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A NEW GRAPHIC USER INTERFACE TO THE SOUTH POLE INFORMATION SYSTEM

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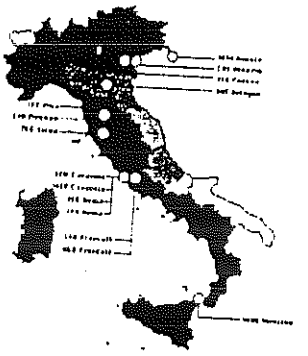
Introduction

An integrated multi-disciplinary information system, known as the South Pole Information System (SPIS), has been developed within the framework of the Italian Programme for Research in the Antarctic promoted by ENEA (National Agency for Alternative Energy). The system consists of a series of heterogeneous data banks sited in Local Centres, geographically distributed throughout the Italian territory, each one dedicated to a specific theme.



CODE	SITE	DATA
AUO	CNR Firenze	[illegible]
BAT	CNR Bologna	Bathymetric data
BIO	Università' di Padova	Land Biology data
CHI	Università' di Venezia	Environmental impact data
FIS	Università' di Roma	Earth Sismology data
OEM	OGS Trieste	Marine Sismology data
OFO	Enea-Casaccia	Satellite Remote Sensing data
LID	CNR Firenze	LIDAR Data
MAR	CNR Messina	Sea Biology Data
MET	Enea-Casaccia	Meteo Station data
OCE	CNR Roma	Oceanographical data
TER	Università' di Siena	Earth Sciences and Glaciology data

Fig. 1 - Territorial distribution map of the Local Centres

The main objective of the South Pole System has been to make all the data and information concerning the Italian Antarctic expeditions available to the scientific community, through the creation of a series of specific networked Local Centres (LC).

The system thus provides:

- local and remote access to all the information
- compatibility with international standards
- homogeneous user-friendly interfaces
- the possibility to perform comparative and interdisciplinary searches

The LCs are connected via telematic networks (using "WWW" technology) and the kernel of the system is at the European Space Agency (ESA-ESRIN) in Frascati (Fig. 2).

The EO-GDS (Earth Observation Guide and Directory Service) server at the ESA-ESRIN contains a description (DIF format) of the data-set stored in the distributed LCs, and therefore ESA-ESRIN functions as a bridge between the LCs themselves, allowing remote users to connect directly to any LC (via WWW browser or Telnet), utilising their own local access modes.

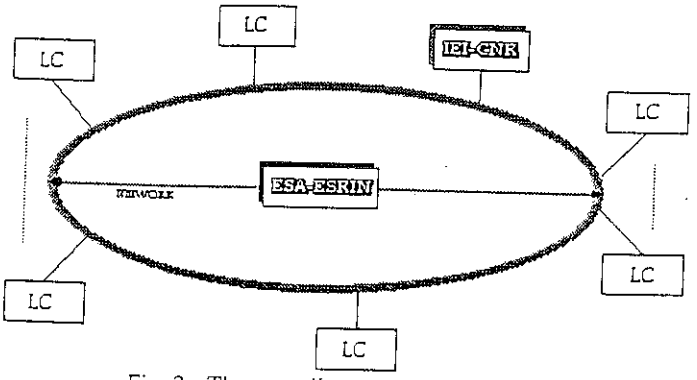


Fig. 2 - The overall structure of the system

In order to develop a user-friendly system interface, we have analysed: user-system communication (access to the information system); system-data bank communication (access to the data banks). A common model was designed able to cover both internal aspects (i.e. data access and retrieval by local users) and external aspects (remote access). Any user, connected via WWW browser to an LC, is able to navigate in a local system and perform the following tasks (see Fig. 3):

- access to macro-information (more details on the contents of the data-set)
- access to micro-information (access to the stored data)
- access to other LCs.

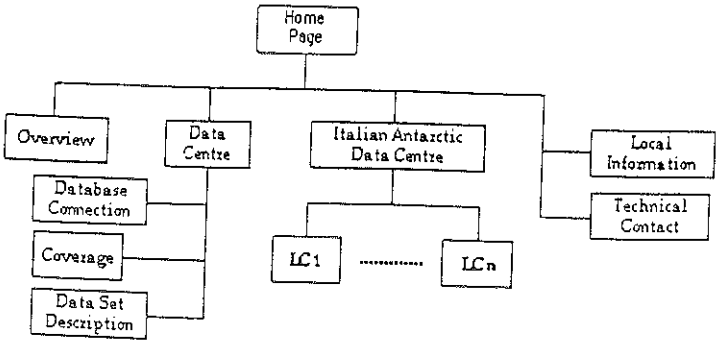


Fig. 3 - Local Centre structure

A new graphic user interface

WWW interfaces to databases referenced by geo-spatial and temporal attributes are a growing public resource for Environmental, GIS and Space-based data. Therefore, by developing a new graphic Java-based user interface, we had two objectives:

1. to provide a graphic user-friendly interface;
2. to integrate the South Pole Information System with other geographic data banks by querying a Meta-database. Meta-data, that is "data about data", describes content, quality, condition and other characteristics of given data.

