



## **Project of Strategic Interest NEXTDATA**

Scientific Report  
for the reference period 01 - 01 - 2014 / 31 - 12 - 2014

### **WP 2.1 Archive of high-altitude observation networks**

**WP Coordinator: Maria Teresa Melis**  
URT EvK2-CNR

## **1. Scheduled activities, expected results and Milestones**

During the reporting period it was planned to obtain operational archives of the atmospheric observation data (meteorological parameters, solar and infrared radiation, atmospheric composition) acquired by the weather and GAW -WMO stations in high altitude and remote regions. In this phase, it was expected to include also data from the activities carried out by the other research groups and Special Projects. A dedicated and sophisticated portal and WEB GIS platform, originally developed in collaboration with the SHARE-GeoNetwork Project, will be upgraded on the basis of the existing system developed during the first phases of NextData. It was also planned to build new databases, integrated and accessible through the structure of SHARE-GeoNetwork, dedicated to the collection and distribution of data and metadata from mountain glaciers and cores of marine sediments in the Mediterranean area.

In collaboration with WP2.3, 2.4 and 2.6, the planned activities included:

- analysis of new data (file formats, data structures, query systems, connecting existing DB);
- configuration of WDB to contain the new data;
- analysis and sharing of standard formats for data storing;
- filling WDBPALEO;
- implementation of the interface to query data in WDBPALEO.

The activities here provided were related to:

- analysis, design and first implementation of the data and metadata archive of the Special Project DATAGRALP;
- updating Geoserver services;
- activities of training dedicated to the Pakistan technicians for the implementation of the system NextData SHARE-GeoNetwork in Pakistan.

## **2. Deliverables expected for the reference period**

D2.1.5 : Trial version of the specific portal; transfer of data to the General Portal.

D2.1.6 : Report on the activities of training and configuration of the shared system.

## **3. Activities which have been actually conducted during the reference period**

### *3.1 Research activities*

In this WP, it was planned the design, development and implementation of an Environmental Data System (EDS). The EDS was designed up to now to store data from two sources: high altitude automatic stations and non-polar ice cores and marine sediment cores. The EDS is split in two parts, WDB and WDBPALEO database systems: the first is dedicated to the storing of high altitude data from Automatic Weather Stations (AWS), and the second to paleoclimate data from non-polar ice cores and marine sediment cores. These two data sources (AWS and cores) would be the base of a timeline history for global past climate reconstructions.

The scientific interest of this service is the possibility to access, in the same website, the data acquired from the network of highest altitude stations for actual climate analysis and provision and data from paleoclimate samples acquired from non-polar glaciers and sea cores. The service shares these data in a downloadable standard format for all researchers and describes, by the metadata catalogue, all necessary information for the correct use of these data. The structure to store and share data, from database to Web GIS application, is based on open source software tools and they are free, useful and very capable. The present database is released with GNU license and it could potentially be customized and shared without limitations.

This phase of the Project mainly involved the publication of dedicated databases and therefore it was a phase of technological application.

With the coordination of system administrators that deal with IT infrastructure at the University of Cagliari, the system, with a revisited and renewed structure and interface, has been upgraded and put online. Required changes to meet the needs of new services required to the portal, accessible via the web at <http://geonetwork.nextdataport.it> were developed. The new site features, in addition to the new possibilities of searching and downloading of environmental data, the integration of a panel cartographic WEB-GIS advanced. The portal provides access to the two main services: searching metadata and searching datasets. These services are also integrated into a catalogue by categories which allows access to the contents of the system through the home page.

### *3.2 Applications; technological and computational aspects*

The activities were developed according to a plan that included two specific phases of work:

- collection, analysis and organization of the new dataset for the development of a database system to integrate into GeoNetwork;
- revisiting the interface for data/metadata management into NextData Project, in order to have a system based on SHARE-GeoNetwork dedicated to the Project.

We therefore included the acquisition of existing data and the study of issues related to different recording formats and validation specifications. The data were structured according to the logical ordering to enable a population of the database. Because the system Share-GeoNetwork interfaces with a database based on PostgreSQL dedicated to the data of the stations at high altitudes (WDB, Weather Data Base), the possibility of using the same database with a targeted customization to accommodate various data was evaluated.

Steps were taken towards the consolidation and improvement of the existing system, checking the availability of any updates to the main software and applications on a regular basis, in order to ensure greater stability. The administration of the system includes all activities of keeping contacts with the international GeoNetwork community and the management of the users of the portal. The activities included performing periodic backups of the metadata database in order to safeguard from malfunctioning computer data already computerized and in the catalogue.

### *3.3 Formation*

Within this WP, in 2014 the researcher Filippo Locci completed and discussed his doctoral thesis research at the "International PhD in Environmental Science and Engineering", University of Cagliari with the specific theme "Implementation and Management of High Altitude Data System for Climatological Research ", in which large space has been dedicated to the development of some phases of the NextData SHARE-GeoNetwork system.

