Project of Strategic Interest NEXTDATA

Scientific Report for the reference period **1/01/2012 – 30/09/2012**

WP 2.1 - Archive of high-altitude observation networks (Resp. Maria Teresa Melis, URT Ev-K2-CNR)

Partners: URT Ev-K2-CNR, CNR-ISAC, CNR-DTA, UNIMIB

1. Scheduled activities, expected results and Milestones

- Census of available data from high altitude stations;
- Analysis of existing environmental and climatologic DBs (databases) and evaluation of the possibility of sharing;
- proposal of a shared data storage.

Milestones:
M2.1.1 (PM12): Census of the field data collected during the project activities.
M2.1.2 (PM12): Feasibility study for a data collection center in the HKKH region.

2. Deliverables expected for the reference period

D2.1.1 (PM12): Report on the existing data and the structure of the archives.
D2.1.2 (PM12): Feasibility study for a data collection center in HKKH

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

3.1 Research activities

SHARE stations data collection and development of a database system integrated with SHARE GeoNetwork

This activity is carried out in synergy with the SHARE project; the data collected by a monitoring network of stations installed in high mountain regions (14 AWSs and 4 atmospheric observatories) are archived in a database system integrated with the SHARE Geonetwork. This activity includes the development of the data access service and its integration in the existing SHARE GeoNetwork.

The first step has been the analysis on the existing data and issues related to the different recording formats and validation specifications. Another analysis was carried out about the current state of the art for catalogue system, archiving and online publishing meteo-climatic data. WDB (Weather and Water Data Base), a software developed by the Norwegian Meteorological Organization, has been chosen. This system is designed to "store meteorological, hydrological and oceanographic (MHO) data in a PostgreSQL database management server" (https://wdb.met.no/doku.php) but, the customization of the system to the needs of NextDATA project and the extension of the database to other physical parameters is possible.
The WDB source files can be downloaded at https://github.com/wdb.
Within this activity, the UNIMI and IAMC research units (WP 2.3, WP 2.4) were involved to verify the adaption of WDB to the storing of glacial and marine data. It was decided to use it and support was given for the installation of WDB in their servers.
The general scheme of the system is shown in Fig. 1. The access to the informations is the metadata catalogue SHARE GeoNetwork with its upgrades and the data are stored in the dedicated DBs.

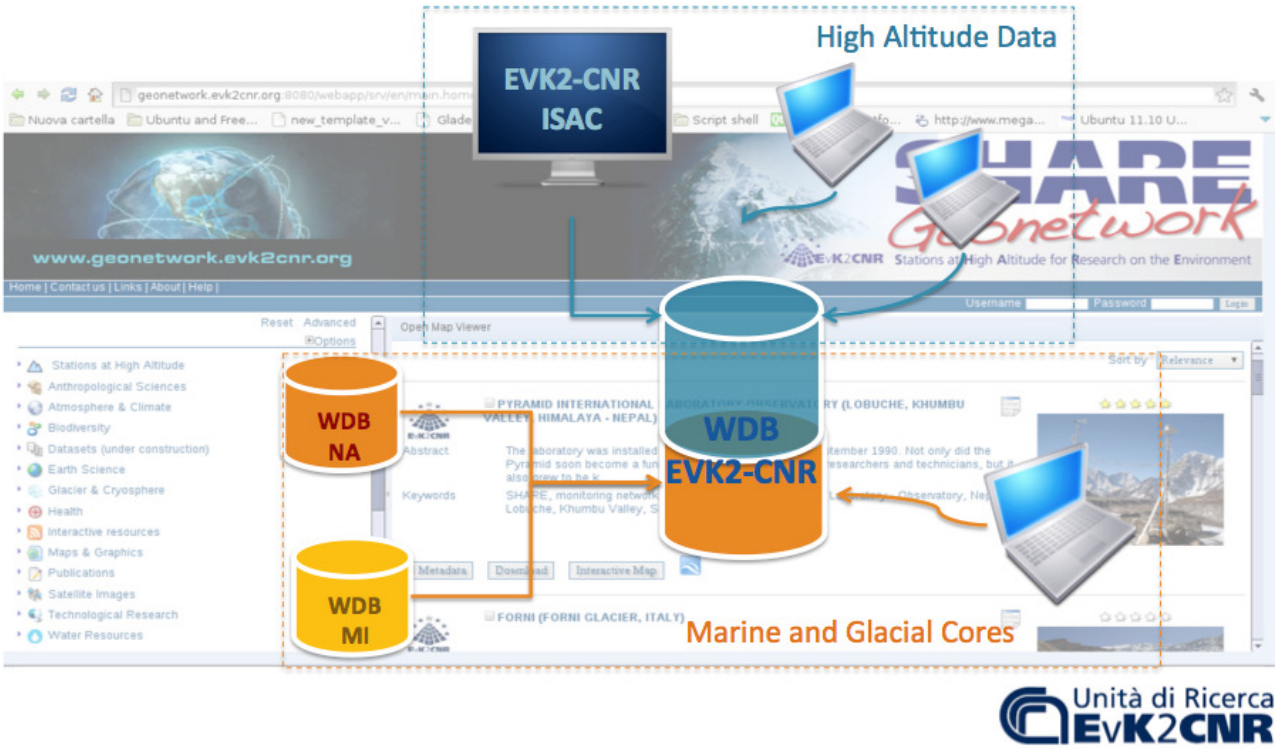

Fig. 1. General scheme of the DBs implemented in NextData.

Upgrade and Development of the SHARE GeoNetwork

This activity has mainly focused on the integration of Google Maps cartographic data in the GeoServer available with GeoNetwork: sat images, street maps, physical maps and hybrid maps. The system was deeply modified to bring the configurations to the publication of the Google's layers: the main issue is related to the change of the cartographic parameters to

make them compatible with the publication in Google. The interface of GeoNetwork SHARE was then changed in the configuration files and scripts with their dependencies that concern the segment mapping.

