



Bari, 2-5 September 2024

ABSTRACT BOOK

a cura della Società Geologica Italiana



**Geology for a sustainable
management of our Planet**



Politecnico
di Bari



PRESIDENTS OF THE CONGRESS

Luisa Sabato (SGI), Emanuela Schingaro (SIMP).

VICEPRESIDENT OF THE CONGRESS

Marcello Tropeano (SGI).

SCIENTIFIC COMMITTEE COORDINATOR

Sandro Conticelli (Università di Firenze).

SCIENTIFIC COMMITTEE

Lucia Angiolini (Università di Milano), Giuseppina Balassone (Università di Napoli), Domenico Calcaterra (Università di Napoli), Angelo Camerlenghi (OGS), Serafina Carbone (Università di Catania), Chiara Cardaci (Protezione Civile), Domenico Chiarella (Royal Holloway, London), Angelo Cipriani (ISPRA), Paolo Conti (Università di Siena), Giovanni De Giudici (Università di Cagliari), Patrizia Fiannacca (Università di Catania), Diego Gatta (Università di Milano), Guido Giordano (Università di Roma Tre), Lara Maritan (Università di Padova), Annalisa Martucci (Università di Ferrara), Ilaria Mazzini (CNR-IGAG), Stefano Mazzoli (Università di Camerino), Barbara Nisi (CNR-IGG), Stefano Poli (Università di Milano), Giovanna Rizzo (Università della Basilicata), Laura Scognamiglio (INGV), Mauro Soldati (Università di Modena e Reggio Emilia), Mario Tribaudino (Università di Torino), Chiara Varone (CNR-IGAG).

ORGANISING COMMITTEE

Donato Belmonte (SIMP), Bernardo Carmina (Università di Pisa), Fabio Dioguardi (Università di Bari), Giacomo Eramo (Università di Bari), Lorenza Fascio (SIMP), Vincenzo Festa (Università di Bari), Marilena Filippucci (Università di Bari), Fulvio Franchi (Università di Bari), Salvatore Gallicchio (Università di Bari), Giulia Innamorati (SGI), Maria Lacalamita (Università di Bari), Isabella Serena Liso (Università di Bari), Stefania Lisco (Università di Bari), Piernicola Lollino (Università di Bari), Daniela Mele (Università di Bari), Patrizia Maiorano (Università di Bari), Nadia Malaspina (SIMP), Virginia Marchionni (SIMP), Giuseppe Mastronuzzi (Università di Bari), Ernesto Mesto (Università di Bari), Francesca Micheletti (Università di Bari), Mario Parise (Università di Bari), Fabio Massimo Petti (SGI), Angela Rizzo (Università di Bari), Giovanni Scardino (Università di Bari), Giovanni Scicchitano (Università di Bari), Luigi Spalluto (Università di Bari), Simona Tripaldi (Università di Bari), Alessandro Zuccari (SGI).

COMMUNICATION COMMITTEE

Giovanna Agrosì (Università di Bari), Giulia Innamorati (SGI), Christian Leo (Università di Bari), Fabio Massimo Petti (SGI), Virginia Marchionni (SIMP), Nicola Venisti (Museo di Scienze della Terra, Università di Bari), Martina Zucchi (Università di Bari).

ABSTRACT BOOK EDITORS

Bernardo Carmina, Lorenza Fascio, Giulia Innamorati, Virginia Marchionni & Fabio Massimo Petti.

COVER IMAGE

The Pontifical Basilica of Saint Nicholas (Bari).

*Papers, data, figures, maps and any other material published are covered by the copyright own by the **Società Geologica Italiana**.*

DISCLAIMER: The Società Geologica Italiana, the Editors are not responsible for the ideas, opinions, and contents of the papers published; the authors of each paper are responsible for the ideas opinions and contents published.

La Società Geologica Italiana, i curatori scientifici non sono responsabili delle opinioni espresse e delle affermazioni pubblicate negli articoli: l'autore/i è/sono il/i solo/i responsabile/i.

