	59	UK-2D
Mehl	rc-wc	Germany	165	DE-3E
Melalahti	qz	Finland	10	FI-1A
Melbur-Meledor	ka	United Kingdom	5	UK-2A
Meldon quarry	li	United Kingdom	57	UK-2
Meleto-Palagione	rc	Italy	262	IT-5
Melfa	qs	Italy	207	IT-5
Melg el Ouidan	be	Morocco	37	MA-1
Meliata	wc	Slovakia	104	SK-1
Melk	qs	Austria	52	AT-3
Melkfjell	qz	Norway	22	NO-3
Melomais	qz	Russia	39	RU-2
Melotta	rc	Italy	422	IT-8
Mem Moniz	rc	Portugal	187	PT-10
Memaliaj	rc	Albania	74	AL-3
Membruggen	rc	Belgium	46	BE-1A
Mendes	wc	Portugal	113	PT-6
Mendterbach	rc-wc	Germany	136	DE-3E
Menemen	rc	Türkiye	227	TR-5
Menen	rc	Belgium	6	BE-1
Mengen	rc	Germany	281	DE-1
Menzel Fersi	rc	Tunisia	53	TN-1A
Menzel Harb	rc	Tunisia	43	TN-1A
Menzel Hayet	rc	Tunisia	54	TN-1A
Menzel Jemil	rc	Tunisia	10	TN-1
Menzel Temime	rc	Tunisia	14	TN-1
Mérel	ka	France	126	FR-5
Mescitli	wc	Türkiye	150	TR-4
Mescitli	pe	Türkiye	502	TR-12
Meşəkənarı	rc	Azerbaijan	41	AZ-1
Meşeligedil	fd	Türkiye	407	TR-9
Mešić	ka	Serbia	38	RS-1
Mesopotam	rc	Albania	76	AL-3
Mesruriye	wo	Türkiye	179	TR-5
Messingham quarry	qs	United Kingdom	205	UK-4
Mesu Pranu	qs	Italy	117	IT-2G
Métairie des Perdraux	fd	France	326	FR-9
Metaxades	ze	Greece	68	GR-1
Metchangyarvi	qz	Russia	43	RU-2
Metekhi	rc	Georgia	41	GE-1
Metholmen	fd	Sweden	36	SW-3
Metiš-Štubik	rc	Serbia	74	RS-1
Metsada	rc	Israel	6	IL-2
Meudon	ka	France	106	FR-5
Meudt	rc-wc	Germany	135	DE-3E
Meulebeke	rc	Belgium	11	BE-1
Mezdra	rc	Bulgaria	15	BG-1
Mëzez	rc	Albania	54	AL-2
Meziad	bx	Romania	73	RO-1
Mezőberény	rc	Hungary	57	HU-1
M'fis	ba	Morocco	100	MA-4
Miass	rc-tc	Russia	125-126	RU-4
Michał	ka	Poland	103	PL-2
Michaľany - Lastovce	be	Slovakia	155	SK-10
Michałów	rc	Poland	30	PL-1
Michelmersh quarry	rc	United Kingdom	79	UK-3
Midar	rc	Morocco	113	MA-1
Midtoen	mo	Denmark	9	DK-1A
Mieslahti-Pitkäperä	tc	Finland	13	FI-1A
Mihăiești-Dealul Varului	ka	Romania	53	RO-1
Mijas	tc	Spain	295	ES-8
Mikaševiči	fd	Belarus	18	BY-1A
Mikolaiv	al	Ukraine	180	UA-1
Mikulovice	fd	Czechia	105	CZ-1
Milićevci	mg	Serbia	82	RS-4
Miličinica	rc	Serbia	51	RS-3
Miljevica	mg	Bosnia H.	44	BH-1
Milldam Mine	ba	United Kingdom	177	UK-4
Millstätteralpe	mg	Austria	8	AT-1
Milly-la-Forêt	qs	France	68	FR-4
Milosavci	wc	Bosnia H.	16	BH-1
Mina David	ol	Spain	28	ES-2
Mina Esmeralda	qz	Spain	14	ES-2
Mina Esther	qs	Spain	76	ES-3
Mina Kopelia-Parres	qz	Spain	50	ES-2
Mina Leymon	qz	Spain	1	ES-2
Mina San Antonio	qz	Spain	57	ES-3
Mina Serrabal	qz	Spain	13	ES-2
Mina Sonia	qz	Spain	29	ES-2
Minqar El-Wahsh	sc	Egypt	4	EG-2
Minshat Al Jazair*	rc	Egypt	87	EG-4
Mira-Barranco de las Tejerias	rc	Spain	233	ES-6
Miriani	rc	Georgia	39	GE-1
Mirkovo	rc	Bulgaria	20	BG-1
Mirosław	qs	Poland	9	PL-1
Mírová	be-ka	Czechia	12	CZ-2
Mirzik	wc	Azerbaijan	18	AZ-1
Mishbeh	ns	Egypt	189	EG-8
Mit Abou Ghaleb*	rc	Egypt	45	EG-3
Mit Al Harun	rc	Egypt	65	EG-3
Mit Bera*	rc	Egypt	68	EG-3
Mit Ghamr	rc	Egypt	62	EG-3
Mit Mohsen*	rc	Egypt	60	EG-3
Mittainville	rc	France	37	FR-4
Mitterndorf	rc	Germany	299	DE-6
Miviña	wc	Spain	192	ES-6E
Mizab-Ain Mimoun	ba	Algeria	68	DZ-1
Mjölkalånga	ka	Sweden	9	SW-2
Mjösund	rc	Finland	64	FI-1F
Mladějov v Čechách	qs	Czechia	58	CZ-1
Mládzovo	ka	Slovakia	83	SK-5
Mlakou	rc	Algeria	43	DZ-2
Mníšek nad Hnilcom	qz	Slovakia	119	SK-7
Močarmany	rc	Slovakia	130	SK-1
Möderau	ka	Germany	207	DE-4
Mogendorf	rc-wc	Germany	152	DE-3E
Moitalina	rc	Portugal	131	PT-7
Mojzesovo	rc	Slovakia	29	SK-1
Mokrá Lúka	rc	Slovakia	110	SK-6
Mokrsko	rc	Poland	114	PL-1
Molino di Caneparola	sc	Italy	288	IT-6N
Molino Falzu	qf	Italy	25	IT-2A
Mollaköy	pe	Türkiye	516	TR-12
Molnári	rc	Hungary	1	HU-1
Molupiai	rc	Lithuania	16	LT-1
Mommenheim	rc	France	29	FR-3
Mon	qz	Sweden	93	SW-4
Mondoñedo	qz	Spain	36	ES-2
Monigrouli	be	Cyprus	20	CY-1
Monserrato	be	Italy	112	IT-2G
Montbron	wc	France	79	FR-4D
Monte Aratro	rc	Italy	188	IT-4J
Monte Arcado	rc	Portugal	75	PT-4
Monte Botto - Monte Castra	qz	Italy	407	IT-8
Monte Bracco	qz	Italy	354	IT-7P
Monte Bram	tc	Italy	350	IT-7
Monte Burilli	fd	Italy	151	IT-3H
Monte Calighe	be	Italy	58	IT-2
Monte Calvo	be	Italy	199	IT-4K
Monte Calvo	mg	Italy	359	IT-7
Monte Camoscio-Baveno	fd	Italy	401	IT-7U
Monte Cimo	be	Italy	447	IT-8
Monte Cuccureddu	fd	Italy	52	IT-2
Monte Cugola	qs	Italy	453	IT-8W
Monte della Guardia	qs	Italy	373	IT-7R
Monte Furros	be	Italy	26	IT-2A
Monte Guarda	be	Italy	458	IT-8W
Monte Idda	be	Italy	108	IT-2
Monte Ladu	be	Italy	11	IT-2A
Monte Madarosa	ka	Italy	456	IT-8W
Monte Mamas	qf-ka	Italy	15	IT-2A
Monte Nurra	ze	Italy	30	IT-2
Monte Oliena	be	Italy	110	IT-2
Monte Ossoni	ze	Italy	3	IT-2
Monte Porceddu	ka	Italy	90	IT-2E
Monte Poto	rc	Italy	170	IT-4
Monte Quercia	sc	Italy	289	IT-6N
Monte Ravenna	be	Italy	111	IT-2
Monte Redondo	ka-qf	Portugal	107	PT-6
Monte Sa Pria	qf	Italy	17	IT-2A
Monte Sparau	pe	Italy	81	IT-2
Monte Stadola - Roteglia	sc	Italy	295	IT-6N
Monte Sughereto-Sasso	ka	Italy	217	IT-5
Monte Tamara	wo	Italy	104	IT-2
Monte Tiloromo	ka	Italy	38	IT-2B
Monte Torretta	qs	Italy	173	IT-4
Monte Zaccon-Marter	fd-ba	Italy	445	IT-8
Monte Zocca	tc	Italy	420	IT-8V
Monteagudo-La Cuesta	qz	Spain	45	ES-2
Montebello della Battaglia	rc	Italy	316	IT-6O
Montebras	fd-li	France	181	FR-6
Montemezzo	wc	Italy	454	IT-8W
Montepagliulo	rc	Italy	165	IT-4
Montes de Torrero	na	Spain	90	ES-3
Montes e Lagares	rc	Portugal	188	PT-10
Montesalgueiro	ka	Spain	23	ES-2
Montfort-en-Chalosse	rc	France	305	FR-9
Montgru-Saint-Hilaire	qs	France	61	FR-4B
Montguichot	fd	France	163	FR-6
Monti Miana - Santa Maria	be	Italy	80	IT-2
Monticello di Fara	wc	Italy	448	IT-8
Montipeneau	rc	France	179	FR-6
Montola-Niittylampi	ka	Finland	40	FI-1D
Montorfano (Toce)	fd	Italy	403	IT-7U
Montorio	qs	Spain	64	ES-3
Montpon	rc	France	259	FR-7
Monyoród	rc	Hungary	71	HU-1
Moorseelsesteenweg	rc	Belgium	5	BE-1
Moosburg	be	Germany	304	DE-6
Mora	rc	Spain	160	ES-5
Mora de Rubielos	sc	Spain	206	ES-6
Moravče	qs	Slovenia	6	SI-1
Moray-Dufftown	ky	United Kingdom	234	UK-5
Moreilles	rc	France	150	FR-5
Morella	sc	Spain	204	ES-6
Moreno-Alberite	rc	Spain	79	ES-3
Moreschi	tc	Italy	306	IT-6
Morghen	fd	Italy	368	IT-7
Moriantsi	ze	Bulgaria	81	BG-5
Moritz	rc-wc	Germany	158	DE-3E
Mormoiron	wc	France	296	FR-8
Morpeth	rc	United Kingdom	221	UK-5
Morrón de Mateo	be-ze	Spain	304	ES-8O
Morscheid	qz	Germany	261	DE-5
Mortesins	rc	Italy	505	IT-8
Mosabaa	ka	Egypt	113	EG-6A

deposit	ore	country	number	map
Mosebjerg	mo	Denmark	2	DK-1
Mossen	wc	Sweden	3	SW-2
Mossgruvan	fd	Sweden	90	SW-4
Mostaganem	qz	Algeria	11	DZ-1
Mostefa Ben Brahim	rc	Algeria	6	DZ-1
Mosteiros	ka-rc	Portugal	146,148	PT-5
Mostówka	qs	Poland	24	PL-1
Mostys'ka	rc	Ukraine	59	UA-4
Motronivka-Annivka	zr	Ukraine	108	UA-6
Motto Grizza-Oleggio	rc	Italy	391	IT-7
Motto Tondo-Maggiora	fd	Italy	399	IT-7T
Motto-Cavallirio	wc	Italy	393	IT-7T
Mouilha	rc	Algeria	24	DZ-2
Moulay Rachid	be	Morocco	33	MA-3
Mount Batur	be-rc	Israel	19-20	IL-2
Mount Gabriel	ba	Ireland	14	IE-1
Mount Ghiona district	bx	Greece	18	GR-2
Mount Gshor	be	Israel	21	IL-2
Mount Ketura	be	Israel	24	IL-2
Mount Koromilia district	bx	Greece	19	GR-2
Mount Lots	be	Israel	18	IL-2
Mount Parnassos district	bx	Greece	17	GR-2
Mouquinho e Cruzeiro	ka	Portugal	45	PT-3
Mouselow quarry	rc	United Kingdom	178	UK-4
Moylisha	li	Ireland	21	IE-1
Mraclin	rc	Croatia	15	HR-1
Mračnice	fd	Czechia	27	CZ-1
M'Sila	rc	Algeria	83	DZ-1
Muckish	qz	Ireland	1	IE-1
Mud di Mezzo	fd	Italy	367	IT-7
Mühlheim-Kärlich	rc	Germany	102	DE-3
Mükremin	rc	Türkiye	314	TR-7Q
Mülheim-Kärlich	be	Germany	103	DE-3
Müller	rc-wc	Germany	155	DE-3E
Mullerod	rc	Germany	316	DE-6
Mullet	rc	Albania	56	AL-2+3
Mundays Hill quarry*	qs	United Kingdom	116	UK-3
Munellë	ze	Albania	80	AL-2
Murdeghina	fd	Italy	84	IT-2
Muriedas	rc	Spain	58	ES-3
Murineddu	qf	Italy	22	IT-2A
Murinski jarak-Gornja Jelenska	be	Croatia	38	HR-1
Muruhatten	tc	Sweden	92	SW-4
Murzuq	ka	Libya	20	LY-1
Murzyntsi-Vatutin	ka	Ukraine	88	UA-5
Musalı	cr	Türkiye	464	TR-11
Muscadroxiu	ba	Italy	86	IT-2
Muttalip*	rc	Türkiye	264	TR-6O
Mutxamel	qs	Spain	247	ES-7
Myjava	rc	Slovakia	16	SK-1
Mykolaïvka	qf	Ukraine	137	UA-7
Myrsjö	qz	Sweden	134	SW-6
M'zila	be	Algeria	12	DZ-1
Mzouda	rc	Morocco	76	MA-1
Načešice	qs	Czechia	84	CZ-1
Naciria	fd	Algeria	36	DZ-2
Nadelbach	rc	Austria	54	AT-3
Nærøydalen	an	Norway	43	NO-4
Naipköy	rc	Türkiye	15	TR-2
Naire/Hostun	ka	France	216	FR-6B
Nal'čik	be	Russia	156	RU-1
Nançay	wc	France	155	FR-6
Nange	rc	Albania	15	AL-2
Naqb El-Sillim	sc	Egypt	137	EG-1
Nasafjell	qz	Norway	19	NO-3
Nasce Água	qs-ka	Portugal	106	PT-6
Nasierowo	rc	Poland	27	PL-1
Naslavcea	ec	Moldova	31	MD-1A
Nassington	rc	United Kingdom	127	UK-4
Nata	be	Cyprus	3	CY-1
Natrup-Hagen	rc	Germany	39	DE-2A
Navas de la Asuncion	rc	Spain	98	ES-3+5
Nävshult	qz	Sweden	45	SW-3
Nawasa Al Bahr*	rc	Egypt	52	EG-3
Nea Potidea	rc	Greece	35	GR-1
Nea Santa	rc	Greece	52	GR-1

