



Project of Strategic Interest NEXTDATA

Scientific Report for the reference period 1-01-2013 /31-12-2013

WP 2.1 Archive of high-altitude observation networks

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1. Scheduled activities, expected results and Milestones

The scheduled activities carried out during the period of reference were:

- Full implementation of the data archives related to atmospheric observations (meteorological parameters, fluxes of solar and infrared radiation, atmospheric composition) performed at the weather stations and weather - WMO GAW stations in regions of high altitude and in stations in remote areas with similar characteristics, through the establishment of a dedicated Web GIS, developed in line with the SHARE GeoNetwork system.
- In this context, it was expected the inclusion of data related to the Station of Lampedusa.
- Inclusion of data on weather and climate in mountain areas from other national and international institutions, through protocols and conventions of collaboration.
- Continuation of the activities of the collecting and processing data center in Nepal, the consolidation of relationships with key institutional partners and research in Pakistan (PMD, WAPDA, GCISC) in relation to the management and enhancement of observational systems and local storage, processing and validating data according to International protocols QA / QC and comparison with the scientific community on key issues in the region of the Hindu Kush - Karakoram Himalaya (HKKH).
- It will begin the construction of new DBs, as part of the structure SHARE GeoNetwork, dedicated to the collection and distribution of data and metadata on the snow cover in the western Alps, on the state and evolution of the cryosphere in the Italian Alps, and the high-resolution climatology in the Italian Alps (activities related to special projects presented to the calls of the first year).
- The construction of a repository of mountain biodiversity and ecological data compatible with international standards (eg, EnvEurope) and the SHARE GeoNetwork will be started.
- There will be two semi-annual meetings of the researchers involved in the measurements at high altitude, for the harmonization of data and protocols files on the web and update of key scientific issues, the organization of an international meeting with the representatives of other measurement networks and international projects.

2. Deliverables expected for the reference period

D2.1.3: First version of the specific portal, data transmission to the General Portal, Data Storage from the Station of Lampedusa (see attached report).

D2.1.4: Report on the activities of data collection center in HKKH (see attached report).

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

3.1 Research activities

The NextData Project aims to provide support in the dissemination of in-situ measurement networks in remote areas of mountain and sea, developing the technology needed to deal with the whole data life, from production to validation through the selection, management and analysis, permanent archiving of data to the scientific and practical usability by users through the web platform SHARE GeoNetwork. During the second year of this research, activity

concerns in particular the creation of the two new climate archives dedicated to the collection of data from:

- Ice cores (non-polar) and sedimentary rocks from mountain glaciers (refer to WP 2.3);
- Cores of marine sediments of the Mediterranean area (WP 2.4).

Since the system Share GeoNetwork interfaces with a database dedicated to the data of the stations of high altitude, it is evaluated the possibility to use the same database with a targeted customization to collect different data. Therefore, the realization of such files shall be started from the change in the sources of the open-source database WDB (Weather and Water Database).

The following research activities were carried out during the reference period at the station for Climate Observations of Lampedusa:

- GAW activities include, in particular, measurements of greenhouse gases, aerosol optical properties, and meteorological parameters. Collected data, after quality control, were supplied to GAW databases, and were prepared for the submission to the NextData Database.
- Measurements of solar and infrared radiation made at the GAW NCO-P station were calibrated, quality checked and validated. The data were supplied to the NextData Database.

In 2013, activities in support of pilot projects started as well and, in particular, a series of technical meetings with the representatives of the Project DATAGRALP took place, in order to design and develop the system of data sharing inventory of glaciers in the Alps through the platform SHARE GeoNetwork.

3.2 Applications; technological and computational aspects

The specific activities developed in the second year of the project, as required, were:

- Completion of the DB compilation with the details of the high-altitude stations including all available data, validated and in raw format.
- The development of new paleoclimate DB (WDBPALEO) for climatological and environmental non-polar ice cores and marine sediments data storage, in collaboration with WP 2.3 and 2.4.
- The development of new web interfaces for access to both data and metadata, dedicated to information obtained under the Project NextData and in line with the system;
- Participation to the DataCite project for the allocation of DOI (Digital Object Identification);
- A new CO₂/CH₄ analyzer was installed at Lampedusa, in substitution to old systems (GC for CH₄, Siemens Ultramat for CO₂). The measurements obtained with the new and old systems were compared, and the new ring down absorption spectrometer (Picarro G2401, acquisition on funds from a different project) was run as the main operational instrument. Tests and comparisons between the old and the new system, as well as the on-line operation of the new analyzer, were carried out within NextData.
- Calibrations of the radiometers operational at Lampedusa and NCO-P were updated.

