Ministero
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NextData
un sistema nazionale per la raccolta, conservazione, accessibilità e diffusione dei dati ambientali e climatici in aree montane e marine

Project of Interest NEXTDATA

A national system for the retrieval, storage, access and diffusion of environmental and climate data from mountain and marine areas

SUMMARY OF FIRST YEAR ACTIVITIES

Project of Interest NEXTDATA

A national system for the retrieval, storage, access and diffusion of environmental and climate data from mountain and marine areas

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Partners for the first project year: CNR-DTA, CNR-ISAC, URT Ev-K2-CNR, University of Milan Bicocca, CMCC, INGV, ENEA, CASPUR, ICTP

Report on the project activity during the first year
01/01/2012-31/12/2012

SUMMARY OF FIRST YEAR ACTIVITIES

Ministero
Istruzione
Università
Ricerca

ISAC

Unità di Ricerca
EvK2CNR

DISAT

cmcc

ENEA

ICTP
The Abdus Salam
International Centre
for Theoretical Physics

INGV

CASPUR
CONSORZIO INTERUNIVERSITARIO

1. GOAL OF THE PROJECT

Mountains are sentinels of climate and environmental change and many marine regions provide information on past climate variations. The Project of Interest NextData will favour the implementation of measurement networks in remote mountain and marine areas and will develop efficient web portals to access meteoclimatic and atmospheric composition data, past climate information from ice and sediment cores, biodiversity and ecosystem data, measurements of the hydrological cycle, marine reanalyses and climate projections at global and regional scale. New data on the present and past climatic variability and future climate projections in the Alps, the Himalaya-Karakoram, the Mediterranean region and other areas of interest will be obtained and made available. The pilot studies conducted during the project will allow for obtaining new estimates on the availability of water resources and on the effects of atmospheric aerosols on high-altitude environments, as well as new assessments of the impact of climate change on ecosystems, health and societies in mountain regions. The system of archives and the scientific results produced by the NextData project will provide a unique data base for research, for environmental management and for the estimate of climate change impacts, allowing for the development of knowledge-based environmental and climate adaptation policies.

2. PROJECT DESCRIPTION

2.1 Scientific topics

The NextData Project intends to (1) favour new and ongoing experimental measurements, observational campaigns and numerical simulations on the present climate in high-altitude regions in Italy, Himalaya-Karakoram and other relevant areas (Rwenzori, Andes), in collaboration with the SHARE Project; (2) develop new climatic reconstructions in the Mediterranean region and in other areas of interest; (3) produce climatic projections for the next decades in the Alps and Apennines, in the Himalaya-Karakoram region and in other mountain areas. This will allow for obtaining a characterization of present climate and of its ongoing changes, as well as of past climate variability in regions of particular interest, to improve the estimate of climatic changes expected in the coming decades.

Measurement and observation activities are devoted to the characterization of the present climate in mountain regions and include:
(1) atmospheric, air quality and aerosol measurements in remote regions, supporting and implementing the activities carried out in the framework of the SHARE project. This will be based on global and regional WMO-GAW stations, newly installed stations in the framework of national and international monitoring networks, and measurement campaigns supported by the NextData Project;
(2) characterization of the hydrological cycle in mountain areas, including the state of the cryosphere (snow cover and glaciers), through the use of existing and newly measured data;
(3) measurements and quantitative observations of the state and dynamics of mountain ecosystems and biodiversity in high-elevation regions.

Reconstructions of past climate variability are devoted to the last centuries and include:
(1) recovery of existing data and new measurements in mountain environments, with particular focus on non-polar mountain glaciers;
(2) recovery of existing data and new measurements in marine sediments in the Mediterranean area
(3) identification of other natural proxies (lake sediments, peat bogs) for the reconstruction of recent climate variability;
(4) reconstruction/reanalysis of the climatic variability of the Mediterranean Sea in the last century and climatic characterization of the Italian area.