Two internships were held of two students Marco Cocco and Giovanni Macaluso's course of study in natural sciences, at the Department of Chemical Sciences and Geological University of Cagliari, on the issues of metadating and inputting the data into the environment of GeoNetwork.

### *3.4 Dissemination*

Among the activities related to the NextData Project there are those relating to the consolidation of relations with key partners and institutional research in Pakistan (PMD, WAPDA, GCISC) in relation to the management and enhancement of observational systems and local storage, processing and validation data according protocols, QA / QC and comparison with the international scientific community on the key issues in the region of Hindu-Kush Karakoram Himalaya (HKKH). As part of these activities has been carried out a trip to Pakistan from 9 to 17 March 2014 with the aim of illustrating and train local staff of

various organizations and institutions around the sharing technologies and data acquisition using the GeoNetwork platform, with seminars in Islamabad and Gilgit (Baltistan).

### *3.5 Participation in conferences, workshops, meetings*

MELIS M.T., LOCCI F., DESSÌ F., FRIGERIO I., STRIGARO D., VUILLERMOZ E.: NextData Project: development of a web system for climate and paleoclimate data sharing. *87th Congress of the Italian Geological Society*, Milan 10 - 12 september 2014.

## **4. Results obtained during the reference period**

### *4.1 Specific results (Data libraries, Measurements, Numerical simulations, etc)*

The results relate to the customization and the peopling of WDB with different kind of data compared to data for which he had chosen this database system, and the provision of the same via a web portal dedicated to the NextData Project.

### *4.2 Publications*

LOCCI F., MELIS M.T., DESSÌ F., STOCCHI P., AKINDE M.O., BØONES V., BONASONI P., VUILLERMOZ E. (2014): Implementation of a webGIS service platform for high mountain climate research: the SHARE GeoNetwork Project. *Geoscience data journal*. DOI: 10.1002/gdj3.14

MELIS M.T., LOCCI F., DESSÌ F., FRIGERIO I., STRIGARO D., VUILLERMOZ E., (2014): NextData Project: development of a web system for climate and paleoclimate data sharing. In: AMES, D.P., QUINN, N.W.T., Rizzoli, A.E. (Eds.), *Proceedings of the 7th International Congress on Environmental Modelling and Software*, San Diego, California, USA, June 15-19. ISBN: 978-88-9035-744-2

### *4.3 Availability of data and model outputs (format, type of library, etc)*

Data included in the portal are available to display in tabular and graphic format and for download in CSV format.

Geographic data managed by the system webGIS are accessed and used in platforms that use the OGC WFS and WMS services.

### *4.4 Completed Deliverables*

D2.1.5: Trial version of the specific portal; transfer of data to the General Portal.

D2.1.6: Report on the activities of training and configuration of the shared system.

## **5. Comment on differences between expected activities/results/Deliverables and those which have been actually performed.**

There were no substantial deviations from the planned activities and the results respond to the expectations and scheduled activities.

Since the NextData General Portal is not completely functional yet, the transfer of data has not yet been activated. In any case the system developed in this WP follows the directions of interoperability and standards required by the NextData Project.

## **6. Expected activities for the following reference period**

The activities currently in progress and planned for the next phase include upgrading the services of data and metadata publication related to the various projects that contribute to the portal, expanding the possibility to make geospatial resources available.

Specific activity of this WP is also the assistance to researchers and users in the activities of structuring, population and publication of their information, at least in the start-up, and this is

mostly done through electronic means. Currently we are structuring the information that the portal will incorporate in the Special Project "HAMMER: Ground Deformations in Mountain".

The development of the project includes:

- testing activities with the researchers of the Project and publishing / sharing with the entire scientific community of validated data.
- Interoperability within the system that will see a natural range in the Portal General, where this data will be made available more widely. In this sense, the service of data querying should be expanded to allow users to access information with queries to multiple variables and possible internal correlations.
- Development of new procedures for interrogation and returning data in graphical form dedicated to paleoclimatic analysis. Integration in the navigator of cartographic features such as search, display data in WDB in the form of graphics, the ability to create printable maps according to standard formats.
- Access and visualization of published data in near real time. Storing data (raw and validated) in a space dedicated server and massive downloading through FTP and SFTP protocols and the ability to upload by authorized users.
- Cataloguing, through the instrument of "feature catalogue", the geographic component of the data processed through the Geoserver.
- Activation of the instrument validation metadata.
- Collaboration with operators in Pakistan for a full use of the services developed.

Deliverables:

D2.1.7: Testing version of the specific portal and publication of the sections and services validated; transmitting data to the Portal General.

D2.1.8: Report on the activities of training and configuration of the system of data sharing.