3.3 Formation

As reported in the statement of 2012, the WP 2.1 has seen the involvement of the researcher Filippo Locci, who is attending his PhD thesis at the "International PhD in Environmental

Science and Engineering", University of Cagliari with the specific theme "Implementation and management of High Altitude Climatological Data System for research ", supervisor Dr Maria Teresa Melis.

Besides, in 2013 Dr. Davide Tocco has developed his Master's Degree in Geoinformation and Geographic Information Systems to support the processes of Sustainable Land Management and Homeland Security (University of Rome "Tor Vergata" - Faculty of Engineering) on the theme: Contribution to the development of a system for web sharing of environmental data and metadata acquired as part of the SHARE project EVK2 -CNR, under the coordination of Dr Maria Teresa Melis.

The study for the thesis for a Laurea degree (Martina Sbrana, University of Roma Tre, Physics master degree) was started. The thesis analyzes and interprets ground-based and satellite measurements of atmospheric CO₂ in Lampedusa.

3.4 Dissemination activities

Information Day: Lampedusa sentinel of air quality and climate in the Mediterranean. Lampedusa, 20 June, 2013 .

SARRA A., Large effects of atmospheric aerosols on the Mediterranean climate through interaction with solar and terrestrial radiation. *Seminar as part of the Conversations of Physics*, University of Roma Tre, 2013.

3.5 Participation in conferences, workshops, meetings

MELIS M. T., DESSÌ F., LOCCI F., BONASONI P., VUILLERMOZ E.: SHARE Geonetwork: a web-service platform for environmental data sharing. *First International Conference on Remote Sensing and Geoinformation of the Environment (RSCy2013)*. Cyprus, 2013.

FRIGERIO, M. DE AMICIS, D. STRIGARO, M. MATTAVELLI, E. VULLEIRMOZ, F. LOCCI, F. DESSI, M.T. MELIS, A. PROVENZALE (2013): A structured server architecture to stock and SHARE ice core data. *GIT – Geology & Information Technology – Chiavenna (So)*, 17-19 June 2013.

F. LOCCI, F. DESSÌ, M. DE AMICIS, I. FRIGERIO, D. STRIGARO, E.VUILLERMOZ, M. T. MELIS: WDBPALEO 1.0: database per la raccolta di dati paleo-climatologici. *17 Conferenza Nazionale ASITA*, Riva del Garda, 5–7 November 2013.

M.T.MELIS (2013): SHARE GN2 The new system of data sharing. *High Summit*, Lecco 2013.

BECAGLI, S., M. MARCONI, D. SFERLAZZO, C. BOMMARITO, G. CALZOLAI, M. CHIARI, A. DI SARRA, J. L. GOMEZ-AMO, F. LUCARELLI, D. MELONI, G. PACE, R. TRAVERSI, M. SEVERI, and R. UDISTI: A seven year record of Saharan dust outbreaks over the Central Mediterranean Sea: chemical characterization, size distribution and optical properties. *European Geophysical Union*, Vienna, 2013.

BECAGLI, S., D. M. SFERLAZZO, C. BOMMARITO, M. CHIARI, A. DI SARRA, D. FROSINI, J.L. GÓMEZ-AMO, F. LUCARELLI, M. MARCONI, D. MELONI, S. NAVA, G. PACE, S. PIACENTINO, M. SEVERI, R. TRAVERSI AND R. UDISTI: Seasonality of Saharan dust outbreaks over Lampedusa island (central Mediterranean Sea) revealed by chemical composition of PM10 sampled at ground level and optical properties measured over the air column. *7th International Workshop on Sand/Duststorms and Associated Dustfall*, Frascati (Rome), 2013.

CALZOLAI, G., S. NAVA, M. CHIARI, F. LUCARELLI, S. BECAGLI, R. TRAVERSI, M. MARCONI, F. RUGI, R. UDISTI, A. DI SARRA, G. PACE, D. MELONI, C. BOMMARITO, and D. SFERLAZZO: Characterization of PM10

chemical composition and its variability in relation to different sources in the central Mediterranean. *European Geophysical Union*, Vienna, 2013.