deposit	ore	country	number	map
Nederhemert	rc	Netherlands	23	NL-1
Nedre Øyvollen	qz	Norway	14	NO-3
Nedroma	fd	Algeria	1	DZ-1
Nehvizdy	wc	Czechia	60	CZ-1
Neo Chorio	mg	Cyprus	1	CY-1
Neochori, Platanos	be	Greece	84	GR-1
Nepicar Farm quarry	qs	United Kingdom	108	UK-3
Nepomyšl-Maledivy	be-ka	Czechia	21	CZ-2
Nesodden	qz	Norway	45	NO-4
Neuenkirchen	rc	Germany	29	DE-2A
Neuhaus-Schierschnitz	qf	Germany	353	DE-7
Neuhofen an der Krems	rc	Austria	40	AT-2
Neundling	rc	Austria	14	AT-2
Neuötting	rc	Germany	313	DE-6
Neuparadis-Schlatt	rc	Switzerland	25	CH-1
Neuruppersdorf	rc	Austria	68	AT-3
Neuschoo	rc	Germany	10	DE-1
Nevernes	ol	Norway	23	NO-3
Neveronys	rc	Lithuania	19	LT-1
New House Farm quarry	rc	United Kingdom	141	UK-4
Newbridge Pit	wc	United Kingdom	52	UK-2C
Nezhilovo	ba	North Macedonia	8	MK-1
N'Gaous	rc	Algeria	74	DZ-1
N'Goussa	li	Algeria	96	DZ-1
Nīcgales	rc	Latvia	29	LV-1
Niederahr	rc-wc	Germany	142	DE-3E
Niederfladnitz	ka	Austria	63	AT-3
Niederottensheim	rc	Austria	39	AT-2
Niederplanitz	rc	Germany	192	DE-4
Niedźwiada	qs	Poland	163	PL-1
Nietążkowo	rc	Poland	43	PL-1
Nieurlet	rc	France	5	FR-2
Nigrub El-Fogani	ns	Egypt	187	EG-8
Nigrub El-Tahtani	ns	Egypt	186	EG-8
Nikolskoe	be	Russia	91	RU-3
Nikonova Varakka	qz	Russia	37	RU-2
Nilivaara	qz	Sweden	101	SW-4
Nilsiä	qz	Finland	31	FI-1
Ninove	rc	Belgium	18	BE-1
Nitrianske Pravno	rc	Slovakia	34	SK-1
Niyazlar*	cr	Türkiye	359	TR-8
Nizhnee Kotozero	fd	Russia	27	RU-2
Nizhneuvelsk	wc	Russia	133	RU-4
Niziny	rc	Poland	169	PL-4
Nižný Hrabovec	ze	Slovakia	146	SK-9
Njakh	ba	Morocco	97	MA-4
Njeretjakke	cr	Sweden	112	SW-5
Nkob	tc	Morocco	84	MA-1
Nkob	ba	Morocco	85	MA-1
Noaillac	rc	France	271	FR-7
Nobitz	qs	Germany	200	DE-4
Nochten	rc	Germany	247	DE-4
Nor Koghb-Noyemberian	be-ze	Armenia	15	AR-1
Nordhausen	rc	Germany	81	DE-2
Nordre Teigen sør	fd	Norway	56	NO-5
Nordre Våtåstjern	fd	Norway	58	NO-5
Norman-Alseveor	ka	United Kingdom	33	UK-2A
Norr-Darlkarlssjön	qz	Sweden	152	SW-6
Norrskogen Arlanda	li	Sweden	72	SW-4
North Cave quarry	rc	United Kingdom	128	UK-4
North Fayyum	qs	Egypt	73	EG-4
North Park Extension	qs	United Kingdom	110	UK-3
Nossa Senhora da Assunção	fd-li-qz	Portugal	49	PT-3
Nostell quarry	rc	United Kingdom	200	UK-4
Nothamn	fd	Sweden	91	SW-4
Nova	rc	Belgium	32	BE-1B
Nova Karakuba	qs	Ukraine	174	UA-7
Nová Ves u Křižovatky	wc	Czechia	3	CZ-2
Nováčany	fd-ka	Slovakia	135	SK-8
Novaci	fd	Romania	25	RO-1
Novacica	rc	Croatia	18	HR-1
Novi Bečej (Garajevac)	wc	Serbia	14	RS-2
Novi Marof	sw	Croatia	30	HR-1B
Novi Pazar	rc	Serbia	104	RS-5
Novo Orahovo	rc	Serbia	5	RS-2
Novoandriivka	wc	Ukraine	149	UA-7D
Novokraiv	qs	Ukraine	6	UA-2

deposit	ore	country	number	map
Novokubansk	rc	Russia	155	RU-1
Novomirgorod	fd	Ukraine	91	UA-5
Novomoskovsk	rc-wc	Russia	84-85	RU-3
Novooleksandrivka	rc	Ukraine	113	UA-6
Novooleksiivka	fd	Ukraine	98	UA-5
Novoorsk	wc	Russia	143	RU-4
Novopoltavske	sr	Ukraine	128	UA-6
Novorayske	wc	Ukraine	148	UA-7D
Novosedly	rc	Czechia	109	CZ-1
Novoselivska	qs	Ukraine	125	UA-6
Novoselytsya	ka	Ukraine	29	UA-2
Novoselytsya	rc	Ukraine	37	UA-3
Novoukraïnka	fd	Ukraine	96	UA-5
Novovolyns'k	rc	Ukraine	1	UA-2
Nowa Wieś Lęborska	rc	Poland	3	PL-1
Nowe Jaroszowice	wc	Poland	65	PL-2
Nuance Afferden	rc	Netherlands	25	NL-1
Nudersdorf	qs	Germany	215	DE-4
Nuevo Montecastelo	ka	Spain	34	ES-2A
Nukutusvaara	qz	Sweden	19	SW-3
Numancia de la Sagra*	rc	Spain	170-171	ES-5D
Nuova Fontane	tc	Italy	357	IT-7Q
Nuraghe Lorio	fd	Italy	62	IT-2
Nuraghe S'Emis	ka	Italy	36	IT-2B
Nurassolu	wc	Italy	75	IT-2D
Nuribey	rc	Türkiye	301	TR-6
Nusratfakı	rc	Türkiye	16	TR-2
Nussa-Kaipurta	ky	Russia	7	RU-2
Nuweibi	fd-li	Egypt	163	EG-7B
Nybøl	rc	Denmark	25	DK-1
Nyköpingsgruvan	li	Sweden	60	SW-4
Nýrov	qs	Czechia	95	CZ-5
Nytorp	fd	Sweden	89	SW-4
Nyvång-Hyllinge	wc	Sweden	14	SW-2
Óbarok	bx	Hungary	26	HU-1
Oberaching	qs	Austria	12	AT-2
Oberaigen	rc	Austria	101	AT-4
Oberbergkirchen	rc	Germany	312	DE-6
Oberbernbach	rc	Germany	292	DE-6
Oberdorf/Laming	mg	Austria	92	AT-4
Oberdresseldorf	ka	Germany	107	DE-3D
Oberfreundorf	rc	Austria	22	AT-2
Oberlaafeld	rc	Austria	37	AT-2
Obermarkersdorf	qs	Austria	64	AT-3
Oberrudling	qs	Austria	27	AT-2
Obozniva	ka	Ukraine	94	UA-5
Obritzberg - Landhausen	qs	Austria	59	AT-3
Ochkhamuri	wc	Georgia	36	GE-1
Ochtiná	mg	Slovakia	115	SK-6
Ocice	wc	Poland	63	PL-2
Ockrilla	ka	Germany	229	DE-4
Ocnița*	rc	Moldova	28-30	MD-1A
Očová	be-wc	Slovakia	70	SK-1
Ödebyn	qz	Sweden	114	SW-5
Ödek	be	Türkiye	123	TR-3E
Odersberga	wc	Sweden	7	SW-2
Ödingen	ka	Germany	100	DE-3
Ödsmål	fd	Sweden	16	SW-3
Odunpazarı	rc	Türkiye	263	TR-6O
Oeffelt en Panningen	rc	Netherlands	27	NL-1
Offerton quarry	rc	United Kingdom	179	UK-4
Ogradena-Orșova	qz	Romania	33	RO-4
Ograzden-Hamzali	fd	North Macedonia	21	MK-1
Ogrodzieniec	rc	Poland	122	PL-1
Ogulin	rc	Croatia	2	HR-1
Ohaba-Ponor	bx	Romania	28	RO-1
Ohrid-Mladikovine	cr	Bosnia H.	32	BH-1
Okhmyl'k	li	Russia	15	RU-2
Okladnevskoe	wc	Russia	67	RU-3
Okroglica	rc	Slovenia	4	SI-1
Oktemberyanskaya Step	ze	Armenia	4	AR-1
Oktyabr'skoe	wc-qs	Ukraine	154	UA-7D
Old Pound	ka	United Kingdom	17	UK-2A
Oldrzychów	rc	Poland	58	PL-2
Oleksandrivka	rc	Ukraine	102	UA-5
Oleśnica	rc	Poland	185	PL-4

deposit	ore	country	number	map
Oliliq	rc	Kosovo	9	KS-1
Olmedo	bx	Italy	9	IT-2A
Olomouc	rc	Czechia	125	CZ-1
Ølst	ec	Denmark	21	DK-1
Olszanka	rc	Poland	197	PL-4
Oltre Stura	rc	Italy	332	IT-7
Om Tebal	sc	Tunisia	4	TN-1C
Ömer	mg-tc	Türkiye	281	TR-6
Ömerler	fd	Türkiye	379	TR-9
Ömerli	wc	Türkiye	54	TR-2B
Ömerli	wc	Türkiye	83	TR-3
Ömerli	rc	Türkiye	111	TR-3D
Önerler	qs	Türkiye	14	TR-2
Onhaye	qs	Belgium	36	BE-1
Onilsavatn	ol	Norway	29	NO-4
Onostskoe	tc	Belarus	11	BY-1
Ons-en-Bray*	rc	France	49-50	FR-4A
Opalenie	rc	Poland	17	PL-1
Opheusden	rc	Netherlands	16	NL-1B
Opishnia	rc	Ukraine	40	UA-3
Opoka Duża	be	Poland	170	PL-4
Orahovica	rc	Croatia	50	HR-1
Oraşu-Nou	be	Romania	105	RO-1
Őrbottyán	rc	Hungary	31	HU-1
Orchard Farm quarry	rc	United Kingdom	103	UK-3
Orejana	qs	Spain	103	ES-3+5
Örenağıl	ba	Türkiye	551	TR-12Z
Oreské	fd-wc	Slovakia	149	SK-9
Oret	ka-qs	Belgium	26	BE-1
Organi	sr	Greece	71	GR-1
Orhaneli	ns	Türkiye	181	TR-5H
Orhangazi	ol	Türkiye	573	TR-11
Örhen	ka	Türkiye	84	TR-3
Orikhiv	ec-qs	Ukraine	126	UA-6
Oriol-en-Royans	qs	France	223	FR-6B
Örlemiş	pe	Türkiye	226	TR-5
Orleshausen	rc	Germany	180	DE-3
Ormanlı	zr	Türkiye	10	TR-2
Orpethal	rc	Germany	73	DE-2
Orrvik	li	Sweden	119	SW-5
Orta	pe	Türkiye	116	TR-3
Osiecznica	qs	Poland	53	PL-2
Osiek-Grabowiec	rc	Poland	180	PL-4
Osmancık*	rc	Türkiye	106	TR-3
Osmaniye	ka	Türkiye	145	TR-4
Osmanköy	rc	Türkiye	91	TR-3C
Ossenberg	na	Germany	62	DE-2
Øster Hassing	rc	Denmark	13	DK-1
Östergård	fd	Sweden	82	SW-4
Ostra-Alanis	ba	Romania	109	RO-1
Ostrozhanska	be	Belarus	28	BY-1A
Ošve	mg	Bosnia H.	34	BH-1
Otero de Herreros Norte	rc	Spain	138	ES-5C
Otero de los Herreros	ka	Spain	139	ES-5C
Otovice	be-ka	Czechia	15	CZ-2
Otranto	bx	Italy	162	IT-4
Otterbach	rc-wc	Germany	129	DE-3E
Otura-Alhendin	rc	Spain	298	ES-8
Ouahat Sidi Brahim	rc	Morocco	69	MA-1
Ouargla	qz	Algeria	97	DZ-1
Oude Pekela	rc	Netherlands	1	NL-1
Oudenaarde	rc	Belgium	15	BE-1
Oued Akrach	rc	Morocco	55	MA-1
Oued Belif-Nefza	be	Tunisia	5	TN-1C
Oued Laou	rc	Morocco	10	MA-2
Oued Tefal	be	Tunisia	65	TN-1
Oued Zarga	rc	Tunisia	28	TN-1
Oued Zemmour	be	Morocco	30	MA-3
Oued Zitouna	qs	Tunisia	72	TN-1
Ougarta	py	Algeria	101	DZ-1
Oughterard	ba	Ireland	6	IE-1
Oujda	rc	Morocco	35	MA-1
Oulad Ftata	qs	Morocco	51	MA-1
Ouled Khaled	rc	Algeria	8	DZ-1
Ouled Sidi Ali Ben Youssef	rc	Morocco	56	MA-1
Oulja	rc	Morocco	45	MA-1
Oulmès	fd	Morocco	48	MA-1