Pedini M.*, Cella F., Invernizzi C., Mazzoli S., Viramonte J.G. & Filipovich R. - New insights in Andean geothermal exploration: preliminary results from the Tocomar geothermal system case study (Puna, Argentina)	1123
Pignatiello G.*, Coco I., De Girolamo M., Di Persio M., Giannattasio F., Gizzi C., Materni V., Miconi L., Miconi M., Piangiamore G.M., Romano G., Romano V., Santarelli L., Sapia V., Spadoni S., Tozzi R., Tripaldi S., Siniscalchi A., De Michelis P. & Balasco M. - Geoelectromagnetic map for central Italy: preliminary results of the MARGE project	1124
Romeo A.*, Cecere G., Filippucci M., Selvaggi G. & Tallarico A. - GNSS CORS network of the University of Bari: an open infrastructure for research and educational	1125
Tesauro M.*, Cortassa V., Gola G., Galgaro A. & Manzella A. - New insights from analyses of geophysical data in the Northern Apennine buried structures for evaluation of their geothermal potential	1126
Tinivella U.*, Giustiniani M., Castellani B., Giovannetti R., Zannotti M., Nicolini A. & Rossi F. - Reliable long-term CO ₂ storage as clathrate hydrates in seawater and marine sediments: the CO ₂ -RESTO project	1127
Ventola I.* - Seismic-electromagnetic effect in the Pollino area: measurements, analysis and numerical modelling	1128
S43. Groundwater resources innovation and sustainability: from characterisation to management of saturated and unsaturated zone	
Agius B. & Mamo J.* - Characterising rainfall-runoff processes and recharge rates in Mediterranean ephemeral streams with small impoundment dams	1130
Arras C., Calia M.*, Biddau R., Murgia A. & Da Pelo S. - Evaluation of recharge sources and nitrates origin in a karst spring: a case study from the F.na Nurighe spring (NW Sardinia, Italy)	1131
Brigida S.*, De Giglio O., Bagordo F., Grassi T., De Carlo L., Savino A.F., Turturro A.C., Montagna M.T. & Caputo M.C. - Review of laboratory-scale studies to assess factors affecting the fate of microorganisms in porous media	1132
Caputo M.C., De Carlo L., Doveri M., Giamberini M.S., Giordano R., Masciale R., Menichini M., Portoghese I.*, Turturro A.C. & Passarella G. - Integrated assessment of climate impacts on ecosystem functions and productivity of critical-zone eco-hydrology: the Italian case study of the INTERACTION project	1133
De Giglio O., Savino A.F.*, Bagordo F., Grassi T., Brigida S., Triggiano F., Apollonio F., Colella D., Turturro A.C., De Carlo L., Caputo M.C. & Montagna M.T. - Column test to study the influence of lithological characteristics of rocks on the hygienic-sanitary quality of groundwater	1134
Di Giovanni A.*, Di Curzio D. & Rusi S. - High-altitude minor springs in Central Italy tapped for drinking supply: hydrogeological characterization and aquifer potentialities evaluation	1135
Franceschi L.*, Menichini M., Parisi A., Gianecchini R. & Doveri M. - The effect of rainfall extreme events in the unsaturated and saturated zone: the case study of Pianosa Island (Tuscan Archipelago, Italy) ...	1136
Fuoco I.*, Criscuoli A., Vespasiano G., Bloise A., De Rosa R., Apollaro C. & Figoli A. - From geochemistry to treatment: a multidisciplinary study for reuse of safe natural waters	1137
Lapadula S., Balestra V.*, Barzaghi B., Falaschi M., Ficetola G.F. & Manenti R. - Rhythmic response of cave animals to external cycles	1138
Lobina F.*, Da Pelo S., Biddau R., Coppola A., Vacca A., Hassan M.B.S., Arras C. & Porru C. - Evaluation of nitrate leaching processes during infiltration and transport in the unsaturated zone	1139
Mainini A.*, Sabattini M., Critelli V., Arosio D., Brozzo G., Panzani A., Droghieri E., Righetti S. & Ronchetti F. - River Magra aquifer system groundwater flow model, for correct water management in the perspective of climate change (Liguria Region, Italy)	1140
Parisi A.*, Di Gregorio S. & Gentini A. - BIOflushing technology for in situ applications of the Soil-Omic protocol. Operational scale prototype of a plant for the decontamination of soil in the saturated and unsaturated zone	1141
Parisi A.*, Doveri M., Franceschi L., Baneschi I., Provenzale P., Raco B. & Menichini M. - Hydrological processes in the aquifer system unsaturated zone: insights from the small Mediterranean island of Pianosa (Tuscan Archipelago)	1142

Peruzzo L. *, De Carlo L., Caputo M.C. & Cassiani G. - ERT characterization of treated water pathways from large infiltration trenches in unsaturated fractured/karstified calcarenite	1143
Peruzzo L. *, Werban U., Pohle M., Cassiani G., Consoli S. & Vanella D. - EMI and ERT characterization of plant-scale irrigation and ET: an orange orchard-case study and methodological challenges	1144
Piscedda F.A. *, Wanty R., Arras C., Porru M.C., Biddau R., Musu F., Podda F. & Da Pelo S. - Assessing surface water-groundwater exchange dynamics for managed aquifer recharge design: a case study in Muravera, Southeastern Sardinia, Italy	1145
Porru M.C. *, Davids T., Arras C., Oude Essink G.H.P., Piscedda F.A. & Da Pelo S. - Methodological approach to simulate the evolution seawater intrusion with climate change	1146
Surian B. *, Forte E. & Zini L. - Monitoring saltwater intrusion in the area surrounding the Grado lagoon (NE Italy)	1147
Taddia G. *, Gizzi M., Berta A. & Lo Russo S. - Renewable energy application: sustainability techniques in Torino Urban City	1148
Tiwari S., Saviano S. & Polemio M. * - An integrated numerical modelling approach to the management of a coastal plain aquifer (Southern Italy)	1149
Torres D., Zambrano M. * & Baena J.G. - Use of GPR imaging for early detection of water leaks in pipelines	1150
Turturro A.C. *, De Carlo L. & Caputo M.C. - Integrated experimental approach for supporting the planning of a Managed Aquifer Recharge (MAR) plant Integrated experimental approach for supporting the planning of a Managed Aquifer Recharge (MAR) plant	1151
Verani M. *, Caputo M.C., Cassiani G., De Giglio O., Milani M., Carducci A., Federigi I., Pagani A., Angori A., De Carlo L., Turturro A.C., Prigiobbe V., Triggiano F., Savino A.F., Bagordo F., De Donno M.A., Grassi T., Brigida S., Consoli S., D'Emilio A., Barresi S., Bivona F. & Montagna M.T. - Predictive dynamics of microbiological contamination of groundwater in the earth critical zone and impact on human health: the DY.MI.CR.ON Project	1152
Volpe A. *, De Carlo L., Masciale R. & Caputo M.C. - Groundwater - lake interaction in a mediterranean coastal aquifer: the Alimini lake case study (Southern Italy)	1153