A centralised Meta-database gives some advantages, providing for instance:

- information about data catalogues of organisations
- localisation of the stored data;
- minimisation of the network overheads;
- fitness for use: that is, data needed to determine if a data-set meets a specified requirement.

The developed new interface is based on the idea to implement a graphic user interface and a query procedure, by free text or predefined menus, to obtain information suitable to access specific databanks. In this case, for instance, a map of the Antarctic region might be shown and areas of interest could be selected simply using a mouse.

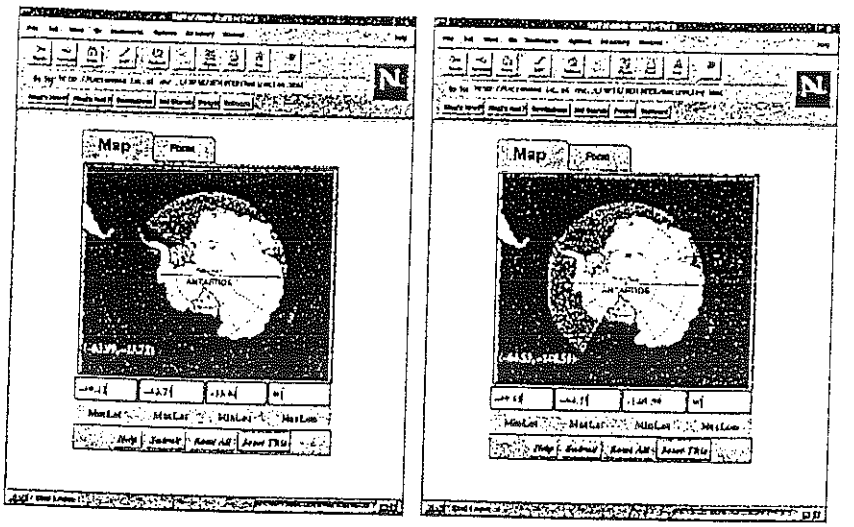


Fig. 4 - Antarctic region selection by clicking and dragging

The main functionality's of the interface are:

- interactive geographic area selection
- zoom area
- free text query

Geographic area selection using the mouse

The user selects a region (as a circular sector area) by clicking and dragging operations or by entering the proper values in the input fields. The mouse selection updates the input fields and vice versa; the selected area will be evidenced in green.

The co-ordinates are calculated as latitude and longitude, according to the standard World Geodetic System 84.

Zoom area

This function works at the moment as a magnifying glass (pushing down the shift key and moving the mouse) but it might be used to provide a multi-resolution selection of a geographic area.

Free text query

The user may fill a form to complete this query by free text and pre-defined menus. The selection of the second item, the "discipline", automatically influence, the possible selection of the third item, "sensor".

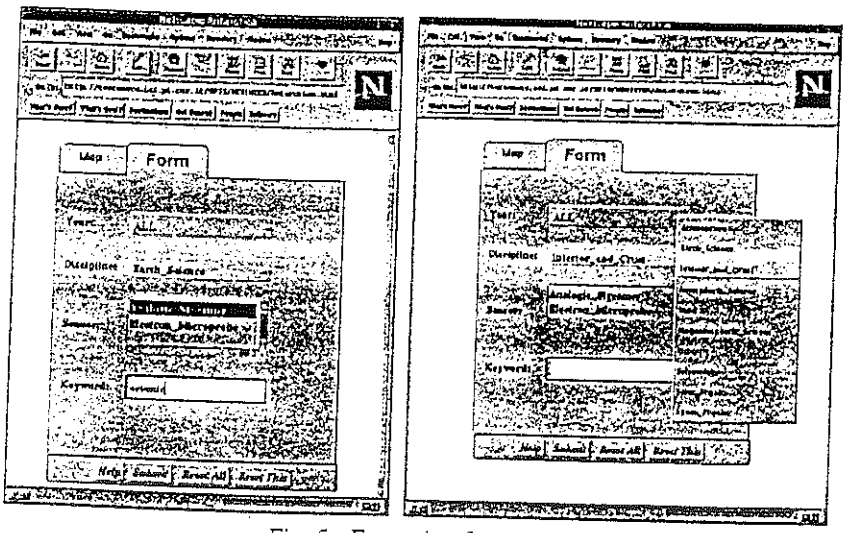


Fig. 5 - Example of query by free text

The query works on a predefined Meta-database and the results are shown by generated HTML document which contain links to other information. In this way, the user can navigate through the selected data and obtain the summary of the contents of a data-set and other useful information, such as the author of the study, the email address, telephone and so on.