deposit	ore	country	number	map
Oum Ali*	rc	Algeria	88-90	DZ-1
Oum diab	qs	Tunisia	76	TN-1
Ouni	qs	Tunisia	77	TN-1
Ounild	mo	Denmark	10	DK-1A
Ourika	rc	Morocco	72	MA-1
Outeiro da Ranha	wc	Portugal	116	PT-6
Outeiro dos Mouros	fd	Portugal	29	PT-2
Outovesi	li	Finland	23	FI-1B
Ovapınarı	fd	Türkiye	406	TR-9
Ovcar Banja	qz	Serbia	86	RS-4
Ovcharovo	tc	Bulgaria	64	BG-1
Oymaağaç	fd	Türkiye	247	TR-6
Oymadal	cr	Türkiye	538	TR-12
Ozalj	qs	Croatia	5	HR-1
Özvatan	ns	Türkiye	332	TR-7
Pacanów	rc	Poland	118	PL-1
Packington quarry	rc	United Kingdom	139	UK-4
Paczków	rc	Poland	110	PL-1
Padulazzu	be	Italy	8	IT-2A
Paganico	qs	Italy	245	IT-5
Pagontas	mg	Greece	12	GR-3
Pagórki Wschodnie	fd	Poland	88	PL-2
Pagorki Zachodnie	fd	Poland	89	PL-2
Paia	rc	Portugal	86	PT-3
Paialvo	wc	Portugal	118	PT-6
Pais Gatinhos	rc	Portugal	152	PT-5
Pajiešmeniai	rc	Lithuania	33	LT-1
Pakrac	wc	Croatia	46	HR-1
Paks	rc	Hungary	63	HU-1
Pala Asonis	wc	Italy	66	IT-2D
Palefito	rc	Greece	49	GR-1
Pałęgi-Gościniec	rc	Poland	146	PL-3
Paleohori	ka	Greece	97	GR-4
Palhanec-Vávrovice	qs	Czechia	130	CZ-1
Pálháza	pe	Hungary	43	HU-2
Palombaro	qf	Italy	146	IT-3H
Pamaraziai	rc	Lithuania	25	LT-1
Pambukovica	wc	Serbia	56	RS-3
Pamukyazı*	rc	Türkiye	346	TR-8
Pančevo	rc	Serbia	35	RS-2
Pancota	rc	Romania	58	RO-1
Pankasz	rc	Hungary	5	HU-1
Panningen	rc	Netherlands	30	NL-1
Pano Koutrafas*	rc	Cyprus	39-40	CY-1
Pano Lefkara	rc	Cyprus	24	CY-1
Panorama	wo	Greece	58	GR-1
Pantano Fragneto	ka	Italy	183	IT-4
Pantoja*	rc	Spain	167-169	ES-5D
Papagaios	rc	Portugal	9	PT-2
Pápateszér	rc	Hungary	20	HU-1
Paragachay	ky	Azerbaijan	25	AZ-1
Paralimon	rc	Greece	47	GR-1
Paranesti	fd	Greece	61	GR-1
Paravani Lake	pe	Georgia	20	GE-1
Parcy	qs	France	58	FR-4B
Pardischedda	be	Italy	59	IT-2
Parowa	qs	Poland	52	PL-2
Parrilla-Rio Odiel	qs	Spain	280	ES-8
Parsata	be	Cyprus	23	CY-1
Parszów-Szkleniec	sc	Poland	160	PL-3
Parva	ka	Romania	106	RO-1
Parvova	tc	Romania	36	RO-1
Pašaminės	rc	Lithuania	28	LT-1
Pascalière/Beauregard	ka	France	221	FR-6B
Passo Gallarino	tc	Italy	355	IT-7
Passos	ka	Portugal	1	PT-2
Pasture Road North quarry	rc	United Kingdom	206	UK-4
Paszkowice	sc	Poland	147	PL-3
Patalza	ka	Italy	44	IT-2
Patoka	rc	Poland	116	PL-1
Patsihkvara	ba	Georgia	2	GE-1
Paulnay	wc	France	169	FR-6
Paulovac	rc	Croatia	44	HR-1
Pavé-Beauregard	ka	France	220	FR-6B
Pavie	rc	France	312	FR-9
Pavlovce nad Uhom	qs	Slovakia	152	SK-1
Pavlovychi	rc	Ukraine	2	UA-2
Payas	bx	Türkiye	496	TR-11
Pazarcık	rc	Türkiye	484	TR-11
Pazeraux/Lureuil	wc	France	173	FR-6A
Pčinja	mg	North Macedonia	14	MK-1
Peace Wood quarry	rc	United Kingdom	193	UK-4
Pechgraben	rc	Germany	350	DE-7
Pećinci	rc	Serbia	34	RS-2
Pécsvárad	qf	Hungary	68	HU-1
Pedalj	wc	Croatia	14	HR-1
Pedra da Moura	fd-qz	Portugal	3	PT-2
Pedra de Fogu-Nalvonazzos	be	Italy	10	IT-2A
Pedras Pintas	fd	Portugal	179	PT-8
Pedrixedda	fd	Italy	92	IT-2
Pedru Soddu	qf	Italy	18	IT-2A
Pefkaki	be	Greece	27	GR-1
Pegões Velhos	rc	Portugal	177	PT-8
Pehčevo	rc	North Macedonia	22	MK-1
Pehmytkivi	tc	Finland	37	FI-1C
Peißen	rc	Germany	5	DE-1
Pejë	rc	Kosovo	2	KS-1
Pelléd	rc	Hungary	70	HU-1
Pena Maquieira	tc	Portugal	35	PT-2
Peñaflor	ka	Spain	46	ES-2
Peñalén	ka-qz-fd	Spain	177	ES-6F
Penhale	ka	United Kingdom	27	UK-2A
Penk	qs	Austria	82	AT-4
Penouta	ka	Spain	2	ES-2
Pentakomon	be	Cyprus	22	CY-1
Pentalofos	ze	Greece	67	GR-1
Pente	rc	Germany	33	DE-2C
Pentlhof	rc	Germany	324	DE-7
Pepino-Talavera de la Reina	rc	Spain	157	ES-5
Pera Chorio	rc	Cyprus	31	CY-1
Perchatka	qz	Russia	23	RU-2
Pereulok Krasnopereval'skiy	rc	Russia	71	RU-3
Perha	fd	Ukraine	17	UA-2
Perheniemi	wo	Finland	59	FI-1
Perlat Qendër	rc	Albania	32	AL-2
Pernighera-Lentrée	fd	Italy	409	IT-8
Perstorp	fd	Sweden	56	SW-3
Pertek (Akdoğmuş)	be	Türkiye	137	TR-4F
Pertusa & San Giovanni	qf	Italy	27	IT-2A
Péruwelz	rc	Belgium	14	BE-1
Pervozvanivka	wc	Ukraine	92	UA-5
Pestarenga	fd	Portugal	51	PT-3
Petacciato Scalo	rc	Italy	202	IT-4
Petershagen	rc	Germany	47	DE-2
Petersminde	rc	Denmark	23	DK-1
Petit-Mesnil	rc	France	95	FR-4
Petroşani	wc	Romania	27	RO-1
Petrota	ze	Greece	66	GR-1
Petrushino	rc	Russia	59	RU-3
Petschmorgen	rc-wc	Germany	146	DE-3E
Peuerbach/Bruck	rc	Austria	20	AT-2
Pezinok	rc	Slovakia	13	SK-1
Pfaffwil-Gisikon	rc	Switzerland	20	CH-1
Pfeul	rc-wc	Germany	141	DE-3E
Pian dell'Organo	sr	Italy	220	IT-5
Pian di Trobas	rc	Italy	6	IT-2
Piana della Battaglia	wc	Italy	186	IT-4
Piandirena	ze	Italy	226	IT-5
Pianella	sc	Italy	292	IT-6N
Piano Tavola	rc	Italy	134	IT-3
Pianu Mannu	qf	Italy	24	IT-2A
Piaro	fd	Italy	366	IT-7
Pias-Barrancos	rc	Portugal	189	PT-10
Piaseczno	qs	Poland	179	PL-4
Piaskowice	ec	Poland	34	PL-1
Piaskownica-Zajączków	qs	Poland	136	PL-3
Piatra Roşie	qz	Romania	5	RO-2
Piatykhatky	wc	Ukraine	107	UA-6
Pidvysoke	rc	Ukraine	3	UA-2
Piedras Albas	li	Spain	150	ES-5
Pieńkowo	rc	Poland	5	PL-1
Pienza	rc	Italy	242	IT-5
Pieterlen	rc	Switzerland	10	CH-1
Pihlajavaara	tc	Finland	9	FI-1
Pikalevo	al	Russia	63	RU-3
Pikalevo	sa	Russia	64	RU-3
Pīlādži	qs	Latvia	1	LV-1
Pilicapu	fd	Italy	68	IT-2D
Piloni (Torniella)	ka-fd	Italy	247	IT-5
Pilviškiai	rc	Lithuania	15	LT-1
Piminoro	fd	Italy	142	IT-3
Pınarbaşı	rc	Türkiye	80	TR-3
Pınarbaşı*	cr	Türkiye	333	TR-7
Pinarejos	ka-qz-fc	Spain	219	ES-6I
Pindos	ol	Greece	22	GR-1
Pindushy	tc	Russia	45	RU-2
Pinhal da Guarita	wc	Portugal	68	PT-4
Pinheirinhos	wc	Portugal	123	PT-5
Pinilla de Fermoselle	fd-li	Spain	127	ES-5
Pinsent	wc	United Kingdom	45	UK-2C
Pintixedda	qs	Italy	122	IT-2G
Pintixedda-Canali Trottu	qs	Italy	123	IT-2G
Pirgi	sr	Greece	59	GR-1
Pîrlița	rc	Moldova	19	MD-1
Pırnakapan	mg	Türkiye	505	TR-12X
Pirtyma	fd	Russia	36	RU-2
Pisca	rc	Portugal	94	PT-3
Pischina Niedda	qf	Italy	23	IT-2A
Piscolo	rc	Italy	436	IT-8
Pishkote	rc	Kosovo	4	KS-1
Piškanja-Jarandol	bo	Serbia	98	RS-5
Pistorf	rc	Austria	106	AT-4
Pitzu Rubiu*	wc	Italy	70-71	IT-2D
Piusa	qs	Estonia	11	EE-1
Pivdenno-Oktiabrsk	wc-qs	Ukraine	155	UA-7D
Pivnichne	wc	Ukraine	145	UA-7
Pizzo Corvo	be	Italy	132	IT-3
Plakali	ba	Montenegro	3	ME-1
Plančí	rc	Latvia	30	LV-1
Plani-Arslanovina	ba	Montenegro	1	ME-1
Platakiai	rc	Lithuania	5	LT-1
Plattling	rc	Germany	319	DE-6
Plavisevita	cr	Romania	32	RO-4
Plavynyšče	rc	Ukraine	35	UA-3
Pleiße	rc	Germany	194	DE-4
Plesná-Velký Luh	ka	Czechia	4	CZ-2
Pllakmena	cr	Albania	13	AL-2
Poberđe	bo	Serbia	103	RS-5
Podbořany	ka	Czechia	22	CZ-2
Podbrdo	qz	Bosnia H.	11	BH-1
Podere Bechi	sc	Italy	228	IT-5
Podere Le Pescine	ka	Italy	246	IT-5
Podgumer	qs	Bulgaria	16	BG-1
Podlesí	be-ka	Czechia	16	CZ-2
Podrečany*	mg-wc	Slovakia	95-96	SK-5
Podujevë	rc	Kosovo	11	KS-1
Poggio Cammello	rc	Italy	236	IT-5
Poggio Mezzature	sc	Italy	284	IT-6
Poggio Nardeci	ns	Italy	224	IT-5
Poggio San Luce	ka	Italy	223	IT-5
Poggio Speranzona	qz	Italy	248	IT-5
Pogolewo Male	rc	Poland	81	PL-2
Poigny-Beaujard	wc	France	77	FR-4D
Pointigny	rc	France	98	FR-4
Poivre	rc	France	88	FR-4
Pojana Mare-Strijare	ka	Serbia	37	RS-1
Pojskë	cr	Albania	59	AL-3
Pokotylivka	qs	Ukraine	44	UA-3
Pokrov	qf	Russia	76	RU-3
Pokrovs'k	wc	Ukraine	163	UA-7
Polanka nad Odrou	qs	Czechia	129	CZ-1
Poletaevo	ka	Russia	127	RU-4
Poley	rc	Germany	233	DE-4
Polhovica-Prapreče	qs	Slovenia	17	SI-1
Poliegos	ze	Greece	89	GR-4
Poligiros	mg	Greece	37	GR-1
Poljanci	bx	Bosnia H.	54	BH-1A
Poljanska-Mount Papuk	ze	Croatia	59	HR-1
Poljave	wc	Bosnia H.	36	BH-1
Pollastra	fd-qz	Italy	152	IT-3H
Polmostundra	li	Russia	14	RU-2
Polohy*	ka-qs-wc	Ukraine	129-130	UA-6
Polokhov	li	Ukraine	97	UA-5
Polom	rc	Czechia	128	CZ-1
Polonne-Baranivka	fd	Ukraine	15	UA-2A
Polsenz	rc	Austria	26	AT-2
Poltár-Dráhy	rc	Slovakia	76	SK-5
Poltavka	wc	Ukraine	160	UA-7D
Pondelok	ka-wc	Slovakia	75	SK-5
Pondelok-Suchà	rc	Slovakia	74	SK-5
Pont Sigoulant	rc	France	231	FR-7A
Ponte Ficocchia	qs	Italy	177	IT-4
Pontenaia	rc	Italy	234	IT-5
Pontgaudron	rc	France	180	FR-6
Popasnyanska	wc	Ukraine	139	UA-7
Popiv Yar	wc	Ukraine	161	UA-7D
Popovo	rc	Bulgaria	33	BG-1
Pórszombat	rc	Hungary	4	HU-1
Portela	qz-fd	Portugal	25	PT-2
Portelas	rc	Portugal	93	PT-3
Portomé	wc	Spain	187	ES-6E
Portovesme	al	Italy	113	IT-2G
Portworthy Dams	ka	United Kingdom	39	UK-2B
Poruba	wc	Slovakia	33	SK-1
Posądza	sr	Poland	130	PL-1
Possens	rc	Switzerland	2	CH-1
Postenje	rc	Serbia	102	RS-5
Poštorná	be-wc	Czechia	120	CZ-1
Posušje	bx	Bosnia H.	46	BH-1
Potira	be	Cyprus	18	CY-1
Potkovac-Rajišići	ba	Montenegro	2	ME-1
Pottelberg	rc	Belgium	16	BE-1
Pottenbrunn	rc	Austria	55	AT-3
Povenchanka	tc	Russia	46	RU-2
Pöverding	qs	Austria	50	AT-3
Povington Heath	wc	United Kingdom	67	UK-2E
Pozdišovce	wc	Slovakia	151	SK-9
Pozo del Salto	qs	Spain	193	ES-6E
Pozzani	wc	Italy	485	IT-8W
Pozzerle	qz	Italy	487	IT-8W
Pozzolo	be	Italy	451	IT-8
Pra Mosin	tc	Italy	412	IT-8V
Prača	ba	Bosnia H.	49	BH-1
Prado	tc	Portugal	38	PT-2
Prado-Calatayud	qs	Spain	88	ES-3
Pragersko	rc	Slovenia	23	SI-1
Prambachkirchen	qs	Austria	25	AT-2
Pranjani	mg	Serbia	85	RS-4
Prassa	be-ze	Greece	86	GR-4
Pravdinske	mg-tc	Ukraine	115	UA-6
Predas Biancas	tc	Italy	48	IT-2
Prefingkogel	bx	Austria	84	AT-4
Preggraben	mg	Austria	96	AT-4
Près-de-Peyrac	rc	France	233	FR-7A
Preseľany	rc	Slovakia	20	SK-1
Prievidza	rc	Slovakia	36	SK-1
Prilepec	ky	North Macedonia	7	MK-1
Priopcea	qz	Romania	4	RO-2
Pripek	fd	Bulgaria	87	BG-1
Prodănești	be	Moldova	20	MD-1
Profen	ka	Germany	202	DE-4
Profitis Elias	qz	Greece	109	GR-1
Progress	rc	Latvia	13	LV-1
Progun	be	North Macedonia	15	MK-1
Proisy	rc	France	18	FR-2
Propast-Dobrovoletz	be	Bulgaria	82	BG-5
Prosek	rc	Albania	31	AL-2
Prosiana	ka	Ukraine	116	UA-6
Proszowa-Kwieciszowice	fd	Poland	68	PL-2
Provatas	pe	Greece	100	GR-4
Providencia	be	Morocco	27	MA-3
Provodín	qs	Czechia	54	CZ-3
Prrenjas	be	Albania	63	AL-3
Przecław-Podlesie	rc	Poland	189	PL-4
Przysieka	rc	Poland	12	PL-1
Psathi	pe	Greece	88	GR-4
Psunj	tc	Croatia	47	HR-1

deposit	ore	country	number	map
Puceul	rc	France	127	FR-5
Puckley quarry	rc	United Kingdom	98	UK-3
Puebla de Lillo	tc	Spain	51	ES-2
Puentes de Garcia Rodríguez	fd	Spain	27	ES-2
Puerta del Monte	qs	Spain	96	ES-3+5
Puğkaracadağ	qz	Türkiye	465	TR-11
Pukanec	wc	Slovakia	31	SK-1
Pukis	rc	Bosnia H.	67	BH-1
Pukiš	wc	Bosnia H.	68	BH-1
Pullagh	rc	Ireland	27	IE-1
Punasuo	tc	Finland	17	FI-1A
Punta Pepixedda	ba	Italy	109	IT-2
Punta Salamura	ka	Italy	43	IT-2
Punta Su Corongiu	wc	Italy	77	IT-2D
Puntal de Ramos	ka-qz	Spain	216	ES-6
Puolivälinkalliot-Tervasmäki	li	Finland	47	FI-1E
Purnu-Puolalaki	ol	Sweden	115	SW-5
Pusté Čemerné	ze	Slovakia	148	SK-9
Puttenhausen	rc	Germany	302	DE-6
Puttu Sassu	be	Italy	41	IT-2B
Puyloubier	rc	France	301	FR-8
Pye	rc	Germany	37	DE-2C
Pysochnyy	qs	Ukraine	165	UA-7
Q'a Al Azraq	be	Jordan	8	JO-1
Qa'a El Disi	ka-qs	Jordan	20	JO-1
Qabilat Salimah*	qs	Libya	22-23	LY-1A
Qaimaqli	be	Azerbaijan	1	AZ-1
Qalamshah	be	Egypt	90	EG-4
Qarabulaq	wc	Azerbaijan	19	AZ-1
Qaradag	rc	Azerbaijan	38	AZ-1
Qasr El Sagha	be-sc	Egypt	74	EG-4
Qender	rc	Albania	71	AL-3
Qobu	rc	Azerbaijan	37	AZ-1B
Quba	qs	Azerbaijan	29	AZ-1
Quedlinburg	qs	Germany	80	DE-2
Queiriga	fd-li	Portugal	48	PT-3
Quelhas das Borralhas	ka	Portugal	15	PT-2
Querenberg I-III	rc	Germany	28	DE-2B
Querenstede	rc	Germany	14	DE-1
Quérigut	fd	France	330	FR-9B
Quinta da Antónia	ka	Portugal	11	PT-2
Quinta da Bogalheira*	rc	Portugal	162-165	PT-9
Quinta do Covo	ka	Portugal	46	PT-3
Quinta dos Netos	ka	Portugal	100	PT-5
Quintanilla	qs	Spain	56	ES-3
Quintas de Mala	ka	Portugal	89	PT-3
Quinto	rc	Spain	89	ES-3
Quittière-Le Marronnier	wc	France	254	FR-7B
Rabenberg	rc	Austria	18	AT-2
Rabensburg	qs	Austria	69	AT-3
Rabenwald	tc	Austria	112	AT-4
Rådanefors	qz	Sweden	38	SW-3
Radeburg	ka	Germany	230	DE-4
Radelfingen	rc	Switzerland	6	CH-1
Radlach	rc	Austria	35	AT-2
Radoshkovichi	rc	Belarus	4	BY-1
Radostów Dolny	rc	Poland	60	PL-2
Radymno	rc	Poland	203	PL-4
Raelingen	ec	Norway	47	NO-4
Rafz	rc	Switzerland	23	CH-1
Raiding	rc	Austria	116	AT-4
Rainberg	qs	Austria	49	AT-3
Rakas	mg	Sweden	144	SW-6
Rakovac	wc	Bosnia H.	58	BH-1A
Rakovac	fd	Serbia	23	RS-2
Rakovica	rc	Bosnia H.	28	BH-1
Rakszawa-Pikor	rc	Poland	193	PL-4
Ralitsa	be	Bulgaria	85	BG-1
Rallaki	ka	Greece	106	GR-4
Ramalhal*	rc	Portugal	168-170	PT-9
Rambla del Corzo	ka-qz-fd	Spain	239	ES-6H
Ramnava	wc	Serbia	52	RS-3
Ramnicu Valcea	na	Romania	19	RO-1
Ramon*	wc-ka-rc	Israel	15-17	IL-2
Rapasaaret	li	Finland	25	FI-1B