Numerical simulations include:
(1) simulation of atmospheric dynamics in the regions of interest of the project;
(2) simulation of climate variability in the last centuries;
(3) projections of future climate variability in the next decades;
(4) development and implementation of impact models to assess the response of the mountain environment to climate change.

A central goal of the Project is to create a system of archives and thematic portals which will make environmental and climate data on remote mountain and marine regions widely available. The core of the system will be a **General Portal for accessing the data and metadata**, which will become an important Italian contribution to the international programme **GEO/GEOSS.** This project activity is carried out in sinergy with the SHARE project, some activities of which are now supported by the NextData project.

The **pilot studies** carried out during the Project will focus the "scientific questions" which will be answered by the data and simulations obtained during the Project. The pilot studies

will provide quantitative estimates on the availability of water resources and the effects of atmospheric aerosol on the mountain environment, as well as new results on the impact of climate and environmental change on the hydrological cycle, on ecosystems, and on health and society in high-altitude regions.

The NextData Project includes an ensemble of intense **training activities**, based on the activation of research, Post-Doc and Doctorate felloships, and on the organization of summer schools and residential scientific and technological training courses.

The activities of the NextData Project are linked with international programmes and initiatives, such as the activities of **GAW-WMO**, **UNEP**, **ECRA**, **SHARE**, and are an important Italian contribution to the **Global Earth Observation System of Systems of GEO**.

2.2 Regions of interest - first year

The activities of NextData are centered on mountain areas and on the Mediterranean region. During the first year, the areas of interest of the Project are:

Italian Alps and Apennines, where measurements of atmospheric parameters, air quality and biodiversity have been carried out, mountain glacier drilling has been supported and hydrological and cryospheric (snow cover) data have been collected.

Hindu-Kush Karakorum Himalaya (HKKH), where field measurements of atmospheric and air quality parameters have been conducted, hydrological and cryospheric data have been collected, and gridded data sets on precipitation, temperature and snow cover have been prepared.

Mediterranean region, where marine sediment cores have been identified and analyzed, and the input data for building a recontruction/reanalysis of the recent variability of the Mediterranean Sea have been collected.

We carried out preliminary explorations for extending the research activities in other two areas of potential interest for the Project, namely, the Bolivian Andes and the Rwenzori Mt. area in Uganda.

2.3 Structure of the Project

The Project is organized in two Sub-Projects, which currently include 11 Work Packages (WP):

Sub-Project 1 aims at creating an integrated observation system and it is divided into five different Work Packages, according to the type of data measured. They are associated with diverse requirements of research, and of climate, environmental, experimental, instrumental and technological applications:

WP 1.1 High-altitude climate observation system
WP 1.2 GAW-WMO climate observatories
WP 1.3 Marine observation systems and climate reconstructions
WP 1.4 Environment and climate data from ice cores
WP 1.5 Paleoclimate data from marine sediments

Sub-Project 2 is devoted to the creation of environmental and climatic archives, data analysis and interpretation and pilot studies. It covers the different types of archive corresponding to particular WPs:

WP 2.1 Archive of high-altitude observation networks
WP 2.2 Archive of marine observation networks and climate reconstructions
WP 2.3 Archive of data from non-polar ice cores and long-term biological data
WP 2.4 Archive of paleoclimatic data from sediment cores
WP 2.5 Archive of numerical simulations and projections
WP 2.6 Portal for access to data and pilot studies on data use

Figure 1 schematically illustrates the Project structure.