S44. New concepts and applications in exploration, sustainable exploitation, storage and modelling of georesources

Anderlini L. *, Anselmi M., Braun T., Errico M., Garcia A., Morelli A., Pezzo G., Saccorotti G., Serpelloni E. & Zaccarelli L. - What we learned from geodetic monitoring of subsurface industrial activities	1155
Chiozzi P., Bonorino L. & Verdoya M. * - Lithosphere heat flow and subsidence of the Tyrrhenian back-arc basin	1156
De Luca M. *, Mackay E.J., Good T.R., Scisciani V., MacBeth C. & Patruno S. - Geological modelling and CO ₂ flow simulation: an integrated approach for basin scale storage in a saline aquifer	1157
Dinani P. *, Bigi S., Conti A. & Moallemi A. - Carbon sequestration potential of abandoned fractured reservoirs in Northwest Zagros, Iran	1158
Fagiani A., Antoncicchi I. *, Corneli D., Sofia R. & Sterpa S. - National energy policy: a focus on georesources targets at 2050	1159
Galione M.R. *, Criscuolo L., Manzella A. & Trumpy E. - Enhancing the Italian geothermal data infrastructure: integrating geothermal data and potential assessment tools	1160
Giorgetti C. *, Scuderi M.M., Bourgeois F., Wibberley C. & Collettini C. - Evolution of hydromechanical coupling from quartz to shale rich faults and implications for fault parallel vs. fault perpendicular permeability	1161
Lorenzet R., Corradetti A., Del Ben A., Franceschi M. & Bonini L. * - A potential site to store Hydrogen in the subsurface in Northeast Italy	1162
Loreto M.F. * & Exp. Science Party - Sealing potential of the messiniaN SALT from IODP Expedition 402 .	1163
Maiorana M. *, Rizzo G.F., Todaro S., Gasparo Morticelli M., Agate M. & Sulli A. - Linking an outcrop analogue to a deep potential CO ₂ storage site with 3D geological model: an example from southwestern Sicily	1164

Groundwater - lake interaction in a mediterranean coastal aquifer: the Alimini lake case study (Southern Italy)

Volpe A.*, De Carlo L., Masciale R. & Caputo M.C.

Istituto di Ricerca Sulle Acque, CNR, Bari.

Corresponding author email: angela.volpe@ba.irsra.cnr.it

Keywords: coastal aquifer, hydrogeochemical indicators, saline intrusion.

The current study is focused on the characterisation of a coastal water system located in the Apulia Region, Southern Italy. The study site lies in the context of a semi-arid region, and comprises a freshwater lake fed by a multi-layer shallow porous aquifer. Groundwater is the main freshwater resource of the area, and suffers from an intensive exploitation that rises dramatically during summer, due to the increase of both population, caused by the massive presence of tourists, and the demand by agriculture. This study is intended to provide insight into the interactions between groundwater and lake water, in view of the potential lake water exploitation for drinking purposes, in order to help efficient and sustainable water management by local authorities.

Four monitoring campaigns were carried out throughout one hydrological year to collect a set of water samples both from the lake and wells in its nearby surroundings. Geochemical interpretation of water quality data was performed by comparing a set of hydrochemical indicators that can suggest the processes controlling the chemical composition of groundwater, with special attention to the potential seawater intrusion. The applied indicators included a number of correlations involving major ions concentrations and a few physico-chemical parameters relating thereto, e.g., total dissolved solids, and seawater fraction. Groundwater and lake water quality were then compared, particularly considering the standard values for drinking water. Data processing was aimed at bringing out potential seasonal variations of groundwater quality, due to the increased withdrawal from wells in the summer season, and the consequent potential impact on lake water quality.

Results suggested that groundwater chemistry was mainly controlled by the dissolution of carbonate minerals, with almost no contribution of cation exchange mechanisms, and a minimal impact of saltwater intrusion only into the wells closer to the coastline. The extent of intrusion showed no significant variation throughout the year. Lake water quality closely mirrored that of the feeding groundwater. Data analysis suggested that either biological and chemical processes occurring in the lake ecosystem, or anthropic activities in the area, did not have an impact on drinking water quality standards.