deposit	ore	country	number	map
Rapperswil	rc	Switzerland	9	CH-1
Ras Al-Baroud	fd	Egypt	142	EG-7
Ras An-Naqab	qs	Jordan	18	JO-1
Ras el-Metn	qs	Lebanon	22	LE-1
Ras Ghareb	fd	Egypt	129	EG-6
Ras Kammouna	ba	Morocco	103	MA-4
Ras Tunat	fd	Libya	30	LY-1A
Ras Umm Sid	fd	Egypt	126	EG-6
Râșca-Muntele Rece	fd	Romania	78	RO-1
Rascoia	rc	Portugal	105	PT-5
Raseiniai	rc	Lithuania	13	LT-1
Rashaya	rc	Lebanon	19	LE-1
Rashtani	rc	North Macedonia	11	MK-1
Rašnava	rc	Lithuania	22	LT-1
Raso (Lugar da Quinta)	rc	Portugal	58	PT-3
Rasva	qs	Estonia	7	EE-1
Ratcher Hill	qs	United Kingdom	172	UK-4
Ratiš-Lipje	rc	Bosnia H.	38	BH-1
Rátka	ze	Hungary	47	HU-2
Ratkovac	rc	Bosnia H.	18	BH-1
Raudberget*	an-tc	Norway	39-40	NO-4
Raudbergvik	ol	Norway	30	NO-4
Raudfjellet	tc	Norway	26	NO-3
Rauischholzhausen	qs	Germany	178	DE-3
Raunheim	qs	Germany	254	DE-5
Ravenhead quarry	rc	United Kingdom	183	UK-4
Ravna Reka	fd	North Macedonia	24	MK-1
Ravno	qs	Slovenia	18	SI-1
Razdelna	rc	Bulgaria	52	BG-1
Razhana-Srezojevci	mg	Serbia	83	RS-4
Răzoare	be	Romania	101	RO-1
Reach Lane quarry*	qs	United Kingdom	117	UK-3
Real	fd	Portugal	55	PT-3
Recea	rc	Romania	97	RO-1
Rečica	rc	Croatia	6	HR-1
Red Barns quarry	rc	United Kingdom	220	UK-5
Redhurst quarry	rc	United Kingdom	144	UK-4
Reet	rc	Belgium	24	BE-1
Reetz	rc	Germany	210	DE-4
Reft-Zolotoruda	wc	Russia	113	RU-4
Regione Magenta	rc	Italy	325	IT-6O
Regione Molino	rc	Italy	333	IT-7
Rehhag	rc	Switzerland	7	CH-1
Reinfjorden	ol	Norway	11	NO-2
Reitherkogl	ba	Austria	3	AT-1
Relvão	rc	Portugal	57	PT-3
Relvinha	rc	Portugal	134	PT-7
Remchi*	rc	Algeria	2	DZ-1
Remeți	bx	Romania	83	RO-6
Remeți	wc	Romania	84	RO-6
Remo-Kalkkimäki	wo	Finland	62	FI-1
Remolinos	na	Spain	92	ES-3
Remsfeld	rc	Germany	94	DE-2
Renardières/Tournon-St-Martin	wc	France	174	FR-6A
Renc	rc	Albania	18	AL-2
Rengetsweiler	qs	Germany	280	DE-1
Řepov	rc	Czechia	59	CZ-1
Repovaara	tc	Finland	38	FI-1C
Requena	rc	Spain	232	ES-6
Rettigheim	rc	Germany	273	DE-5
Reutuaapa	qz	Finland	4	FI-1
Revai	rc	Lithuania	24	LT-1
Revigny-sur-Ornain	rc	France	90	FR-4
Revilla	rc	Spain	59	ES-3
Revúčka	fd	Slovakia	109	SK-6
Reynaux/Beauregard	ka	France	222	FR-6B
Rezip	rc	Türkiye	529	TR-12
Rgotina	qs	Serbia	79	RS-1
Riadh	rc	Tunisia	62	TN-1
Rianxo	ka	Spain	10	ES-2
Ribeira do Grou*	rc	Portugal	137-138	PT-7
Ribnica-Liska	mg	Serbia	92	RS-4
Ribnjak	rc	Croatia	34	HR-1
Richard	rc-wc	Germany	132	DE-3E
Richemont	li	France	225	FR-7
Ried	rc	Germany	295	DE-6
Riedlingsdorf-Pinkafeld	rc	Austria	113	AT-4

deposit	ore	country	number	map
Riemsloh	rc	Germany	41	DE-2A
Rietz	qs	Germany	213	DE-4
Rieussequel	rc	France	324	FR-9
Rijkevorsel	rc	Belgium	30	BE-1B
Ringslade Pit	wc	United Kingdom	44	UK-2C
Rio Bau Nurri	be	Italy	79	IT-2D
Rio Belasio	rc	Italy	438	IT-8
Rio Escuriza	wc	Spain	189	ES-6E
Rio Palmas–Nuraghe Panicasu	be	Italy	107	IT-2
Río Pirón	fd-qf	Spain	99	ES-3+5
Riola	sc	Italy	297	IT-6N
Riolo (Valle dei Mercanti)	ka	Italy	478	IT-8W
Riomoros	qs	Spain	136	ES-5C
Rioni	wc	Georgia	11	GE-1
Ripa Bianca	rc	Italy	269	IT-6
Ripa o Mucchi	qs-wc	Italy	203	IT-5M
Ripatetta	rc	Italy	189	IT-4J
Ripky	qs	Ukraine	32	UA-2
Riscani	rc	Moldova	23	MD-1
Riserva Muraccio	ns	Italy	221	IT-5
Risili	rc	Albania	70	AL-3
Ristimaa	qz	Finland	5	FI-1
Ritzing-Lackendorf	qs	Austria	122	AT-4
Ritzing-Zauberberg	qs	Austria	123	AT-4
Riu Badu de Ludu	ka	Italy	40	IT-2B
Rivo Freddo	fd-ka	Italy	352	IT-7P
Rixey Park	wc	United Kingdom	56	UK-2C
Rixton quarry	rc	United Kingdom	180	UK-4
Röblingen	ka	Germany	205	DE-4
Rocadas	rc	Portugal	130	PT-5
Rocca Ruja	be-ka	Italy	13	IT-2A
Roche-en-Régnier	ns	France	213	FR-6
Rocks-Kerrow Moor	ka	United Kingdom	34	UK-2A
Rod Umm El-Farag	tc	Egypt	167	EG-7B
Rodgau	qs	Germany	252	DE-5
Rodoretto	tc	Italy	358	IT-7Q
Röfjällsgruvan	cr	Sweden	107	SW-5
Roggwil	rc	Switzerland	14	CH-1
Rogoźnica	fd	Poland	102	PL-2
Rojów	rc	Poland	37	PL-1
Rokle	ka	Czechia	20	CZ-2
Rokle u Kadaně	be	Czechia	19	CZ-2
Romănești	ba	Romania	54	RO-1
Rombly	rc	France	7	FR-2
Romont	qs	Belgium	50	BE-1A
Roncobotto	sc	Italy	282	IT-6
Rønne	ka	Denmark	32	DK-1B
Rosendal	fd-li-qz	Finland	70	FI-1F
Roșia Montană	fd	Romania	63	RO-1
Rosignano Marittimo	sa	Italy	255	IT-5
Roßbach	ka	Germany	203	DE-4
Rostowrack	ka	United Kingdom	11	UK-2A
Rothbach	qs	France	20	FR-3
Rougé	ka	France	122	FR-5
Roumazières	rc	France	232	FR-7A
Roupidière	fd	France	336	FR-9B
Roussa	wc	Portugal	109	PT-6
Roussa de Cima	wc	Portugal	110	PT-6
Route Nabeul-Hammamet	rc	Tunisia	22	TN-1B
Rovinji	bx	Croatia	1	HR-1
Rovné	mg	Slovakia	108	SK-6
Roza Lampi	fd	Russia	40	RU-2
Różana	wc	Poland	98	PL-2
Rozet-Saint-Albin	qs	France	59	FR-4B
Rožupes	rc	Latvia	28	LV-1
Rozwady	sc	Poland	148	PL-3
Rragam	cr	Albania	3	AL-2
Rubbiano	ec	Italy	305	IT-6
Rübeland	rc	Germany	79	DE-2
Rubì	rc	Spain	120	ES-4
Rubián	mg	Spain	38	ES-2
Rubikiai	rc	Lithuania	31	LT-1
Ruda-Kamionka	ec	Poland	190	PL-4
Rudice-Seč	qs	Czechia	102	CZ-5
Rudka-Kunštát	qs	Czechia	96	CZ-5
Rudmyanskoye	wo	Belarus	9	BY-1
Rudňany	ba	Slovakia	125	SK-7

deposit	ore	country	number	map
Rudník*	fd-ka	Slovakia	136-137	SK-8
Rudovci	wc	Serbia	62	RS-3
Rujište	rc	Serbia	95	RS-1
Ruma	rc	Serbia	31	RS-2
Runcului	wc	Romania	90	RO-6
Ruopsok	ol	Sweden	153	SW-6
Ruoutevare	fd	Sweden	32	SW-3
Ruppach-Glückauf	rc-wc	Germany	140	DE-3E
Ruppreschtsreuth	ka-qz	Germany	343	DE-7
Ruprechtov	be-ka	Czechia	17	CZ-2
Rushacre Farm Quarry	rc	United Kingdom	76	UK-2
Rusinów	wc	Poland	155	PL-3
Rusko-Jaroszów	wc	Poland	97	PL-2
Ružomberok	rc	Slovakia	66	SK-1
Ryah*	rc	Morocco	52-53	MA-1
Ryazan	rc	Russia	82	RU-3
Rybova Lhota	be	Czechia	66	CZ-4
Rynholec-Hořkovec	wc	Czechia	38	CZ-1
Rytwiany	rc	Poland	181	PL-4
S. Gens	rc	Portugal	7	PT-2
S. Munkeby	fd	Sweden	66	SW-4
S`Aliderru	be	Italy	7	IT-2
S`Allumini	ka	Italy	89	IT-2E
S`Arramanargiu (Ortuabis)	wc	Italy	63	IT-2D
Sa Contra	ze	Italy	2	IT-2
Sa Costa	fd	Italy	49	IT-2
Sa Guardia Iada-Bruncu Arrubiu	rc	Italy	102	IT-2
Sa Matta	tc	Italy	50	IT-2
Sa Pigada Bianca	be	Italy	12	IT-2A
Sa Spinarba	qs	Italy	118	IT-2G
Saalburg	rc	Germany	173	DE-3
Saarenkylä	li	Finland	51	FI-1
Saasa	rc	Germany	197	DE-4
Šaca	wc	Slovakia	139	SK-8
Saçaklı*	cr	Türkiye	204	TR-5I
Sadisdorf	li	Germany	225	DE-4
Safaalan	qs	Türkiye	8	TR-2
Sagarejo	rc	Georgia	28	GE-1
Saghro	ns	Morocco	91	MA-1
Sağlık	ka	Türkiye	446	TR-10
Sagnity	rc	Poland	19	PL-1
Sahilköy*	wc-qs	Türkiye	36-42	TR-2B
Şahin	wc	Türkiye	216	TR-5
Sahrajt Al Kubra*	rc	Egypt	64	EG-3
Saida	rc	Algeria	7	DZ-1
Saint-Adjutory	rc	France	237	FR-7A
Saint-André-de-la-Marche	rc	France	135	FR-5B
Saint-Ange-le-Viel	qs	France	73	FR-4
Saint-Arnac	fd	France	338	FR-9B
Saint-Astier	rc	France	272	FR-7
Saint-Aubin-des-Châteaux	rc	France	123	FR-5
Saint-Barthélemy-de-B.de	rc	France	258	FR-7
Saint-Cyr-des-Gâts*	rc	France	145-147	FR-5C
Saint-Estèphe	rc	France	242	FR-7
Saint-Étienne-sur-Reyssouze	rc	France	190	FR-6
Saint-Flour	rc	France	208	FR-6
Saint-Genou	qs	France	168	FR-6
Saint-Geours-d'Auribat-Arbagea	rc	France	307	FR-9
Saint-Geours-d'Auribat-Lauga	rc	France	306	FR-9
Saint-Germain-Laprade	rc	France	210	FR-6
Saint-Germer-de-Fly	rc	France	44	FR-4A
Saint-Hippolyte-de-Montaigu*	rc	France	285-286	FR-8
Saint-Jean-de-Côle	qs	France	240	FR-7
Saint-Jean-d'Illac	qs	France	262	FR-7
Saint-Jean-Pla-de-Corts	rc	France	339	FR-9
Saint-Laurent-des-Hommes	rc	France	260	FR-7
Saint-Laurent-en-Royans	qs	France	215	FR-6B
Saint-Loup de Naud	wc	France	74	FR-4D
Saint-Martin-des-Fontaines	rc	France	148	FR-5C
Saint-Palais	rc	France	156	FR-6
Saint-Papoule	rc	France	321	FR-9
Saint-Paulien*	ka-be	France	211-212	FR-6
Saint-Pierre-de-Chandieu	rc	France	198	FR-6
Saint-Rémy-en-Mauges	rc	France	128	FR-5B
Saint-Trivier-de-Courtes	rc	France	189	FR-6
Šajdíkove Humence*	qs	Slovakia	8,11	SK-2