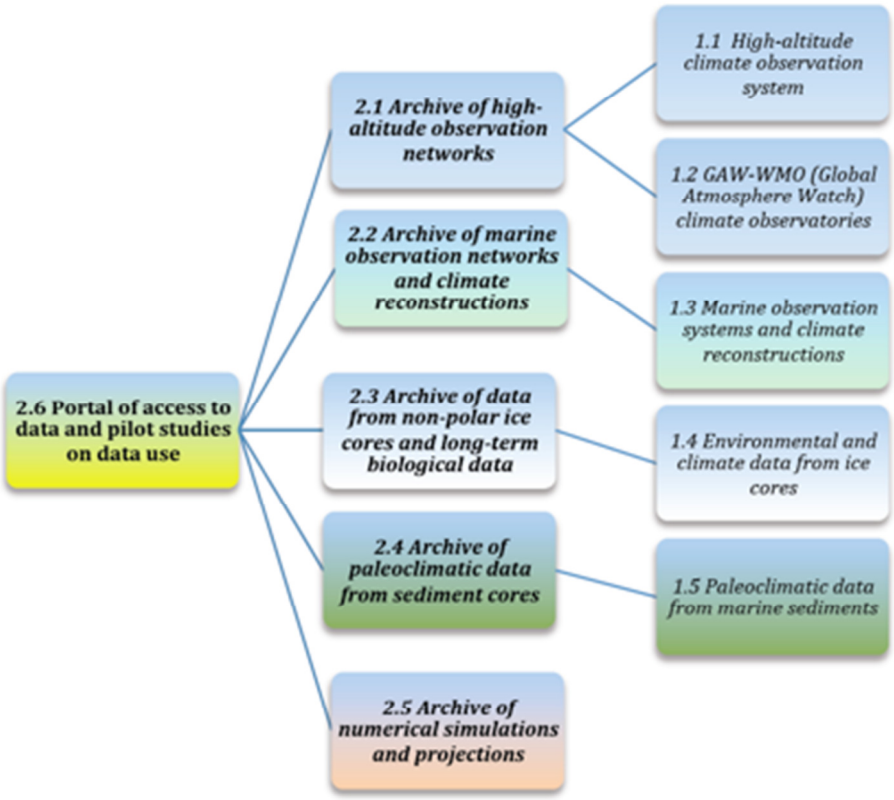

Figure 1. Structure of the Project of Interest NextData

2.4 Project partners - first year (2012)

CNR-DTA. State research institution. International excellence in the running of experimental and observation programmes in remote areas, the drilling of cores in marine sediments and processing of sediment cores, data analysis and paleoclimate research activities.

CNR-ISAC. State research institution. International excellence in the field of climate observations in remote regions, measurement of atmospheric parameters and air quality, design, management and implementation of measurement campaigns, development of innovative technologies for data measurement and transmission, data analysis, numerical simulations of the global climate and high-mountain climates, downscaling techniques and

analysis of climate change impacts on the mountain environment. It is involved in the management of European projects and participates in international programmes (GAW-WMO, ABC-UNEP, SHARE, ACTRIS, GEO/GEOSS, GEWEX, EC-Earth, ECRA).

URT Ev-K2-CNR. CNR institution of research for Third Parties. International excellence in the implementation of climate monitoring and measurement campaigns in remote high-mountain areas, the set up and management of experimental facilities in extreme environments, the running of the participation in international measurement programmes (SHARE, GAW-WMO, UNEP, bilateral programmes). It conducts activities in high-altitude areas in the Alps, Apennines, Hindu-Kush Himalaya Karakorum, Rwenzori, and the Andes.

DISAT-UNIMIB. State university. Competence of international excellence in paleoclimate research based on ice cores, in ice drilling and data analysis, the development of techniques for the drilling and analysis of ice cores in extreme environments.

ENEA UTMEA. National Agency for new technologies, energy and sustainable economic growth: Governmental research institution. The ENEA UTMEA groups involved in the project have competences of international excellence in the measurement of atmospheric parameters in remote areas, the development and use of numerical regional-scale and climate models, Earth-atmosphere interactions in the Mediterranean area, paleoclimate studies by means of ice-core analysis, and participation in the running of international projects.

CASPUR. Non-profit inter-university consortium (now merged into CINECA). Competences of excellence in scientific numerical calculations on massively parallel computers, data processing and storage, the development of archives and data access portals and procedures of graphic visualization.