CALZOLAI, C., S. NAVA, M. CHIARI, F. LUCARELLI, S. BECAGLI, R. TRAVERSI, M. MARCONI, F. RUGI, R. UDISTI, A. DI SARRA, G. PACE, D. MELONI, C. BOMMARITO, and D. M. SFERLAZZO: Characterization of PM₁₀ sources in the central Mediterranean Basin. *European Aerosol Conference*, Prague, 2013.

4. Results obtained during the reference period

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

The results apply specifically to:

- The completion of the peopling of WDB
- The structuring of the metadata of new information related to WP 2.3 and 2.4 and the population of GeoNetwork;
- The development of the new DB, WDBPALEO and its first phase of population;
- The assignment of a DOI to metadata of the stations.

Data collected at Lampedusa were submitted to various databases related to GAW. In particular, greenhouse gases and aerosol optical properties were provided.

Solar and infrared radiation data from NCO-P were supplied to the NextData Database.

4.2 Publications

M. T. MELIS, F. DESSÌ, F. LOCCI, P. BONASONI and E. VUILLERMOZ (2013): SHARE Geonetwork: a web-service platform for environmental data sharing, Proc. SPIE 8795. *First International Conference on Remote Sensing and Geoinformation of the Environment (RSCy2013)*, 87951V (August 5, 2013); doi: 10.1117/12.2027602; <http://dx.doi.org/10.1117/12.2027602>.

F. LOCCI, F. DESSÌ, M. DE AMICIS, I. FRIGERIO, D. STRIGARO, E. VUILLERMOZ, M. T. MELIS, (2013): WDBPALEO 1.0: database per la raccolta di dati paleo-climatologici. *17a Conferenza Nazionale ASITA*, Riva del Garda, Italy, 5-7 November, 2013. pp. 885- 892. ISBN 978-88-903132-8-8.

F. LOCCI, M. T. MELIS, F. DESSÌ, P. STOCCHI, M. O. AKINDE, V. BØNES, P. BONASONI, E. VUILLERMOZ (accepted, in press): Implementation of a web GIS service platform for high mountain climate research: the SHAREGeoNetwork Project. *Geoscience Data Journal*.

FRIGERIO, D. STRIGARO, M. MATTAVELLI, F. LOCCI, M.T. MELIS, M. DE AMICIS (submitted, under revision): A Structured Server Architecture To Store And SHARE Ice Core Data For Nextdata Project, *Geoinformatica*.

MARCONI, M., D.M. SFERLAZZO, S. BECAGLI, C. BOMMARITO, G. CALZOLAI, M. CHIARI, A. DI SARRA, C. GHEDINI, J.L. GÓMEZ-AMO, F. LUCARELLI, D. MELONI, F. MONTELEONE, S. NAVA, G. PACE, S. PIACENTINO, F. RUGI, M. SEVERI, R. TRAVERSI, and R. UDISTI: Saharan dust aerosol over the central Mediterranean Sea: PM₁₀ chemical composition and concentration versus optical columnar measurements. *Atmospheric Chemistry and Physics*, in press, 2014 (also as: Saharan dust aerosol over the Central Mediterranean Sea: optical columnar measurements vs aerosol load, chemical composition and markers solubility at ground level, *Atmospheric Chemistry and Physics Discussions*, 13, 21259–21299, 2013).

4.3 Availability of data and modelling output (size, support, etc.)

The data included in WDB are available for download in CSV format.

4.4 Deliverables completed

D2.1.3: First version of the specific portal, data transmission to the General Portal, Data Storage Station Lampedusa.

The Deliverable is completed for the stages of development and publication of specific portal platform based on SHARE GeoNetwork and is accessible at <http://geonetwork.evk2cnr.org> (see attached report).

Through the Portal General will then be accessible by this link.

D2.1.4: Report on the activities of data collection centre in HKKH (see attached report).

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

There have been no significant differences with respect to the provisions made in the project and the expected deliverables were completed.

6. Expected activities for the following reference period

The development of the project includes:

- The population of WDBPALEO.
- The integration of data from other Italian stations participating in the project and in particular the data from Station Lampedusa.
- The implementation of the interface to query data WDBPALEO.
- The implementation of loading web interface of the data in WDB and WDBPALEO.
- The update of Geoserver services.
- The population of metadata and project data DATAGRALP.
- Collaboration in the development and sharing of new DB and ecological data on biodiversity.