deposit	ore	country	number	map
Šajdíkove Humence-Borský*	qs	Slovakia	7,9	SK-2
Sajobábony	be	Hungary	40	HU-1
Sakarcaören	rc	Türkiye	117	TR-3
Sakintepe	rc	Türkiye	265	TR-6O
Saksahan	wc	Ukraine	104	UA-6
Sakule	rc	Serbia	27	RS-2
Salar*	rc	Türkiye	89	TR-3C
Salas	ka	Spain	44	ES-2
Salavila*	qz	Spain	144-145	ES-5
Salda Lake	mg	Türkiye	358	TR-8
Salgueiral	fd	Portugal	56	PT-3
Sallanlatva	ba	Russia	24	RU-2
Salle	be	France	273	FR-7
Sälpä	fd-qz	Finland	66	FI-1F
Salselas	tc	Portugal	37	PT-2
Saltfjell	ky	Norway	71	NO-3
Šaltiškiai	rc	Lithuania	4	LT-1
Salur	cr	Türkiye	307	TR-7
Salvaterra del Miño	rc	Spain	6	ES-2
Salvezines	fd	France	332	FR-9B
Salz	rc-wc	Germany	127	DE-3E
Salzburgerwald	rc	Austria	102	AT-4
Salzmünde	ka	Germany	206	DE-4
Samnu	ka	Libya	13	LY-1
Sampedro-Lardero	rc	Spain	78	ES-3
Sampor	wc	Slovakia	69	SK-1
San Al-Hajar*	rc	Egypt	30	EG-3
San Cibrao	al	Spain	31	ES-2A
San Cibrao	ka	Spain	32	ES-2A
San Francesco	tc	Italy	51	IT-2
San Giovanni Rotondo	bx	Italy	194	IT-4
San Giuseppe	rc	Italy	241	IT-5
San Grato	rc	Italy	344	IT-7
San Grato	fd	Italy	394	IT-7T
San Juan de Morò	sc	Spain	208	ES-6G
San Leonardo - Pievequinta	rc	Italy	271	IT-6
San Leone	wo	Italy	103	IT-2
San Lorenzo	be	Italy	4	IT-2
San Marco	rc	Italy	469	IT-8W
San Martín de Montalbán	ka	Spain	158	ES-5
San Martino	rc	Italy	212	IT-5
San Michele al Fiume	rc	Italy	267	IT-5
San Nicolò	fd	Italy	87	IT-2
San Pedro	qs	Spain	86	ES-3
San Piero in Campo	li	Italy	251	IT-5L
San Quirico	rc	Italy	330	IT-6
San Rocco	fd	Italy	374	IT-7R
San Rocco (Crino di Serra)	fd	Italy	250	IT-5L
San Salvatore	qf	Italy	28	IT-2A
San Simplicio	fd	Italy	33	IT-2
Sanchonuño	qs	Spain	100	ES-3+5
Sandelzhausen	be	Germany	303	DE-6
Sandominic	ka	Romania	113	RO-1
Sandown quarry	rc	United Kingdom	148	UK-4
Săndulești	be	Romania	70	RO-1
Sandy Lane Farm quarry	qs	United Kingdom	164	UK-4
Sangas-Saibro	fd	Portugal	80	PT-3
Sanoano	rc	Portugal	31	PT-2
Sant Pau	qs	Spain	205	ES-6
Sant Pere de Ribes	qs	Spain	117	ES-4B
Sant`Angelo di Olzai	fd	Italy	53	IT-2
Santa Ana	qz	Spain	84	ES-3+5
Santa Brà	be	Italy	106	IT-2
Santa Caterina	fd	Italy	157	IT-3
Santa Caterina I	ka	Italy	484	IT-8W
Santa Cruz de Mudela*	rc	Spain	259-262	ES-8M
Santa Eugenia de Berga	rc	Spain	121	ES-4
Santa Eulalia	rc	Spain	255	ES-7
Santa Maria	fd	Italy	439	IT-8
Santa Marinha	rc	Portugal	6	PT-2
Santa Marta-Belorado	na	Spain	67	ES-3
Santa Quiteria-Zuera	qs	Spain	91	ES-3
Santa Reparata	fd	Italy	32	IT-2
Sant'Antonio	rc	Italy	322	IT-6O
Sant'Apollonia	fd	Italy	434	IT-8
Sântimbru	rc	Romania	64	RO-1
Santolea	wc	Spain	202	ES-6E
Sant'Urbano	be	Italy	455	IT-8W
Sanxenxo	rc	Spain	7	ES-2
São Matias	fd-qz	Portugal	181	PT-10
São Teotónio	rc	Portugal	183	PT-10
Şapçı-Arpatarla	ka	Türkiye	223	TR-5K
Sapes	be	Greece	72	GR-1
Şaphane	ka	Türkiye	241	TR-5L
Saranovski	cr	Russia	111	RU-4
Saratov	rc	Russia	96	RU-1
Saratovka	rc	Russia	140	RU-4
Sarayönü	rc	Türkiye	438	TR-10
Sarıalan	mg	Türkiye	114	TR-3D
Sarıbeyli-Sığırlı	ka	Türkiye	162	TR-5
Sarigyukh	be	Armenia	14	AR-1
Sarıhacılı-Kayabağı	fd	Türkiye	309	TR-7Q
Sarıkaya*	fd	Türkiye	416-419	TR-9
Sarıkaya-Sorgun	qz	Türkiye	315	TR-7
Sarıkısık*	fd	Türkiye	411-412	TR-9
Sarıkum	qs	Türkiye	86	TR-3
Sariokuz	be	Türkiye	274	TR-6O
Sárisáp	ka	Hungary	27	HU-1
Sarnaja*	rc	Egypt	59	EG-3
Sarniç	ht	Türkiye	364	TR-8V
Samitsa	pe	Bulgaria	71	BG-5
Sarny	rc	Ukraine	7	UA-2
Şaroluk	ka	Türkiye	174	TR-5G
Sárospatak	wc	Hungary	45	HU-2
Sarvaš	rc	Croatia	58	HR-1
Sas Arenas	qf-ka	Italy	16	IT-2A
Šaša-Bednja	be	Croatia	24	HR-1B
Sasso	tc	Italy	414	IT-8V
Sasso della Pradaccia	tc	Italy	417	IT-8V
Sasso Nero	tc	Italy	413	IT-8V
Šaštín - Stráže	qs	Slovakia	5	SK-2
Sat Batran	fd	Romania	40	RO-5
Säter	ky	Sweden	127	SW-5
Šatijai	rc	Lithuania	17	LT-1
Satka	mg	Russia	123	RU-4
Satu Nou de Jos	rc	Romania	104	RO-1
Sătuc	rc	Romania	14	RO-1
Saucats	rc	France	266	FR-7
Saulgé	rc	France	176	FR-6
Sauverdun	rc	France	320	FR-9
Savcılı	wo	Türkiye	322	TR-7
Savića Mala	wc	Serbia	43	RS-1
Scala Erre	rc-li	Italy	5	IT-2
Scalabrino	rc	Italy	259	IT-5
Scarpa	fd	Italy	430	IT-8
Scart	ba	Ireland	11	IE-1
Scartazza	rc	Italy	298	IT-6
Scendamo	fd	Italy	149	IT-3H
Schafbach	rc-wc	Germany	131	DE-3E
Schaffhouse-près-Seltz	rc	France	22	FR-3
Scharrel	rc	Germany	13	DE-1
Schelle	rc	Belgium	23	BE-1
Schenklengsfeld	rc	Germany	93	DE-2
Schiffenberger Forst	rc	Germany	175	DE-3
Schimatari-Viotia	rc	Greece	5	GR-1
Schipperswaard	rc	Netherlands	20	NL-1
Schlemm	ka-qz	Germany	340	DE-7
Schonlind	rc	Germany	333	DE-7
Schüpfen	rc	Switzerland	8	CH-1
Schwarzenhasel	rc	Germany	92	DE-2
Scout Moor quarry	rc	United Kingdom	186	UK-4
Scovizze	rc	Italy	465	IT-8W
Ščugor	bx	Russia	4	RU-1
Sdoth Aqiva	rc	Israel	3	IL-2
Sebaya	sc	Egypt	152	EG-7
Sebha East	ka	Libya	15	LY-1
Sebha West	qs	Libya	16	LY-1
Sedan	rc-wc	Germany	163	DE-3E
Seewen	rc	Switzerland	12	CH-1
Segalara	qf	Italy	279	IT-6
Segura*	li-ba	Portugal	127-128	PT-5
Şehit Savaş Kaşif Caddesi	rc	Cyprus	33	CY-1
Seiferbach	rc-wc	Germany	126	DE-3E
Seignelay	rc	France	96	FR-4
Seilitz	ka	Germany	228	DE-4
Seixigal	fd-li	Portugal	23	PT-2
Seixinhos	fd	Portugal	79	PT-3
Seixo da Beira	rc	Portugal	78	PT-3
Seixoso	qf	Portugal	20	PT-2
Sejnène	sc	Tunisia	3	TN-1C
Seksaoua	ba	Morocco	77	MA-1
Sela	ka	Slovenia	7	SI-1
Selborne quarry	rc	United Kingdom	80	UK-3
Seldare	rc	Italy	460	IT-8W
Selibice	rc	Czechia	41	CZ-1
Sella Bramaterra	fd	Italy	384	IT-7S
Selters	rc	Germany	172	DE-3
Semerovo	rc	Slovakia	30	SK-1
Semikarakorsk	rc	Russia	150	RU-1
Senftenberg	li	Austria	60	AT-3
Senhora da Luz	rc	Portugal	139	PT-7
Šenkovec	rc	Croatia	32	HR-1
Senovo	ka	Bulgaria	39	BG-3
Senta	rc	Serbia	4	RS-2
Sepeda (Romano)	li	Portugal	28	PT-2
Sepetçi*	mg	Türkiye	261	TR-6
Sepetli	be	Türkiye	97	TR-3
Seppälä	li	Finland	46	FI-1E
Šeprun-Bednja	be	Croatia	25	HR-1B
Septveilles	wc	France	76	FR-4D
Serçaören	wo	Türkiye	190	TR-5
Serçeören	tc	Türkiye	188	TR-5H
Serdio-Las Brañas	qs	Spain	54	ES-3
Sered'	rc	Slovakia	14	SK-1
Serenissima-Roncade	rc	Italy	493	IT-8
Serényfalva	rc	Hungary	39	HU-1
Serra da Póvoa	wc	Portugal	73	PT-4
Serra do Ferro e da Olga	qz-fd	Portugal	30	PT-2
Serra do Monchique	zr	Portugal	190	PT-10
Serra Maiore	fd	Italy	34	IT-2
Serra Narbonis	be	Italy	78	IT-2D
Serralta	fd	Italy	156	IT-3
Serviers	wc	France	283	FR-8
Setch road quarry	rc	United Kingdom	123	UK-4
Sete Fontes	tc	Portugal	34	PT-2
Setetjern	fd	Norway	62	NO-5
Setsadzor*	pe	Armenia	7	AR-1
Seula-Baveno	fd	Italy	402	IT-7U
Severo-Onezhskiy Boksitovyy	bx	Russia	49	RU-2
Severouralsk	bx	Russia	108	RU-4
Seybətin	rc	Azerbaijan	42	AZ-1
Seydişehir	al	Türkiye	448	TR-10
Seyitgazi	pe	Türkiye	279	TR-6O
Seyitömer basin	rc	Türkiye	270	TR-6O
Seymen	qs	Türkiye	13	TR-2
Sezanne	wc	France	84	FR-4
Shabel'kivka	qs	Ukraine	136	UA-7
Shabrovski	tc	Russia	116	RU-4
Shahumyan	rc	Armenia	3	AR-1
Shaklofa	be	Egypt	92	EG-4
Shalatin	tc	Egypt	184	EG-8
Shamkir	be	Azerbaijan	7	AZ-1
Shapkozero	ol	Russia	34	RU-2
Shaugh Moor Quarry	ka	United Kingdom	37	UK-2B
Shcheglovo	rc	Russia	57	RU-3
Shëngjun	rc	Albania	44	AL-2
Shepetivka	rc	Ukraine	12	UA-2A
Shershnevsk	fd	Russia	131	RU-4
Shevchenkivke	li	Ukraine	166	UA-7
Shgharshik*	pe	Armenia	9	AR-1
Shibin El Kawm*	rc	Egypt	18	EG-3
Shilton	ka	United Kingdom	24	UK-2A
Shirak	ze	Armenia	18	AR-1
Shkurupiivka	rc	Ukraine	39	UA-3
Sholokovo	rc	Russia	69	RU-3
Shongui	li	Russia	16	RU-2
Shortwood quarry	rc	United Kingdom	74	UK-2
Shoshaj	rc	Albania	38	AL-2
Shostakivka	wc	Ukraine	95	UA-5
Shrosha	wc	Georgia	13	GE-1
Shulepovskoe	wc	Russia	86	RU-3
Shupenze	rc	Albania	39	AL-2
Shushet Abu El-Nimran	ka	Egypt	108	EG-6A
Shynoy-Varna	pe	Ukraine	51	UA-4C
Siarova	rc	Belarus	7	BY-1
Siblingen	rc	Switzerland	24	CH-1
Sichevița	wc	Romania	34	RO-4
Šíd	qs	Slovakia	100	SK-1
Sidi Abderrahman	rc	Morocco	66	MA-1
Sidi Abed	rc	Algeria	19	DZ-2
Sidi Aïch*	rc	Algeria	44-45	DZ-2
Sidi Aïssa	rc	Algeria	80	DZ-1
Sidi Bou Othmane	fd-ky	Morocco	68	MA-1
Sidi El Bader-Tabarka	wc	Tunisia	1	TN-1C
Sidi el Ghandour	rc	Morocco	46	MA-1
Sidi Hrazem	rc	Morocco	41	MA-1
Sidi Kacem	rc	Morocco	40	MA-1
Sidi Maancer	rc	Algeria	70	DZ-1
Sidi Slimane	qz	Algeria	91	DZ-1
Sidironero	ky	Greece	60	GR-1
Siebengebirge	fd	Germany	99	DE-3
Siedlec-Krzeszowice	fd	Poland	129	PL-1
Siedleszczany-Lachowski	rc	Poland	178	PL-4
Siegerstetten-Zweikirchen	be	Germany	311	DE-6
Sierakowice	rc	Poland	123	PL-1
Sierra del Pedroso	ka	Spain	47	ES-2
Sigmundsherberg	ka	Austria	65	AT-3
Sigrano	qs	Netherlands	36	NL-1A
Šikulje	qs	Bosnia H.	62	BH-1
Silán	fd	Spain	26	ES-2
Silberfeld	rc-wc	Germany	167	DE-3
Silbergrube	fd-li	Germany	341	DE-7
Silbersee	rc-wc	Germany	157	DE-3E
Silkeborg	qs	Denmark	22	DK-1
Silverband	ba	United Kingdom	213	UK-5
Silveron	wo	Sweden	77	SW-4
Simonichi	be	Belarus	25	BY-1A
Sinanköy	be	Türkiye	2	TR-2
Sinanlı	qs	Türkiye	17	TR-2
Sindirga	pe	Türkiye	195	TR-5
Sindos	rc	Greece	45	GR-1
Sinkovica	qz	North Macedonia	19	MK-1
Sint-Gillis-Waas	rc	Belgium	19	BE-1
Sint-Niklaas	rc	Belgium	20	BE-1
Sirault	rc	Belgium	17	BE-1
Şiremir Çavuş	rc	Türkiye	74	TR-3
Şirinevler	rc	Türkiye	492	TR-11
Široka ulica	bx	Montenegro	13	ME-1A
Sirte	qz	Libya	12	LY-1
Şirvan	rc	Azerbaijan	40	AZ-1
Šitbořice	rc	Czechia	119	CZ-1
Sithonia	fd-qz	Greece	36	GR-1
Sitjar	sc	Spain	211	ES-6G
Sitnitsa	ka	Belarus	17	BY-1A
Siurunmaa	ka	Finland	2	FI-1
Šivetice	wc	Slovakia	112	SK-6
Siyəzən	rc	Azerbaijan	30	AZ-1
Sjevjerodonec'k	rc	Ukraine	138	UA-7
Skallelv	qz	Norway	1	NO-2
Skalná	wc	Czechia	2	CZ-2
Skaloma	ze	Greece	73	GR-1
Skarpö	fd	Sweden	63	SW-4
Skarrehage	mo	Denmark	4	DK-1
Skinnardal	fd	Sweden	20	SW-3
Sklené Teplice	ze	Slovakia	63	SK-4
Skočaj	bx	Bosnia H.	3	BH-1
Skodsbøl	rc	Denmark	26	DK-1
Skopilia Vrisi	mg	Greece	11	GR-3
Skoutari	rc	Greece	56	GR-1
Skripitsy	ka	Belarus	20	BY-1A
Skromberga	wc	Sweden	11	SW-2
Skudras	qs	Latvia	2	LV-1
Skuleboda	qz	Sweden	121	SW-5
Skulte	zr	Latvia	14	LV-1
Sladojevci	rc	Croatia	49	HR-1
Šlapanice	rc	Czechia	118	CZ-1
Slatina	wc	Serbia	55	RS-3
Slatina-Timiș	fd	Romania	41	RO-5