ICTP. International institution funded by the Italian Government, UNESCO and IAEA. Competences of international excellence in high-resolution numerical simulations of regional climate in the areas involved in the project, including the Himalayan zone.

INGV. State research institution. The INGV group involved in the project has competences of international excellence in the analysis of marine data and in reanalyses of the Mediterranean, based on the assimilation of historical data into high-resolution numerical models.

CMCC. Non-profit limited consortium company. Competences of international excellence in numerical simulations of the global and regional climate, the analysis of climate variability impacts, and participation in international research programmes on climate simulations (IPCC, CMIP5).

3. ACTIVITIES AND RESULTS IN THE FIRST YEAR (2012)

3.1 Research activities: measurements, climate reconstructions, numerical simulations

All measurement activities, reconstruction/reanalysis and numerical simulations indicated in the Executive Plan have been effectively completed. The reports of each WP provide a detailed description of the individual activities and of the results obtained during the first year, as well as of the scientific publications produced so far.

In the following, a short description of the results for each WP is provided.

WP 1.1: High-altitude climate observation system
The in-situ measurement activities at the 14 SHARE automatic weather stations in the Alps, Apennines, Himalaya-Karakoram, Rwenzori and Andes were continued, thanks also to the support of specifically trained local personnel. Studies concerning the installation of new infrastructures and/or the upgrade of existing stations for climate and environmental monitoring were also performed.

WP 1.2: GAW-WMO climate observatories
Measurements of trace gases (greenhouse and reactive), atmospheric aerosol (chemistry and physics) and meteorological parameters were carried out at the GAW-WMO global stations "Monte Cimone" (GAW ID: CMN) and "Nepal Climate Observatory – Pyramid" (GAW ID: PYR), as a continuation of the activities started within the SHARE project.

WP 1.3: Marine observation systems and climate reconstructions
The first year of activity was dedicated to the feasibility study and design of a Reconstruction/ Reanalysis (RR) of the past hundred years of the Mediterranean Sea climate variability. The Mediterranean RR production will start in 1958 while other efforts will be invested in the implementation of the climate reconstruction of the previous fifty years.

WP 1.4: Environment and climate data from ice cores
An ice core drilling of 32 m was performed on the Lys Glacier at the Colle del Lys (Valle d'Aosta, Italy). The ice core was processed on the Eurocold Lab in DISAT-UNIMIB, obtaining the stratigraphy and the density profile. Two sites for new ice core drillings were defined (Colle Gnifetti, Italian Alps and South Gasherbrum glacier, Karakorum, Pakistan).

WP 1.5: Paleoclimate data from marine sediments
Five potential keysites in the Central-Western Mediterranean Basin, able to preserve the marine records for the last 2000 years, were identified. The analysis of the numerical data available for the Gulf of Salerno allowed for identifying the main climatic oscillation for the last 2000 years (Roman Period, Medieval Period, Little Ice Age, Modern warm Period).

WP 2.1: Archive of high-altitude observation networks
A direct access service to the monitoring station data was developed and data integration in the SHARE GeoNetwork was obtained through the implementation of specific tools. The access to the information is provided by the metadata catalogue of SHARE GeoNetwork, with its upgrades, and the data are stored in dedicated databases.

WP 2.2: Archive of marine observation networks and climate reconstructions
The activities of WP2.2 were dedicated to the creation and organization of the reference database of historical marine and atmospheric data needed to produce the "Reconstruction-Reanalysis" of the Mediterranean Sea for last 100 years.

WP 2.3: Archive of data from non-polar ice cores and long-term biological data
A thorough information recovery from the international scientific literature and databases allowed for identifying the existing archives and the sites where ice cores from non-polar glaciers have been drilled. A specific Geodatabase for spatial and non spatial data on drillable glaciers and ice core drillings was created.