Depending on the query result, the user is allowed to connect to the Local Centre using the "get data" button and then to obtain data according to the modality's in use at that specific centre.

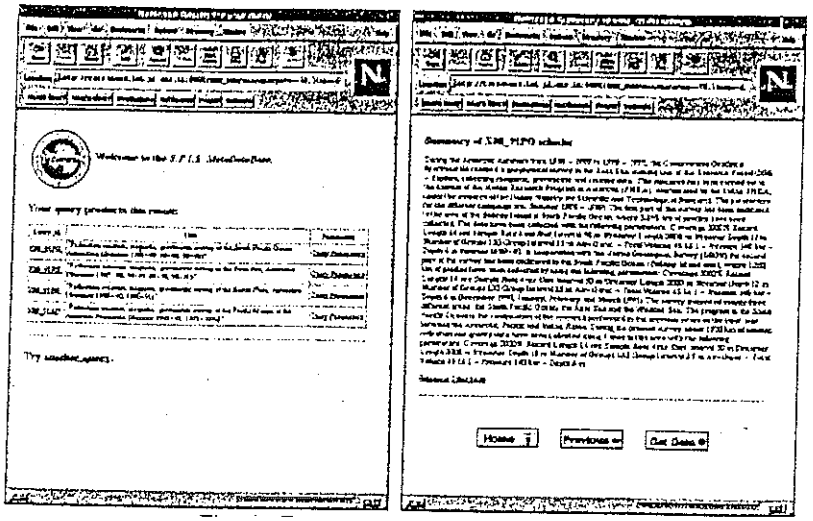


Fig. 6 - Example of query results

Conclusions

Concepts for the definition and realisation of a new graphic user interface to access the South Pole Information System have been presented.

In order to evaluate the system performance, a prototype has been implemented at IEI; this prototype can be accessed at the address *http://terranova.iei.pi.cnr.it* and it is able to simulate the entire distributed information system.

The IEI prototype allows to experiment and test possible developments of the system and applications, with particular attention to the end-user interface.

The database used in the prototype, as a Meta-database, is the implementation in a relational data base system of the DIF directory regarding the South Pole Information System. However, in order to extend the search to geographic data other than "The South Pole Information System" we considered to use the Content Standard For Digital Geo-spatial Meta-data which seems a model more complete than the DIF directory. This model has been approved by FGDC, the Federal Geographic Data Committee, who is the co-ordinator of the geo-spatial data in the United States.

At present, as a potential further development of our activity, we are now examining the possibility of extending this interface to the Local Centres (the second level of access) in order to provide the same standard data access mode for each site.

Acknowledgment

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Bibliography

1. S. Biagioni, C. Carlesi, F. Fabbrini, O. Salvetti, G. Leone, S. Russo, "Sistema Informativo South Pole: disegno e sperimentazione di una interfaccia orientata all'acquisizione di informazioni distribuite", N.I. B4-36, IEI-CNR, Ottobre 1994.
2. S. Biagioni, C. Carlesi, F. Fabbrini, O. Salvetti, G. Leone, S. Russo, "Sistema Informativo South Pole: disegno e sperimentazione di un sistema per l'accesso a informazione distribuita ed eterogenea", N.I. B4-37, IEI-CNR, Ottobre 1994.
3. S. Biagioni, G. Leone, A. Romani: "Un modello per l'archiviazione e la restituzione di immagini", Nota Interna IEI-CNR B4-52, Progetto Antartide ENEA, Dicembre 1994.
4. S. Biagioni, C. Carlesi, G. Leone, O. Salvetti: "National Antarctic Research Programme: the South Pole Information System", ERCIM NEWS, Paris (France) - N.22, July 1995.
5. S. Biagioni, C. Carlesi, G. Leone, O. Salvetti: "Rapporto sull'attività svolta nel periodo 1992-1995", in 'Stato delle attività del Progetto 3b: Telerilevamento, GIS, Banche-dati e Idrografia', ANT 95/12.
6. S. Biagioni, C. Carlesi, O. Salvetti: "The South-Pole Information System: Design and WWW Access Features", Fifth International W3 Conference, Paris, June 1996.
7. S. Biagioni, C. Carlesi, O. Salvetti, V. Spoto: "An Interface to Geographical Dynamic Environments via Java Programming", International Conference "Earth Observation (EO)/GEO, World Wide Web Workshop '97", Washington, DC, February 1997.