deposit	ore	country	number	map
Slätteryd	fd	Sweden	40	SW-3
Slavonka	rc	Croatia	56	HR-1
Slavošovce	fd	Slovakia	116	SK-6
Slavyanovo	rc	Bulgaria	28	BG-2
Slavyansk-on-Kuban	rc	Russia	153	RU-1
Sławków	rc	Poland	127	PL-1
Sławniowice	fd	Poland	111	PL-1
Šljibčica	rc	Bosnia H.	25	BH-1
Sljudnyanaya	li	Russia	22	RU-2
Sllovi	qs	Kosovo	26	KS-1
Slobidka-Krasylivska	rc	Ukraine	67	UA-4
Słodków	rc	Poland	166	PL-4
Słowiany	rc	Poland	57	PL-2
Sludyanoy Bor	fd	Russia	42	RU-2
Småbergshön	qz	Sweden	103	SW-4
Small Dole	rc	United Kingdom	88	UK-3
Smederevska Palanka	rc	Serbia	72	RS-1
Smeed Dean quarry	rc	United Kingdom	102	UK-3
Śmiałowice	ka	Poland	94	PL-2
Smigada	tc	Greece	69	GR-1
Šmiklavž	rc	Slovenia	13	SI-1
Smirnenski	ka	Bulgaria	34	BG-3
Smolín	fd	Czechia	116	CZ-6
Smoljave-Zagoni	wc	Bosnia H.	59	BH-1A
Smolník	qz	Slovakia	118	SK-7
Smrček	fd	Czechia	104	CZ-1
Smyadovo	tc	Bulgaria	54	BG-1
Smyshlyayevka	rc	Russia	99	RU-4
Snekkevik	qz	Norway	52	NO-5
Snive Colla Bassa	qz	Italy	349	IT-7
Snjiegotina-Vrbanja	mg	Bosnia H.	15	BH-1
Söbçayırı	fd	Türkiye	414	TR-9
Soblinec	rc	Croatia	37	HR-1
Sobolevo	be	Russia	97	RU-4
Šobov	qz	Slovakia	32	SK-1
Sofça*	mg	Türkiye	272	TR-6O
Sofular	wc	Türkiye	49	TR-2B
Söğütalan	mg	Türkiye	185	TR-5H
Sohag	be	Egypt	140	EG-7
Sohodol-Campeni	bx	Romania	62	RO-1
Sohodoll	qz	Albania	30	AL-2
Sokata	rc	Bulgaria	55	BG-1
Söke-Yatağan	qz	Türkiye	381	TR-9
Sokolac "Greda"	be	Bosnia H.	9	BH-1
Sokyrnytsia	ze	Ukraine	50	UA-4
Sól	ec	Poland	198	PL-4
Solčany	wc	Slovakia	19	SK-1
Solero-Cascina Urbana	rc	Italy	331	IT-7
Solons'ke	rc	Ukraine	58	UA-4
Solymár	rc	Hungary	28	HU-1
Solymárvölgyi	rc	Hungary	29	HU-1
Somberek	rc	Hungary	69	HU-1
Sommartorn	fd	Sweden	106	SW-4
Somotor	qs	Slovakia	159	SK-10
Soncino	rc	Italy	423	IT-8
Sondalo	qz	Italy	431	IT-8
Søndre Teigen	fd	Norway	57	NO-5
Sooneck	qz	Germany	255	DE-5
Sopra Vigne	sc	Italy	286	IT-6N
Sopronbánfalva	tc	Hungary	14	HU-1
Soran	rc	Italy	481	IT-8W
Sośnica	rc	Poland	86	PL-2
Sostegno	qs	Italy	309	IT-6
Sotiras	ky	Greece	62	GR-1
Soufflenheim	qs	France	26	FR-3
Sougy-sur-Loire	rc	France	164	FR-6
Souk El Arbaa	rc	Morocco	38	MA-1
Souk Kdim	rc	Morocco	7	MA-2
Sousse	rc	Tunisia	41	TN-1A
South Al Quweira	qf	Jordan	25	JO-1
South Anston Harrycroft q.	rc	United Kingdom	175	UK-4
South Aqaba	rc	Jordan	33	JO-1
South El-Hammam	be	Egypt	7	EG-2
South Fraddon-New Halwyn	ka	United Kingdom	4	UK-2A
South Holmwood quarry	rc	United Kingdom	85	UK-3
South Ushkoty	ka	Russia	146	RU-4
Southacre Pit	wc	United Kingdom	50	UK-2C
Spaniard Hall quarry	rc	United Kingdom	191	UK-4
Spartaks	rc	Latvia	12	LV-1
Spattgruvan	fd	Sweden	18	SW-3
Spešov-Dolní Lhota	qs	Czechia	99	CZ-5
Spielberg	qs	Austria	53	AT-3
Spijk	rc	Netherlands	6	NL-1B
Spinazzola	bx	Italy	171	IT-4
Spiniccio	ns	Italy	222	IT-5
Spišské Podhradie	rc	Slovakia	126	SK-1
Spittal an der Drau	fd-li	Austria	7	AT-1
Spreča	wc	Bosnia H.	37	BH-1
Springberget	qz	Sweden	95	SW-4
Springwell quarry	rc	United Kingdom	219	UK-5
Spuz	rc	Montenegro	24	ME-1
Sredne-Timanskiy*	bx	Russia	3	RU-1
Srednya	qf	Bulgaria	49	BG-4
Sremski Karlovci	rc	Serbia	26	RS-2
Srní 2-Veselí	qs	Czechia	55	CZ-3
Srní-Okřešice	qs	Czechia	53	CZ-3
Srpska Crnja	rc	Serbia	8	RS-2
Srpski Miletić	rc	Serbia	12	RS-2
St. Georgen a.d. Gusen	qs	Austria	43	AT-2
Stackberget	qz	Sweden	41	SW-3
Stackebo	fd	Sweden	65	SW-4
Stade	al	Germany	8	DE-1
Stadtlohn	rc	Germany	56	DE-2
Staerhoj	mo	Denmark	3	DK-1
Staffora-Retorbido	rc	Italy	319	IT-6O
Staggiano	rc	Italy	258	IT-5
Stalać	rc	Serbia	94	RS-1
Staldzene	zr	Latvia	6	LV-1
Stale	qz	Sweden	33	SW-3
Stallings Lane, Himley quarry	rc	United Kingdom	153	UK-4
Stanislaw	qz	Poland	67	PL-2
Stanisławów	ba	Poland	75	PL-2
Stankuvatske	li	Ukraine	99	UA-5
Stannon	ka	United Kingdom	36	UK-2
Stará Halič	wc	Slovakia	93	SK-5
Stará Kremnička	qz	Slovakia	55	SK-4
Stará Kremnička-Jelšový potok I	be	Slovakia	51	SK-4
Stará Kremnička-Jelšový potok N-II	be	Slovakia	48	SK-4
Stará Kremnička - Lutila	be	Slovakia	42	SK-4
Stará Kremnička I	be	Slovakia	46	SK-4
Stará Kremnička-Jelšový Potok	qz	Slovakia	52	SK-4
Stará Kremnička-Kotliště	qz	Slovakia	54	SK-4
Stará Voda	qz	Slovakia	122	SK-7
Stare Kuće	wc	Serbia	47	RS-3
Stari Martinac	qz	Bosnia H.	17	BH-1
Stärnö	sw	Sweden	155	SW-2
Staropatitsa	rc	Bulgaria	14	BG-1
Stary Łom	fd	Poland	90	PL-2
Stavello-Val Dombastone	fd	Italy	432	IT-8
Stavrokonou	rc	Cyprus	42	CY-1
Stavros	mg	Greece	10	GR-3
Štebih	qs	Slovenia	16	SI-1
Štefanec	qs	Croatia	33	HR-1
Stegliden	qz	Sweden	58	SW-3
Steinbeck	rc	Germany	26	DE-2B
Steinberg-Deckenhart	fd	Germany	265	DE-5
Steinsvik	ol	Norway	32	NO-4
Stejera	wc	Romania	103	RO-1
Steliou Mavrommati	rc	Cyprus	37	CY-1
Stemmer	rc-wc	Germany	138	DE-3E
Stenstrup	rc	Denmark	28	DK-1
Stepan Rasin	qs	Azerbaijan	35	AZ-1B
Stepanovo ozero	qz	Russia	26	RU-2
Sterlitamak	sa	Russia	136	RU-4
Sterreberg	rc	Belgium	7	BE-1
Stimmerkulla	qz	Sweden	104	SW-4
Stipshausen	qz	Germany	259	DE-5
Štitovo	bx	Montenegro	21	ME-1A
Stod	rc	Czechia	30	CZ-1
Stoholm	rc	Denmark	19	DK-1
Stoob/Lizzi	rc	Austria	115	AT-4
Stopka	rc	Poland	13	PL-1
Stora Rödberget	ol	Sweden	154	SW-6
Storbekken	tc	Norway	25	NO-3
Store Esjeklumpen	tc	Norway	21	NO-3
Storön	fd	Sweden	69	SW-4
Stover	wc	United Kingdom	45	UK-2C
Støvring	rc	Denmark	15	DK-1
Strada Oriolo-Voghera	rc	Italy	321	IT-6O
Strada per Palmori	rc	Italy	192	IT-4J
Strada San Dono-Noale	rc	Italy	489	IT-8
Stránce	be	Czechia	44	CZ-3
Străşeni	rc	Moldova	16	MD-1
Streesow	rc	Germany	3	DE-1
Strelča	fd	Bulgaria	19	BG-1
Střeleč	qs	Czechia	57	CZ-1
Streoci	tc	Kosovo	1	KS-1
Strezovce	mg	Kosovo	17	KS-1
Strikçan	rc	Albania	41	AL-2
Střimice	be	Czechia	46	CZ-3
Strofis	ba	Greece	70	GR-1
Strohkrug	rc	Germany	89	DE-2
Strömnäs Västra	ba	Sweden	126	SW-5
Strona-Cavallirio	wc	Italy	392	IT-7T
Strupets	qz	Bulgaria	59	BG-1
Strzeblow	fd	Poland	91	PL-2
Stypsi	ka	Greece	81	GR-1
Su Benatzu	ba	Italy	105	IT-2
Su Fongarrazzu	ka	Italy	42	IT-2
Su Lau	be	Italy	69	IT-2D
Su Monte Ladu	fd	Italy	31	IT-2
Su Murtaxiu	qs	Italy	119	IT-2G
Su Padru	qf	Italy	14	IT-2A
Su Venosu	tc	Italy	45	IT-2C
Subotica	rc	Serbia	1	RS-2
Subra al-Yaman*	rc	Egypt	57	EG-3
Suçati	ht	Türkiye	363	TR-8V
Suchynia	rc	Poland	168	PL-4
Suchyrat Kladenec	rc	Bulgaria	24	BG-2
Suddendorf	rc	Germany	21	DE-2
Sudova Vyshnia	rc	Ukraine	60	UA-4
Sueca	rc	Spain	242	ES-7
Şuhut-Taşoluk	qs	Türkiye	303	TR-6
Sukata Reka	fd	Bulgaria	3	BG-1
Sukhachivka	qs	Ukraine	112	UA-6
Sulechowo	qs	Poland	6	PL-1
Süleoğlu	qs	Türkiye	3	TR-2
Süleymaniye	wc	Türkiye	149	TR-4
Sultançayırı	bo	Türkiye	189	TR-5
Suluca*	rc	Türkiye	109-110	TR-3
Şuncuiuş	wc	Romania	91	RO-6
Suorravaara	li	Sweden	137	SW-6
Surduc	wc	Romania	99	RO-1
Surumbay*	rc	Egypt	37	EG-3
Sury-le-Comtal*	rc	France	203-205	FR-6
Susuzdağ	bx	Türkiye	366	TR-8
Suvorotskoe	rc	Russia	74	RU-3
Suwaymah	rc	Jordan	9	JO-1
Svanvik	qz	Norway	9	NO-2
Svarycevyči	rc	Ukraine	4	UA-2
Svätuše	qs	Slovakia	161	SK-10
Švedlár	qz	Slovakia	121	SK-7
Švedlár - Štofova dolina	qz	Slovakia	120	SK-7
Svetlozero	tc	Russia	47	RU-2
Svinninge	fd	Sweden	4	SW-2
Svitavy-Vendolí	qs	Czechia	92	CZ-1
Swanage quarry	rc	United Kingdom	71	UK-2
Şyngah	rc	Türkiye	155	TR-4
Syväjärvi	li	Finland	24	FI-1B
Szécsény	rc	Hungary	35	HU-1
Szeged	rc	Hungary	62	HU-1
Szegilong	ka	Hungary	46	HU-2
Székesfehérvár	rc	Hungary	24	HU-1
Szentes	rc	Hungary	61	HU-1
Szkucin	rc	Poland	140	PL-3
Tabina	qs	Estonia	10	EE-1
Tadardourte	ns	Morocco	106	MA-6
Tadeuszów-Rudzienko	rc	Poland	22	PL-1
Tadjenanet*	rc	Algeria	73	DZ-1
Taher	sc	Algeria	50	DZ-3
Takhla*	rc	Egypt	51	EG-3
Talagiu	wc	Romania	60	RO-1
Talat	rc	Egypt	84	EG-4
Talhas	tc	Portugal	41	PT-2
Talhinhas	tc	Portugal	40	PT-2
Taliouine	tc	Morocco	87	MA-1
Tall al-Kurdi	rc	Syria	8	SY-1
Tallud-Sainte-Gemme	rc	France	144	FR-5
Tamadili	be	Italy	67	IT-2D
Támame de Sayago	be-wc	Spain	128	ES-5
Tamanhint	ka	Libya	14	LY-1
Tamazeght*	fd-ns	Morocco	60-61	MA-1
Tamazert-El Milia	ka	Algeria	53	DZ-3
Tamesloht	rc	Morocco	70	MA-1
Tamiah	rc	Egypt	75	EG-4
Tamnica	mg	Kosovo	18	KS-1
Tamra	ka	Tunisia	7	TN-1C
Tamzoura	rc	Algeria	3	DZ-1
Tananes	qz	Norway	6	NO-2
Tanca Su Santu	be	Italy	21	IT-2A
Tangier	rc	Morocco	1	MA-2
Tanoğlu-Bağıvar*	rc	Türkiye	545	TR-12
Tansey Green quarry	rc	United Kingdom	151	UK-4
Tanyova Molgila	rc	Bulgaria	31	BG-1
Tapada do Manguês	zr	Portugal	155	PT-8
Tápiógyörgye	rc	Hungary	54	HU-1
Tapolcafő	rc	Hungary	19	HU-1
Tarašča	zr	Ukraine	86	UA-5
Tarasivka	rc	Ukraine	131	UA-6
Tarasov	be	Russia	152	RU-1
Tarbtie North	ns	Egypt	203	EG-8
Tarbtie South	ns	Egypt	202	EG-8
Tarerach	fd	France	335	FR-9B
Tarfaya	zr	Morocco	104	MA-5
Târgu Mureş	rc	Romania	67	RO-1
Tarmilet	ky	Morocco	49	MA-1
Tarnogród	rc	Poland	201	PL-4
Tarom	qs	Ukraine	111	UA-6
Tarout	ka	Libya	17	LY-1
Tarrekaise	mg	Sweden	146	SW-6
Taşbaşı	py	Türkiye	534	TR-12Y
Tashky	be	Ukraine	11	UA-2A
Taşmış	py	Türkiye	533	TR-12Y
Tăşnad	rc	Romania	116	RO-1
Taşoluk	ka	Türkiye	304	TR-6
Tašov	fd	Czechia	50	CZ-3
Tatarmemişler	fd-qz	Türkiye	385	TR-9
Tatarsko-Shatrashanskoe	ze	Russia	158	RU-1
Tatvan	pe	Türkiye	555	TR-12Z
Tauragė	rc	Lithuania	12	LT-1
Tavşanlı*	mg	Türkiye	213	TR-5I
Tavurta-Vorgelurta	ky	Russia	12	RU-2
Taza	rc	Morocco	39	MA-1
Tazoghrane	rc	Tunisia	13	TN-1
Tazoult	rc	Algeria	72	DZ-1
Téboulba	rc	Tunisia	46	TN-1A
Tedzami River	ze	Georgia	21	GE-1
Teeh	ka	Egypt	106	EG-6A
Tefenni*	cr	Türkiye	361	TR-8
Tegare	wc	Bosnia H.	57	BH-1A
Tegau	rc	Germany	189	DE-4
Tegelen	rc	Netherlands	28	NL-1
Teillay	ka	France	121	FR-5
Teistungen	rc	Germany	87	DE-2
Tejera de Navas del Turujal	rc	Spain	55	ES-3
Tekke	rc	Türkiye	90	TR-3C
Tekman*	cr	Türkiye	504	TR-12
Telheira	ka	Portugal	18	PT-2
Tell Hassan	ze	Jordan	7	JO-1
Tell Mukleihat	ze	Syria	14	SY-1
Tell Rimah	ze	Jordan	5	JO-1
Temerin	rc	Serbia	17	RS-2
Templeuve	rc	France	12	FR-2
Temse	rc	Belgium	21	BE-1
Tepeköy	ze	Türkiye	61	TR-2
Tepeköy	ze	Türkiye	569	TR-5G
Tepličany	wc	Slovakia	132	SK-8