A feasibility study has been carried out about the possibility of developing a new service integrated with GeoNetwork in order to search and retrieve data acquired from the stations.

During the first year of activities, in collaboration with WP 2.3 and WP 2.4, the structure of cataloging metadata of SHARE Geo Network has been extended to store information on ice and marine cores. A hierarchical structure was identified, which includes the following schematic organization into different levels:

Project ---- > Cruise ---- > Sampling sites

Each level is described by metadata, connected with each other according to a Parent/ Child bond. The last level, related to the sampling stations, will be cataloged and linked to WDB "Weather and Water Database" (Norwegian Metereological Institute, 2012), which includes the alphanumeric data from cores.

3.2 Applications; technological and computational aspects

WDB is a stable and extensible database developed for the collection of meteorological, hydrological and oceanographic data: it is an open source software based on the PostgreSQL relational database and runs under Linux. WDB is also developed in compliance with the standards proposed by the WMO.
For the first installation has been used a test server running Debian "squeeze" (Debian 4.6 net - basic installation-i386) at the University of Cagliari. Installation was followed by a deep revision of the WDB database for loading data points representing the stations at high altitudes.
The adaptation of the data base has been necessary because the WDB has been realized for spatial data storage (GRIB, BUFR formats) originating from weather reports analysis or forecasts and therefore the customization step in SHARE has provided the insertion of approximately 600 new physical parameters in accordance with the variables measured by automatic stations.
The raw and validated data from the stations are not directly loaded into the database, so a Python script has been developed in order to decode the data in a compatible format with WDB. In particular, it was necessary to produce a synthetic metadata of the data of the stations with the schema metadata WDB.
To allow the loading of data from stations also for non-expert users a new graphical interface has been developed and it is possible to:

- insert new synthetic metadata regarding any new data provider;
- convert data from automatic weather stations (raw or validated) in a format compatible with WDB;
- load data directly in WDB.

The whole system of decoding and data entry has been tested with the data from Dosdè and Lukla stations, chosen as meteorological stations reference because their data format is different. A system of decoding ad hoc will be developed for atmospheric observatories, where the format data is different according to the instruments installed and the type of observatory (see Deliverables 1.2.3).

A PHP page (web publication) test with a mask to query the database has been also implemented. With the PHP mask it is possible to query the database by choosing:

• data provider
• automatic ID
• start date
• parameter.

The test of the entire chain of data entry from the input raw and validated data of the station to querying the database has been successfully concluded at this time and does not present any problem at the moment. At present we are loading data into the DB.

In synergy with WP 2.6 and as reported in the deliverable D2.1.2: it has been carried out a feasibility study for a Modelling Center and Data Analysis in Islamabad, Pakistan. Moreover, it has been started a Center for Numerical Modelling and Earth Observation in Kathmandu, Nepal, coordinated by the Nepalese researcher Dr. Bhupesh Adhikary, which main activity in this first year has been dedicated to running a modeling system at regional scale dedicated to meteorological forecast and pollutant transport.

3.3 Training activities

In this activity a PhD student has been involved from the International PhD in Environmental Science and Engineering at the University of Cagliari with the research ons: "Implementation and management of High Altitude Data System for climatological research".

3.4 Dissemination

No dissemination activities during this start-up period.

3.5 Participation in conferences, workshops, meetings

- M. T. Melis, 2012 - "Rio+20 Side Event: Mountain Knowledge Solutions for Sustainable Green Economy and Improved Water, Food, Energy, and Environment Nexus", Data and Information Management, Rio De Janeiro – June 18, 2012.
- M. T. Melis, 2012 - Workshop SEED: "Contribution of science and cooperation to the sustainable development of the Central Karakorum National Park" Innovative technologies for territorial management, Islamabad 4-7 June, 2012.
- F. Locci, M. T. Melis, 2012 - Workshop: International PhD in Environmental Science and Engineering Summer School: Implementation and management of High Altitude Data System for climatological research. Sept 10-14, 2012.

4. Results obtained during the reference period

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

From March 2012 to September 2012 high altitude Database has been installed and implemented. A graphical user interface (GUI) in Phyton has been developed to load data into the Database in a user-friendly manner. A PHP connection page to the Database has been developed with a query mask, that will be accessible during the second year of the project. The information system has been tested for Periche and Dosdè stations; these stations are two cases studies for the different format data received from the data logger, comprehensive of all data format of all 15 stations of the EvK2 CNR Committee network.

In synergy with the WP 2.3 and WP 2.4, the structure of cataloging metadata of SHARE Geo Network to store ice and marine cores has been defined.

4.2 Publications

Locci F., Melis M.T. and Dessì F. (2012) Share Geonetwork project: implementation of a web-service platform for high mountain climate research. Environmental modeling and software. Elsevier (under submission).

Poster presentation
Dessì F., Melis M.T. and Busilacchio M. (2012) The SHARE GeoNetwork Portal: Metadata Sharing for High Altitude Scientists. NAST (Nepal Academy of Science and Technology), The Sixth National Conference on Science and Technology, Kathmandu, Sept 25 - 27, 2012

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

The system preparation is ongoing. It is expected that the system will be online and fully operational by the end of 2012.

4.4 Completed deliverables

D2.1.1: Report on the existing data and the structure of the archives.
D2.1.2: Feasibility study for a data collection center in HKKH.

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

The knowledge and the availability of SHARE data has allowed for starting the operation of data input into the WDB system; this activity was originally planned only for the second year of the project.

6. Expected activities for the following reference period

Completion of data entry into the WDB system and launch of the new GeoNetwork with related new services.