WP 2.4: Archive of paleoclimatic data from sediment cores
An exhaustive archival research on sedimentary cores, drilled in the Mediterranean Basin, was carried out. The comparison between the data collected for the 1517 drilling sites and the information recovered in the scientific literature have allowed for defining the strategy for metadata publishing and the Geodatabase for the recording of marine sediments data.

WP 2.5: Archive of numerical simulations and projections
The census of the climate data (numerical simulations and analysis) that will be made available to the scientific community and users (stakeholders and decision makers) was completed; the construction of the network of numerical data and metadata portals was started.

WP 2.6: Portal for access to data and pilot studies on data use
The structure and characteristics of the General Portal were defined. The pilot studies are : (2.6.a) Water resources in the Himalaya-Karakoram; (2.6.b) Changes in terrestrial biodiversity in the north-western Italian Alps; (2.6.c) Changes in snow cover and the hydrological cycle in the Alps; (2.6.d) Effects of aerosol in high altitude areas. The pilot studies have provided the first relevant results and led to publications in the international scientific literature.

3.2 Project web site

The project web site was designed and implemented. The web site is accessible at the links *http://www.nextdataproject.it* and *http://www.nextdataproject.eu*. Figure 2 shows the Home Page of the NextData web site.

Figure 2. Home page of the web site of the Project NextData

The web site contains (in Italian and English):

a) general description of the project and its structure
b) list of participating institutions
c) list of Scientific Advisors (see section 5)
d) description of the activities of the different WPs
e) description of the data collected by the project archives
f) results of the pilot studies
g) scientific reports of the different WPs, updated every six months
h) project deliverables
i) project news
l) slides and dissemination, schools and conferences
m) call for research proposals (see section 6)

The web site includes a link to the General Portal to access the data, which will be activated during the second year.

3.3 System of archives and General Portal of the Project

The main characteristics of the General Portal have been identified. The General Portal will have two main archives, one for the ground and field data and metadata (based on SHARE GeoNetwork) and one for gridded data (reanalyses and numerical simulations) which will use THREDDS servers. During the first year, the strict collaboration between some of the project partners (CNR-ISAC, URT Ev-K2-CNR, CMCC, CASPUR) has led to the definition of the characteristics of the data portals that will be implemented by the WP partners and that will form the backbone of the General Portal, contributing also to the harmonization of the methodologies for archiving and accessing the data that will be made available through the portals.

The General Portal will include an intermediate *Middleware* layer, based on the GEOSS type of approach and which will be able to access both the thematic portals which will be activated by the various project partners and directly the data and metadata archives. Overall, the NextData Project will provide an important Italian contribution to the International Programme GEO/GEOSS. The figure below schematically illustrates the structure of the NextData General Portal. The existence of different archives and thematic portals for the numerical simulations (WP2.5) is due to the need of avoiding huge data transfers (of the order of hundreds of Terabytes); for this reason, the simulation data will be kept at the institutional archives of the partners which generated them. By contrast, the field and measurement data (including paleoclimatic data) will be stored in a single server, which will be mirrored by at least another server (presumably hosted at CNR).