deposit	ore	country	number	map
Tercan	rc	Türkiye	515	TR-12
Teregova	fd	Romania	38	RO-5
Ternovë	cr	Albania	48	AL-2
Tétouan**	rc	Morocco	8	MA-2
Tetti Filibert-Vernante	qz	Italy	348	IT-7
Teublitz	rc	Germany	325	DE-7
Teutschenthal	al	Germany	204	DE-4
Tevel	rc	Hungary	64	HU-1
Tevni dol	ba	Bulgaria	4	BG-1
Thalheim	rc-wc	Germany	125	DE-3E
Thansüß	ka-fd-qz	Germany	338	DE-7
The Swan	rc	Ireland	25	IE-1
Thermes	ky	Greece	65	GR-1
Thermi	mg	Greece	41	GR-1
Theyoricheia	be	Greece	95	GR-4
Thiaphes	ka	Greece	101	GR-4
Thiel-sur-Acolin*	wc	France	184-185	FR-6
Thin-le-Moutier	rc	France	17	FR-2
Thorn	rc	Netherlands	31	NL-1
Thürnbuch	rc	Austria	47	AT-2
Thymiana	be	Greece	82	GR-1
Ţibrinu	wc	Romania	8	RO-3
Tidiennit	ba	Morocco	24	MA-3
Tidjelabine	rc	Algeria	30	DZ-2
Tiittolanvaara	tc	Finland	14	FI-1A
Tijjekht	ba	Morocco	101	MA-4
Timahoe	rc	Ireland	26	IE-1
Timar	pe	Türkiye	503	TR-12
Timgad	rc	Algeria	69	DZ-1
Timizer	sc	Algeria	48	DZ-3
Timna	rc	Israel	26	IL-2
Tinejdad	tc	Morocco	93	MA-4
Tineo	ka	Spain	42	ES-2
Tingry	rc	France	3	FR-2
Tirrhist	fd	Morocco	63	MA-1
Tirsa*	rc	Egypt	77	EG-4
Tirschenreuth	ka-fd-qz	Germany	347	DE-7
Tisinec	rc	Slovakia	142	SK-1
Tisla	be	Morocco	25	MA-3
Tişoviţa	cr	Romania	30	RO-4
Tiszafüred	rc	Hungary	52	HU-1
Tiszavasvári	rc	Hungary	51	HU-1
Tivat	rc	Montenegro	27	ME-1
Tizza	be	Morocco	19	MA-3
Tjåmotisjaure	wo	Sweden	141	SW-6
Tjeldneset	qz	Norway	7	NO-2
Tjuoltatjåkkah	ol	Sweden	151	SW-6
Tlamim	rc	Israel	2	IL-2
Tlet Ighoud	ba	Morocco	67	MA-1
Točnica	wc	Slovakia	90	SK-5
Todhills quarry	rc	United Kingdom	216	UK-5
Tófej	rc	Hungary	3	HU-1
Togher	rc	Ireland	36	IE-1
Tojal	ka	Portugal	54	PT-3
Tojeiras	rc	Portugal	143	PT-5
Tokivs'ke	fd	Ukraine	123	UA-6
Tokmakliyski bair	be	Bulgaria	75	BG-5
Tolkamer	rc	Netherlands	7	NL-1B
Toloshi	pe	Georgia	19	GE-1
Tomarza*	cr	Türkiye	480	TR-11
Tomašanci	rc	Croatia	52	HR-1
Tomaški hrib	rc	Slovenia	2	SI-1
Tombebœuf	rc	France	277	FR-7
Tong Farm quarry	rc	United Kingdom	187	UK-4
Tonribis	rc	Lithuania	9	LT-1
Topanicë	ze	Kosovo	20	KS-1
Topolovgrad	qf	Bulgaria	63	BG-1
Toppo Capoiacci	qs	Italy	187	IT-4
Toprakkale	rc	Türkiye	160	TR-4
Topuk	mg	Türkiye	180	TR-5H
Topusko	qs	Croatia	13	HR-1A
Tora Moccia	rc	Italy	178	IT-4
Tordesillas	qs	Spain	130	ES-5
Toret'sk	wc	Ukraine	152	UA-7D
Torhop	qz	Norway	8	NO-2
Torhovytsia	rc	Ukraine	78	UA-4
Torlov Stream	fd	Russia	41	RU-2
Torrazzetta-Torrazza Coste	rc	Italy	317	IT-6O
Torre d'Ischia	ka	Italy	218	IT-5
Torrenieri	rc	Italy	244	IT-5
Torrente Senia	rc	Italy	140	IT-3I
Torricella-Gussola	rc	Italy	303	IT-6
Torricella-Motteggiana	rc	Italy	301	IT-6
Torteron	rc	France	165	FR-6
Touffréville	rc	France	112	FR-5
Tourny	be	France	42	FR-4
Trachyla	pe	Greece	102	GR-4
Tranåsen	qz	Sweden	85	SW-4
Transinne	rc	Belgium	42	BE-1
Trappberget	qz	Sweden	86	SW-4
Travasso	rc	Portugal	114	PT-6
Traveiro	rc	Portugal	97	PT-3
Tre Fontane	fd-ka	Italy	353	IT-7P
Treat	rc	Algeria	59	DZ-3
Trebia	be-pe	Morocco	26	MA-3
Treffling	qs	Austria	41	AT-2
Tréguennec - Prat-ar-Hastel	li	France	153	FR-5
Tréguennec - Tréluan	li	France	154	FR-5
Treis	qs	Germany	176	DE-3
Trelavour-Hallew	ka-li	United Kingdom	13	UK-2A
Trenčianska Turná	rc	Slovakia	17	SK-1
Treponti-Casale sul Sile	rc	Italy	492	IT-8
Tres Arroyos	li	Spain	273	ES-8
Tresques-Gea	qs	France	288	FR-8
Treviscoe	ka	United Kingdom	10	UK-2A
Trevllazër	rc	Albania	67	AL-3
Triades	ba	Greece	108	GR-4
Trieben	mg	Austria	89	AT-4
Trigon Hill Pit	wc	United Kingdom	63	UK-2E
Trimiklini	rc	Cyprus	9	CY-1
Trimouns	tc	France	328	FR-9
Trinity-baynovskie	wc	Russia	117	RU-4
Trnava	mg	Serbia	101	RS-5
Trnovac	ka	Serbia	112	RS-6
Tropojë	rc	Albania	2	AL-2
Troschenreuth	rc	Germany	349	DE-7
Trössengraben	rc	Austria	108	AT-4
Troulloi	be	Cyprus	36	CY-1
Troupi	mg	Greece	15	GR-3
Trstené pri Hornáde	wc	Slovakia	140	SK-1
Trudove (Belaya Balka)	ka	Ukraine	171	UA-7
Trumilly	qs	France	54	FR-4
Truseni	rc	Moldova	15	MD-1
Trześń-Łabuda	rc	Poland	176	PL-4
Tsater	ze	Armenia	12	AR-1
Tschirma	rc	Germany	190	DE-4
Tseri	rc	Cyprus	28	CY-1
Tseri E120	rc	Cyprus	29	CY-1
Tsetskhlauri	wc	Georgia	4	GE-1
Tudela	rc	Spain	93	ES-3
Tufanbeyli-Saimbeyli	bx	Türkiye	478	TR-11
Tuggen	rc	Switzerland	27	CH-1
Tūja	rc	Latvia	15	LV-1
Tulcea	al	Romania	1	RO-2
Tulgan	rc	Russia	139	RU-4
Tulisse Juvat	qs	Italy	205	IT-5M
Tumanyan	rc	Armenia	13	AR-1
Tunçbilek basin	wc	Türkiye	211	TR-5I
Turaŭ	rc	Belarus	22	BY-1A
Turbiv	ka	Ukraine	84	UA-5
Turchynka	an	Ukraine	25	UA-2B
Turčianska Štiavnička	rc	Slovakia	65	SK-1
Turgutlu*	rc	Türkiye	340-345	TR-8T
Türkismühle	fd	Germany	264	DE-5
Türkoğlu*	rc	Türkiye	485-486	TR-11
Turów	wc	Poland	51	PL-1
Tušť	fd	Czechia	76	CZ-4
Tutun	rc	Egypt	91	EG-4
Tvardiţa	rc	Moldova	8	MD-1
Tverrådalen	ky	Norway	73	NO-4
Tvršice	wc	Czechia	40	CZ-1
Two Oaks quarry	qs	United Kingdom	171	UK-4
Tyapysh-Manyuk	ky-qz	Russia	11	RU-2
Tyayra*	qs	Tunisia	50-52	TN-1D
Tynagh	ba	Ireland	7	IE-1
Tyskbo	qz	Sweden	94	SW-4
Tyynelä	tc	Finland	15	FI-1A
Ubeidiya	ba	Palestine	1	IL-2
Uccineglio	fd	Italy	390	IT-7S
Uchas	wc	Portugal	72	PT-4
Uderiná	mg	Slovakia	91	SK-5
Udeşti	rc	Romania	108	RO-1
Údrija	rc	Lithuania	23	LT-1
Ueffeln	rc	Germany	30	DE-2C
Ugljari	wc	Bosnia H.	64	BH-1
Uhorské	ka	Slovakia	73	SK-5
Úhřetice	rc	Czechia	85	CZ-1
Uhry	qs	Germany	53	DE-2
Ujście	qs	Poland	10	PL-1
Ukmergé	rc	Lithuania	29	LT-1
Ukonkangas	ka-qz	Finland	44	FI-1D
Ul'yanovo	rc	Russia	87	RU-3
Ulaşlar	wc	Türkiye	239	TR-5L
Ulerud	qz	Sweden	49	SW-3
Uljma	rc	Serbia	36	RS-1
Ullnäset	qz	Sweden	130	SW-5
Ülmitz	rc	Austria	93	AT-4
Ulubey	ka	Türkiye	140	TR-4
Ulychne	rc	Ukraine	57	UA-4
Um El Hueitat	ec	Egypt	143	EG-7
Um Hibal	fd	Egypt	201	EG-8
Um Huitate	cr-ol	Egypt	168	EG-7B
Um Naggat	fd	Egypt	156	EG-7
Um Risha	ns	Egypt	197	EG-8
Umm Ar Razam	be	Libya	4	LY-1
Umm Had	fd	Egypt	149	EG-7
Umm Salatit	mg	Egypt	155	EG-7
Únanov	ka	Czechia	107	CZ-1
Unewel Grudzeń Las	qs	Poland	135	PL-3
Unewel-Wschód	qs	Poland	133	PL-3
Unewel-Zachód-Nowy	qs	Poland	134	PL-3
Ungheni	ec	Moldova	34	MD-1
Ünlüce	ky	Türkiye	553	TR-12Z
Unsleben	rc	Germany	183	DE-4
Untereichen	rc	Germany	283	DE-6
Unterfrauenhaid	rc	Austria	117	AT-4
Unterloquiz	rc	Germany	184	DE-4
Untermamau	qs	Austria	56	AT-3
Untersulzbachtal	ky	Austria	4	AT-1
Untschen	rc	Germany	195	DE-4
Up de Gadde	rc	Germany	27	DE-2B
Urakka	fd	Russia	30	RU-2
Urissaare	ec	Estonia	2	EE-1
Urn Monqul	ba	Egypt	130	EG-6
Üröm	rc	Hungary	30	HU-1
Urxallë	qz	Albania	36	AL-2
Uskerty	rc	Ireland	22	IE-1
Usmas	rc	Latvia	5	LV-1
Ušnėnai	rc	Lithuania	10	LT-1
Ustrem	qf	Bulgaria	62	BG-1
Üşümüş	ky	Türkiye	233	TR-5
Usuniza	be	Türkiye	141	TR-4
Uttendorf	rc	Austria	13	AT-2
Uttenheim	li	Italy	443	IT-8
Utzubar	rc	Spain	75	ES-3
Uutela	tc	Finland	19	FI-1A
Uvel	qs	Russia	132	RU-4
Uzungüney	qz	Türkiye	67	TR-3
Vackov	wc	Czechia	6	CZ-2
Vadakste	rc	Latvia	8	LV-1
Vado	qf	Italy	280	IT-6
Vadu Crişului	wc	Romania	92	RO-6
Vaggedalen	qz	Norway	5	NO-2
Val de Ariño	wc	Spain	185	ES-6E
Val d'Oingt	rc	France	196	FR-6
Val Predere-Vicoforte	qs	Italy	342	IT-7
Val Regone	fd	Italy	421	IT-8
Våland	qz	Norway	55	NO-5
Valbrutta	tc	Italy	418	IT-8V
Vălcineț	ec-qs	Moldova	32-33	MD-1
Valdeflorez	li	Spain	153	ES-5
Valdivia	rc	Spain	272	ES-8
Vale da Alagoa	wc	Portugal	66	PT-4
Vale da Cega e Vila Verde	cr	Portugal	32	PT-2
Vale da Porca	tc	Portugal	39	PT-2
Vale da Silveira	wc	Portugal	70	PT-4
Vale das Covadas	rc	Portugal	96	PT-3
Vale de Água	wc	Portugal	65	PT-4
Vale de André	wc	Portugal	125	PT-5
Vale de Canas	wc	Portugal	60	PT-4
Vale de Cavalos-Esperança	zr	Portugal	154	PT-8
Vale de Coimbra	wc	Portugal	111	PT-6
Vale de Nelas	wc	Portugal	126	PT-5
Vale do Amieiro	rc	Portugal	141	PT-7
Vale Fernando	rc	Portugal	149	PT-5
Vale Galego	wc	Portugal	117	PT-6
Vale Grande	fd	Portugal	77	PT-3
Vale Moleiro	wc	Portugal	102	PT-5
Vale Salgueiro-V. da Erba	wc	Portugal	71	PT-4
Valea Bedeciului	fd	Romania	77	RO-1
Valea Chioarului	be	Romania	102	RO-1
Valea Neagra de Cris	wc	Romania	93	RO-6
Valea Perjei	be	Moldova	10	MD-1
Valea Sării-Andreiaşu	sr	Romania	13	RO-1
Valea Valsanului	fd-qz	Romania	18	RO-1
Valedo Sobral	rc	Portugal	76	PT-3
Valeira	rc	Portugal	167	PT-9
Valencia de Don Juan	rc	Spain	39	ES-2
Vales*	rc	Portugal	185-186	PT-10
Valja Saka	be	Serbia	71	RS-1
Valje	fd	Sweden	61	SW-4
Valkeasiipivaara	ol	Sweden	52	SW-3
Valkeřice-Zaječí vrch	fd	Czechia	51	CZ-3
Valle del Pozzo	rc	Italy	328	IT-6
Valle dell'Orco	ka	Italy	486	IT-8W
Valle Marchesa	rc	Italy	172	IT-4
Vallericca	rc	Italy	215	IT-5
Vallone Defenza	rc	Italy	209	IT-5
Valls	ka-qz-fc	Spain	224,226	ES-6I
Valmy	fd	France	340	FR-9
Valön/Kilane	qz	Sweden	116	SW-5
Vaniskedi	be	Georgia	35	GE-1
Vånkobben	fd	Sweden	57	SW-3
Varbitsa	rc	Bulgaria	25	BG-2
Varciorova	qz	Romania	44	RO-5
Vareilles	fd	France	209	FR-6
Varesin	rc	Italy	463	IT-8W
Varlamovo-Kremenkul	wc	Russia	130	RU-4
Varuträsk	qz	Sweden	80	SW-4
Vasa	mg	Cyprus	21	CY-1
Vasarakangas-Kamukka	mg-tc	Finland	36	FI-1C
Vasikkakangas	tc	Finland	11	FI-1A
Vasil'evskoe	be	Russia	103	RU-4
Vasilatu-Brezoi	fd	Romania	21	RO-1
Vasjar	rc	Albania	73	AL-3
Vassiliko-Evia	rc	Greece	6	GR-1
Västerby	fd	Sweden	67	SW-4
Våtåskammen	fd	Norway	60	NO-5
Våtåstoppen	fd	Norway	59	NO-5
Vatersdorf	rc	Germany	308	DE-6
Vavdos	mg-ol	Greece	40	GR-1
Vb Bezhan	rc	Albania	72	AL-3
Vegas de Matute	ka	Spain	140	ES-5C
Vegri-Campotamaso	be	Italy	475	IT-8W
Veigacha	rc	Spain	3	ES-2
Veitsch/Mur-Mürztal	mg	Austria	83	AT-4
Vejdelevka	qs	Russia	94	RU-3
Velanida	be	Greece	25	GR-1
Veliky Burluk	qs	Ukraine	47	UA-3
Velké Meziříčí-Lavičky	fd	Czechia	103	CZ-1
Velký Luh	qs	Czechia	5	CZ-2
Velpe*	rc	Germany	38	DE-2A
Velyki Hadomtsi	ka	Ukraine	82	UA-5
Velyki Hlibovychi	qs	Ukraine	62	UA-4
Venta-Pampurai	rc	Lithuania	1	LT-1
Venusio S.S. 99	rc	Italy	169	IT-4

