The Italian Arctic Data Center (IADC)

A digital infrastructure for managing data acquired in the Arctic region

"Conceptual model and distributed system for the management, use and dissemination of data"

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In the Arctic the numerous and complex interactions between atmosphere, ocean, cryosphere and biosphere on a broad spectrum of temporal and spatial scales, are largely responsible for the phenomenon that goes under the name of "arctic amplification". The research community is trying to answer to the fundamental questions of the climate system variability by providing observation, data analysis, theory and modeling. National and international institutions, are deeply involved in research activities in the Arctic with particular attention to climate change. In particular since 1998 the National Research Council of Italy (CNR) is supporting and coordinating the research projects and activities carried out by scientific community operating at Ny-Ålesund, in the Svalbard archipelago.

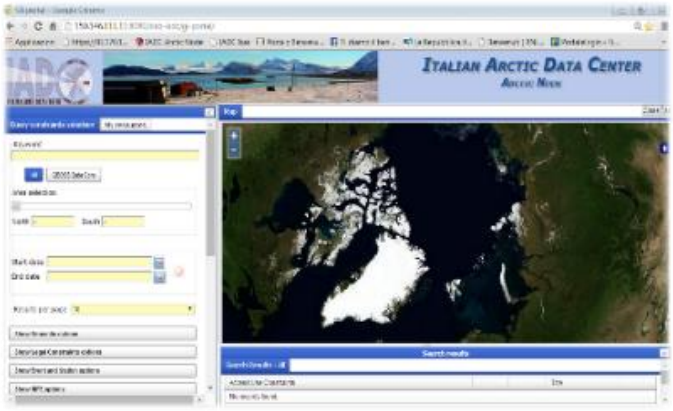
In 2014 the Italian Ministry of Education, University and Research financed the national project ARCA (www.arcaproject.it) to study the present climate change and the extreme past events in the Arctic. Three Institution are participating in the project: Italian National Research Council (CNR), National Institute of Oceanography and Experimental Geophysics (OGS) and the National Institute of Geophysics and Vucanology (INGV).
ARCA aims to develop a conceptual model on the mechanism(s) behind the release, of large volumes of cold and fresh water from melting of ice caps, investigating this complex system from the point of views of paleoclimatic and modern air-sea-ice interaction process.

The amount of information and data collected in the arctic region, as well as the request of accessing to them has been increasing in the last decades. Therefore, new approches must be provided to manage such information, that cannot be limited to small close community, but have to look forward to the optimized use of the resource for a wide scientific community.

"The logical system architecture"

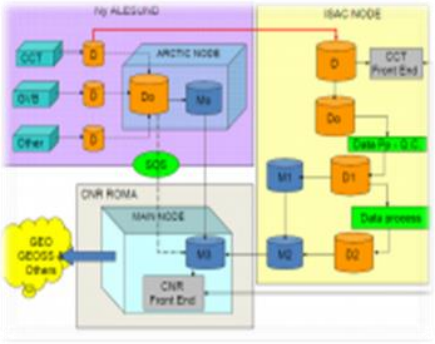
The Italian research activity in the arctic region has increased in the recent years, making necessary the development of an integrated system based on the brokering approach that allow users to easily discover and access data. CNR developed the information infrastructure to provide the polar scientific community, through the IADC (Italian Arctic Data Centre) to easily manage real-time data and metadata. Further work is in progress to improve the infrastructure, which will ensure data discovery through the interconnection of the system with the most common ones, integration with the global environmental observation network of GEOSS, and will contribute to increase the entire GEO community.

The IADC system was conceived to support the scientist, who may want to use it, through simple and intuitive interfaces to create a customized work environment. The infrastructure is provided with SOS service to allow real time updates on data and metadata directly from remote sensors.



"IADC geo portal"

"IADC web portal"



The infrastructure IADC consists of 3 nodes: Arctic Node, ISAC Node a Main Node, located at Ny-Alesund (Svalbard), at ISAC-CNR in Bologna and at CNR in Roma headquarter, respectively.

The data are produced by different measurement systems (sensors and tools), acquired (dataloggers, computers) and stored locally on a dedicated server (Arctic Node). The raw data are downloaded at 00:00 GMT each day on a local (Arctic Node) and a remote server (ISAC Node) to be pre-processed and cataloged on a time basis.

This infrastructure implements multi-disciplinary **interoperability** following a Brokering approach, supporting SCAR data policy and in accordance with European and international standards, including GEO/GEOSS, INSPIRE.

Interoperability principles are:

1. Not to impose any "common solution/specification" but advocate the use of open standards and interoperability APIs
2. To provide a common, consistent, and "high-level" entry point platform for discovering, accessing, and using IADC services
3. To interoperate to GEOSS, Copernicus, and other EC-funded programmes
4. To adopt/implement the GEOSS Architecture Principles
5. To adopt/implement the GEOSS "resource sharing" and "resource management" principles – including quality and preservation to adopt/implement the EC Open Data Access principles.

References

European Commission DG-R&I. (2015, October 01). "Guidelines on Data Management in H2020". Retrieved from http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-data-mgt_en.pdf

European Commission, 2016, "Open Science (Open Access)", URL: https://ec.europa.eu/programmes/horizon2020/en/h2020-section/open-science-open-access

GEO. (2015, October 01). GEOSS Data Management Principles. Retrieved from http://www.earthobservations.org/documents/dswg/201504_data_management_principles_long_final.pdf

GEO. (2015, October 01). The GEOSS Data Sharing Principles. Retrieved from https://www.earthobservations.org/geoss_dsp.shtml

INSPIRE, 2013, "Guidelines for the encoding of spatial data" available at: http://inspire.ec.europa.eu/documents/Data_Specifications/D2.7_v3.3rc3.pdf