deposit	ore	country	number	map
Verea	rc	Spain	22	ES-2
Vergongheon	rc	France	206	FR-6
Veria	qz	Greece	32	GR-1
Verin Bazmaberd	pe	Armenia	6	AR-1
Vërlen-Hoçisht	qz	Albania	68	AL-3
Verlincthun	rc	France	4	FR-2
Verměřov u Aš	li	Czechia	1	CZ-2
Verzenay	rc	France	86	FR-4
Veselivska	mg-tc	Ukraine	132	UA-6
Vetle Raudberget	tc	Norway	41	NO-4
Vetovo*	ka	Bulgaria	35-38	BG-3
Vettrucco	be	Italy	196	IT-4K
Via Arcalini-Voghera	rc	Italy	320	IT-6O
Via Olivi-Possagno	rc	Italy	496	IT-8X
Via Rovasenda-Gattinara	rc	Italy	379	IT-7R
Via Silvano Pietra-Casei Gerola	rc	Italy	324	IT-6O
Vidiná - Halier	rc	Slovakia	88	SK-5
Vidnava	ka	Czechia	91	CZ-1
Vidoeiro	wc	Portugal	67	PT-4
Vidojevica	fd	Serbia	107	RS-1
Viennay	rc	France	151	FR-5
Viens	rc	France	298	FR-8
Vierve-sur-Viroin	ba	Belgium	27	BE-1
Vietjervaratj	tc	Sweden	75	SW-4
Viezuroi	wc	Romania	26	RO-1
Vig	rc	Albania	24	AL-2
Vignali	be	Italy	198	IT-4K
Viilor	rc	Romania	66	RO-1
Viitaniemi	fd-qz	Finland	53	FI-1
Vijciems	qs	Latvia	25	LV-1
Vikno	rc	Ukraine	73	UA-4
Vikonys	rc	Lithuania	32	LT-1
Vila Nova da Rainha	rc	Portugal	160	PT-8
Vila Seca	qf	Portugal	53	PT-3
Vilaka	rc	Latvia	27	LV-1
Vilalba	qz	Spain	25	ES-2
Vilalonga	rc	Spain	8	ES-2
Vilga-Arija	qs	Spain	60	ES-3
Villa del Bosco-Portiglie	wc	Italy	378	IT-7R
Villa Rosselli - Selvena	sc	Italy	227	IT-5
Villabruna	rc	Italy	502	IT-8
Villafría de la Peña	qs	Spain	53	ES-3
Villaggio Snia	rc	Italy	405	IT-8
Villaluenga de la Sagra	rc	Spain	163	ES-5D
Villanueva de la Jara	qs	Spain	241	ES-6
Villanuova	rc	Italy	128	IT-3
Villánykövesd	rc	Hungary	72	HU-1
Villar	sc	Spain	225	ES-6I
Villar Pardo	ka-qz-fc	Spain	220	ES-6I
Villarrubia de Santiago	na	Spain	176	ES-5
Villaurea	wc	Italy	129	IT-3
Villeneuve-sur-Verberie*	qs	France	52-53	FR-4
Vil'ne	wc	Ukraine	156	UA-7D
Vilseck	rc	Germany	334	DE-7
Vimianzo	ka	Spain	15	ES-2
Viñas Rojas-Cardenete	qs	Spain	234	ES-6
Vinica	rc	North Macedonia	20	MK-1
Virauda	wc	Italy	380	IT-7S
Virauda Ceresei	fd	Italy	383	IT-7S
Vireaux	rc	France	99	FR-4
Virgen del Pilar y Bemisa	be	Spain	307	ES-8
Virgina	ka	United Kingdom	7	UK-2A
Virginia-Valdebezana	qs	Spain	61	ES-3
Virolyubivka	wc	Ukraine	146	UA-7D
Visan	rc	Italy	471	IT-8W
Visciolo	rc	Italy	166	IT-4
Vishnevogorsk	ns	Russia	159	RU-1
Vişina	rc	Romania	20	RO-1
Vista Alegre	ka	Portugal	44	PT-3
Vitrupe	rc	Latvia	16	LV-1
Vittajänkä	ka	Finland	3	FI-1
Vižina	wc	Czechia	35	CZ-1
Vlădiceni	rc	Romania	114	RO-1
Vlasotince	rc	Serbia	108	RS-1
Voděrady	qs	Czechia	98	CZ-5
Vogelensangh: Deest	rc	Netherlands	17	NL-1B
Voinești	qz	Romania	23	RO-1
Vojka	qs	Slovakia	160	SK-10
Vojnić	qs	Croatia	7	HR-1A
Volkhovskiy	sa	Russia	60	RU-3
Volodymyrivka	ka	Ukraine	170	UA-7
Voloshchynske	qs	Ukraine	61	UA-4
Volyn field	fd	Ukraine	27	UA-2B
Vorotynsky	rc	Russia	83	RU-3
Voskresenivka	zr	Ukraine	114	UA-6
Voskresensky	rc	Russia	80	RU-3
Voudia	be	Greece	87	GR-4
Vourinos	ol	Greece	29	GR-1
Vovchansk	zr	Ukraine	164	UA-7
Voznesens'k	rc	Ukraine	103	UA-5
Vram	wc	Sweden	2	SW-2
Vransko	ze	Bulgaria	84	BG-1
Vrbica	wc	Serbia	67	RS-3
Vrbovec	rc	Croatia	19	HR-1
Vrdnik	be	Serbia	24	RS-2
Vrhe pri Štorah	qs	Slovenia	15	SI-1
Vrhovine	qs	Serbia	59	RS-3
Vrignon Sud	wc	France	246	FR-7B
Vrion	rc	Albania	77	AL-3
Vrlinska	qf	Croatia	39	HR-1
Všeborovice	be	Czechia	18	CZ-2
Všemyslice	rc	Czechia	67	CZ-4
Vsevolozhsky	rc	Russia	58	RU-3
Vulcănești	rc	Moldova	2	MD-1
Vuorijoki	ka	Finland	42	FI-1D
Výčapy	fd	Czechia	106	CZ-1
Vyšehořovice	wc	Czechia	61	CZ-1
Vyshnivka-Kup'ja'nsk	qs	Ukraine	49	UA-3
Vyšný Petrovec	ka	Slovakia	78	SK-5
Vysoké Mýto	rc	Czechia	86	CZ-1
Vysokopillia	bx	Ukraine	124	UA-6
Waddan	qs	Libya	11	LY-1
Wadi Abansakar	ka	Egypt	111	EG-6A
Wadi Abu Agag*	sc	Egypt	206-207	EG-8C
Wadi Abu Sobeira	sc	Egypt	208	EG-8C
Wadi Al-Jayshiah*	fd-qz	Jordan	30-31	JO-1
Wadi Allaqi	tc	Egypt	195	EG-8
Wadi Al-Mezrab	zr	Jordan	16	JO-1
Wadi Araba	qs	Egypt	104	EG-5
Wadi Araba	ka	Egypt	127	EG-6
Wadi Araba	fd	Jordan	27	JO-1
Wadi Atalla	tc	Egypt	148	EG-7
Wadi Badaa	rc	Egypt	103	EG-5
Wadi Bezah	cr-ol	Egypt	161	EG-7B
Wadi Dib	ns	Egypt	131	EG-6
Wadi El Mingar	ba	Jordan	1	JO-1
Wadi El-Anab	fd	Algeria	61	DZ-3
Wadi El-Dakl	qs	Egypt	128	EG-6
Wadi El-Lawi	cr-ol	Egypt	173	EG-7B
Wadi El-Yatima-Wadi El-Tuleia	fd	Egypt	165	EG-7B
Wadi El-Zarka	cr-ol	Egypt	171	EG-7B
Wadi Essel	sr	Egypt	158	EG-7B
Wadi Felly	qs	Egypt	99	EG-5
Wadi Hafafit	fd	Egypt	170	EG-7B
Wadi Hood Al-Sufun	fd	Jordan	32	JO-1
Wadi Kalabsha	ka	Egypt	199	EG-8
Wadi Mahlab	fd	Jordan	19	JO-1
Wadi Mandar	fd	Egypt	125	EG-6
Wadi Natrun	na	Egypt	8	EG-2
Wadi Natrun	sc-qs	Egypt	09-ott	EG-2
Wadi Nugrus	fd	Egypt	172	EG-7B
Wadi Numeira	qf	Jordan	13	JO-1
Wadi Qena	qs	Egypt	132	EG-6
Wadi Saader Mulghan	fd	Jordan	29	JO-1
Wadi Samra	fd	Egypt	123	EG-6
Wadi Siq-Wadi Rakyia	ka-qs	Jordan	15	JO-1
Wadi Sudud Sabihah	rc	Jordan	12	JO-1
Wadi Taiyba	be	Egypt	116	EG-6A
Wadi Tal	rc	Egypt	110	EG-6A
Wadi Tarr	fd	Egypt	124	EG-6
Wadi Thamil	tc	Egypt	166	EG-7B
Wadi Watir	qs	Egypt	119	EG-6
Wadi Zirib	fd	Egypt	146	EG-7
Wahnscheid	rc-wc	Germany	130	DE-3E
Waingroves quarry	rc	United Kingdom	169	UK-4
Walbrzych	fd	Poland	105	PL-2
Wald am Schoberpass	mg	Austria	90	AT-4
Waldershof	ka-qz	Germany	348	DE-7
Wallenbrück	rc	Germany	43	DE-2A
Wallenhorst	rc	Germany	35	DE-2C
Wallenried	rc	Switzerland	4	CH-1
Walpersbach	rc	Austria	79	AT-4
Wanlin	rc	Belgium	40	BE-1
Waresley quarry	rc	United Kingdom	140	UK-4
Warmwell	qs	United Kingdom	62	UK-2
Warren Glen quarry	rc	United Kingdom	97	UK-3
Webling	rc	Germany	297	DE-6
Webling-II	rc	Germany	298	DE-6
Wefensleben	rc	Germany	55	DE-2
Weferlingen	qs	Germany	54	DE-2
Wehrendorf	rc	Germany	40	DE-2A
Weibern	rc	Austria	19	AT-2
Weilbach	rc	Austria	17	AT-2
Weillen	qs	Belgium	35	BE-1
Weindorf	rc	Austria	16	AT-2
Weinzierl	fd-ka-qz	Austria	45	AT-2
Weinzierlbruck	qs	Austria	23	AT-2
Weiss	rc-wc	Germany	123	DE-3E
Weissenstein	mg	Austria	5	AT-1
Wellacre quarry	rc	United Kingdom	78	UK-2+3
Wellersen	rc	Germany	75	DE-2
Wellmersdorf	ka-qz	Germany	352	DE-7
Welzow	rc	Germany	237	DE-4
Weronika	sc	Poland	61	PL-2
Wesele	rc	Poland	112	PL-1
West Carclaze-Treverbyn	ka	United Kingdom	31	UK-2A
West Gunheath-Cocksbarrow	ka	United Kingdom	21	UK-2A
West Hoathly quarry	rc	United Kingdom	90	UK-3
Westbeare Quarry	wc	United Kingdom	61	UK-2D
Westmalle	rc	Belgium	28	BE-1B
Westport	tc	Ireland	4	IE-1
Wetro	rc	Germany	244	DE-4
Wettenhausen	rc	Germany	286	DE-6
Weyhe	rc	Germany	16	DE-1
Wheal Frederick-Gothers	ka	United Kingdom	14	UK-2A
Wheal Martyn	ka	United Kingdom	25	UK-2A
Wheal Prosper	ka	United Kingdom	23	UK-2A
Wheal Remfry	ka-fd	United Kingdom	6	UK-2A
Wheatherhill	qs	United Kingdom	217	UK-5
Whinney Hill quarry	rc	United Kingdom	188	UK-4
White pit	wc	United Kingdom	49	UK-2C
Whittlesey quarry	rc	United Kingdom	237	UK-5
Wiazynka	qs	Belarus	6	BY-1
Wierzbie	be	Poland	183	PL-4
Wierzbka	sc	Poland	158	PL-3
Wiesa	ka	Germany	240	DE-4
Wiesa (Bautznerstr.)	rc	Germany	241	DE-4
Wilaya	rc	Morocco	9	MA-2
Wilnecote quarry	rc	United Kingdom	137	UK-4
Wilsum	qs	Germany	19	DE-2
Wimpsfeld*	rc-wc	Germany	115-116	DE-3E
Windmill quarry	rc	United Kingdom	146	UK-4
Winnington	na	United Kingdom	181	UK-4
Winterswijk	rc	Netherlands	4	NL-1
Wirschweiler	qz	Germany	260	DE-5
Wiry	mg	Poland	92	PL-2
Wissembourg	qs	France	21	FR-3
Witaszyce	rc	Poland	40	PL-1
Witterschlick*	qs-rc	Germany	97-98	DE-3
Wittershausen	rc	Germany	278	DE-1
Włochów	sc	Poland	156	PL-3
Wola Rzędzińska	rc	Poland	188	PL-4
Wolfendorn	ky	Austria	2	AT-1
Wolfsberg-Weinebene	li	Austria	103	AT-4
Wolfswaard	rc	Netherlands	15	NL-1B
Wolladon-Courtmoor Pit	wc	United Kingdom	58	UK-2D
Wootton quarry	rc	United Kingdom	120	UK-3
Worden	rc	Netherlands	3	NL-1
Worms	qs	Germany	270	DE-5
Wrzawy	rc	Poland	174	PL-4
Wygietzow	fd	Poland	128	PL-1
Wygnanów	qs	Poland	137	PL-3
Wylewa	rc	Poland	202	PL-4
Wyszków-Skuszew	qs	Poland	23	PL-1
Wyszyna Fałkowska*	rc	Poland	141-142	PL-3
Wyszyna Rudzka	rc	Poland	143	PL-3
Xartinho	rc	Portugal	147	PT-5
Xativà	rc	Spain	244	ES-7
Xerolivado-Rodiani	cr-ol	Greece	28	GR-1
Xinzo de Limia	fd-qf	Spain	4	ES-2
Xirdalan	rc	Azerbaijan	31	AZ-1B
Xylokastro	rc	Greece	3	GR-1
Yabanlı	rc	Türkiye	88	TR-3C
Yablonenka	rc	Russia	95	RU-3
Yağmurlar	wc	Türkiye	243	TR-5
Yağmurluseki	tc	Türkiye	338	TR-7
Yahyalı*	cr	Türkiye	474	TR-11
Yakacık	ka-wc	Türkiye	256	TR-6N
Yakkima	fd	Russia	56	RU-2
Yalvaç-Çarıksaraylar	bx	Türkiye	432	TR-10
Yarikçi	ka	Türkiye	282	TR-6
Yassitaş	fd	Türkiye	413	TR-9
Yavuz Selim	rc	Türkiye	108	TR-3
Yaydiğin*	rc	Türkiye	103	TR-3
Yayla	ol	Türkiye	370	TR-8
Yaylacik	ht	Türkiye	365	TR-8V
Yaylayolu	ka	Türkiye	218	TR-5
Yeghnik	pe	Armenia	8	AR-1
Yeletozero	ns	Russia	33	RU-2
Yemylyvka	an	Ukraine	24	UA-2B
Yeni	rc	Türkiye	499	TR-12
Yeniimaret	qs	Türkiye	1	TR-2
Yeniköy	fd	Türkiye	235	TR-5
Yeniköy	fd	Türkiye	403	TR-9
Yeniköy	be	Türkiye	199	TR-5J
Yeşilhisar	rc	Türkiye	469	TR-11
Yeşilköy	fd	Türkiye	376	TR-9
Yeşilköy	fd-qz	Türkiye	383	TR-9
Yılanlıpınar	fd	Türkiye	404	TR-9
Yolüstü	be	Türkiye	133	TR-4F
Yomra-Arsin	rc	Türkiye	151	TR-4
Yongalık	ol	Türkiye	184	TR-5H
Youghal	rc	Ireland	19	IE-1
Ytterby	fd	Sweden	42	SW-3
Yuka-Koski	fd	Russia	55	RU-2
Yukarı İmrohor	rc	Türkiye	287	TR-6
Yukarıemirler	pe	Türkiye	124	TR-3
Yukarıkartal*	mg	Türkiye	267	TR-6O
Yuncler	rc	Spain	162	ES-5D
Yuryev-Polsky	rc	Russia	73	RU-3
Yuxarı Ağcakənd	be	Azerbaijan	20	AZ-1
Yüylük	ka	Türkiye	305	TR-6
Yuzhno-Chistopol	rc	Russia	101	RU-4
Žabčice	fd	Czechia	117	CZ-6
Zabel	rc	Bulgaria	8	BG-1
Záblatí	rc	Czechia	69	CZ-4
Žablyano	rc	Bulgaria	6	BG-1
Zadobrova	rc	Slovenia	14	SI-1
Zaglik	wc	Azerbaijan	13	AZ-1A
Zagrad	bx	Montenegro	17	ME-1A
Zahájí-Blana	wc	Czechia	70	CZ-4
Záhorie	qs	Slovakia	10	SK-2
Zaida	rc	Morocco	58	MA-1
Zalău	rc	Romania	98	RO-1
Zalesie Gorzyckie	rc	Poland	175	PL-4
Zalitsi	rc	Ukraine	66	UA-4
Zallë	rc	Albania	45	AL-2
Zall-Sopot	rc	Albania	42	AL-2
Zaloška Gorica	be-sw	Slovenia	12	SI-1
Zamarramala	qs	Spain	134	ES-5C
Zanconi	be	Italy	446	IT-8
Zanella Vergan	rc	Italy	472	IT-8W
Zanie-Księżpol	rc	Poland	199	PL-4
Zaouia El Abidia	qz	Algeria	92	DZ-1

deposit	ore	country	number	map
Zaozerny	bx	Belarus	29	BY-1
Zapadodonska	wc	Ukraine	150	UA-7D
Żapniów	wc	Poland	150	PL-3
Zapolye	rc	Belarus	3	BY-1
Zaporižžja	rc	Ukraine	118	UA-6
Zaprešić	wc	Croatia	16	HR-1
Zargat Naam	ns	Egypt	177	EG-8
Żarki	rc	Poland	121	PL-1
Zarkovac	tc	Bosnia H.	40	BH-1
Žarnov	wc	Slovakia	127	SK-1
Żarnów	sc	Poland	138	PL-3
Żarów	ka	Poland	96	PL-2
Zarqa River	rc	Jordan	36	JO-1
Zarza de Alange	ka-py	Spain	275	ES-8
Zarzecze-Kamień	rc	Poland	194	PL-4
Žaškiv	rc	Ukraine	85	UA-5
Zatyshok	wc	Ukraine	162	UA-7D
Závadka	qz	Slovakia	123	SK-7
Zavet	wc	Bulgaria	40	BG-1
Zawada	sc	Poland	152	PL-3
Zawia	rc	Tunisia	42	TN-1A
Zbegovi-Zorka	rc	Serbia	50	RS-3
Ždánov	fd	Czechia	25	CZ-1
Zdojan	rc	Albania	34	AL-2
Zebrzydowa Zachód	sc	Poland	55	PL-2
Zefjanes	rc	Albania	23	AL-2
Zefta	rc	Lebanon	20	LE-1
Zefta*	rc	Egypt	61	EG-3
Zelené	rc	Slovakia	80	SK-5
Želenice	fd	Czechia	45	CZ-3
Zelenopyllia	qs	Ukraine	143	UA-7
Zemmouri	qz	Algeria	31	DZ-2
Zemmouri	rc	Algeria	32	DZ-2
Zenaga	fd	Morocco	88	MA-1
Zennewijnen	rc	Netherlands	21	NL-1
Zephyria	pe	Greece	96	GR-4
Zéramdine Lamhar	rc	Tunisia	48	TN-1D
Zéramdine Menhi	rc	Tunisia	49	TN-1D
Zeytindağ	pe	Türkiye	225	TR-5
Zgjeç	cr	Albania	7	AL-2
Zheleznogorsk	rc	Russia	89	RU-3
Zheltoe	be	Russia	141	RU-4
Zhuravlinyi Log	ka	Russia	112	RU-4
Žiar nad Hronom*	ka-qz	Slovakia	56-57	SK-4
Zielonki	rc	Poland	186	PL-4
Ziezow	qs	Germany	211	DE-4
Ziga-Puerto del Velate	ka	Spain	73	ES-3
Žikava	wc	Slovakia	24	SK-3
Zile	rc	Türkiye	102	TR-3
Zimmermann*	rc-wc	Germany	159-160	DE-3E
Zinnwald	li	Germany	227	DE-4
Zivkovci-Garaši	ka	Serbia	63	RS-3
Zizurkil-Alegia	ka	Spain	72	ES-3
Zlaté Moravce	rc	Slovakia	25	SK-3
Zlatna livada	be	Bulgaria	66	BG-1
Zlatno	qz	Slovakia	23	SK-3
Zlatokop	ze	Serbia	113	RS-6
Zlatoust	mg	Russia	124	RU-4
Złocieniec	rc	Poland	7	PL-1
Zofia	ka-wc	Poland	56	PL-2
Zogaj	cr	Albania	6	AL-2
Zoganje	qs	Montenegro	28	ME-1
Zolochiv	rc	Ukraine	43	UA-3
Zolochiv	rc	Ukraine	65	UA-4
Zonnebeke	rc	Belgium	2	BE-1
Zoopigi	rc	Cyprus	10	CY-1
Zrenjanin	rc	Serbia	18	RS-2
Zschornewitz	al	Germany	217	DE-4
Zuggersfeld/Breitensee	qs	Austria	75	AT-3
Żulin	ec	Poland	165	PL-1
Zvolen	rc	Slovakia	67	SK-1
Zvornik	al	Bosnia H.	60	BH-1
Zwevegem	rc	Belgium	12	BE-1

* Cluster of deposits

al alumina (synthetic)
an anorthosite
ba barite (barium minerals)
be bentonite, smectitic clays
bo borates (boron minerals)
bx bauxite
cr chromite
ec expanded clay
fc fireclay, refractory clay
fd feldspar, feldspathic materials
hu huntite
ka kaolin, halloysite
ky kyanite, andalusite, sillimanite
li lithium minerals
mg magnesite, hydromagnesite
na soda ash (natural), sodium sulphates
ns nepheline syenite, nepheline phonolite
ol olivine, dunite
pe perlite
py pyrophyllite
qf quartz-feldspathic sands and arkose
qs quartz sand, silica sand
qz quartz, quartzite
rc red clay
sa soda ash (synthetic)
sr celestine (strontium minerals)
tc talc, steatite, soapstone, leucophyllite
wc white clay, ball clay
wo wollastonite
ze zeolites, zeolitites, zeolitized tuffs
zr zircon, baddeleyite (zirconium minerals)

Atlas of Raw Materials for the Glass and Ceramic Industries
Europe and the Mediterranean Area
Deposits, Production, Reserves, and Uses.

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