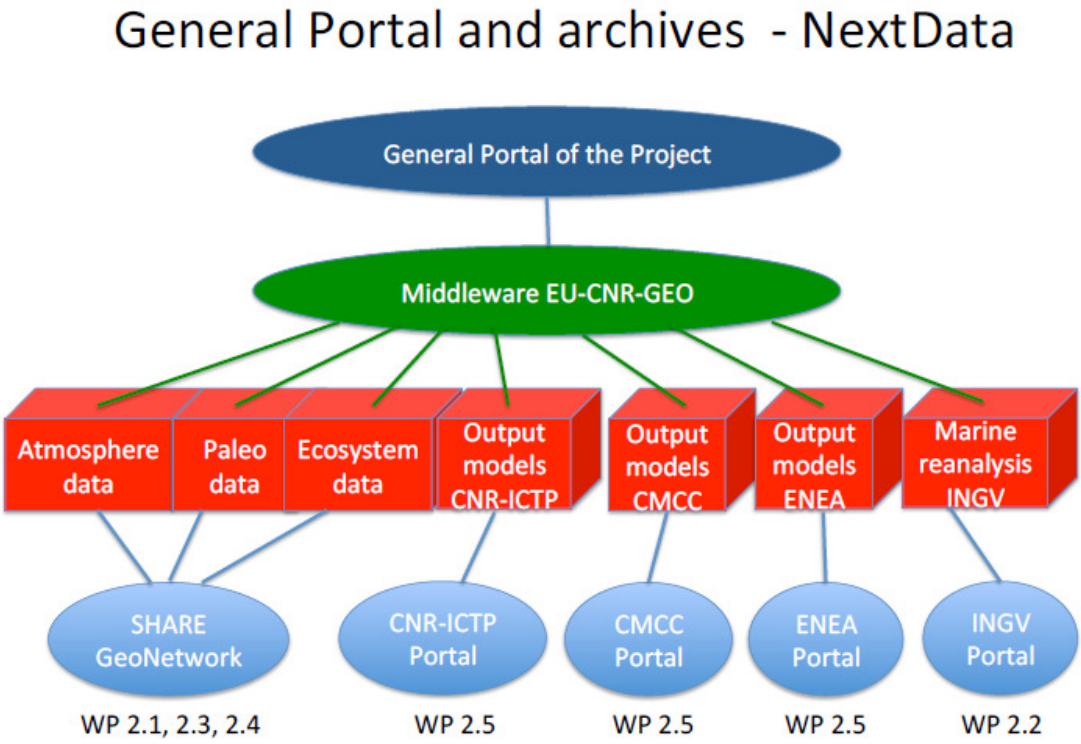

Figure 3. Schematic representation of the General Portal

The implementation of the General Portal has been the object of a public call open to CNR Institutes and non-CNR partners, which was published on the web site of the project, by the CNR-URP and by DTA on 20 November 2012, see section 6.

3.4 MoUs with non-CNR partners and Project meetings

The MoUs with the project partners (CMCC, INGV, ENEA, University of Milan Bicocca, ICTP and CASPUR) have been signed in various dates between 13/07/2012 and 03/09/2012, using the template received by CNR on 17/06/2012.

As described in the Executive Plan, two general meetings of the participants in the NextData Project were organized on 23/01/2012 and 17/10/2012. Project strategies were discussed in the first meeting and the advancement of the project activities was discussed in the second meeting.

Many technical meetings were organized, internally to the various WPs or for coordinating the activities of different WPs which deal with similar topics. Several meetings with scientists not directly involved with NextData were also organized.

3.5 Training activities

In 2012, the training activities have lead to the activation of one Doctorate fellowships at the University of Turin (Physics) and three Doctorate fellowships at the University of Milan Bicocca (Environmental Sciences).

Seven research/PostDoc fellowships and five junior research (Post-Master) fellowships were activated at CNR.

Several Master Theses were concluded and Doctorate Theses are ongoing.

The summer school "Climate, aerosols and the cryosphere" was organized in Valsavarenche (Val d'Aosta) in June 2012, with the participation of 12 lecturers of international standard and about 30 students from all the world (Doctorate students, Post-Docs, young researchers).

The summer school "Climate change and the mountain environment" has been prepared for June 2013, with the participation of 22 lecturers of international level. This latter school will provide a starting point for the creation of a periodic summer school on the mountain environment and its changes.

3.6 Dissemination

The Project of Interest NextData was presented at various scientific meetings and to the general public. The project was presented at the Academy of Sciences of Torino, at the Lincei Academy in Rome, at the Nepal Academy of Sciences and Technology (NAST), at the Italian State TV (RAI Parlament), at ICIMOD (Nepal), at the European Climate Research Alliance (ECRA), at the University of Barcelona, at the meeting of the International Group of Funding Agencies (IGFA), to representatives of the Belmont Forum, at the World Bank and at the InterAmerican Development Bank in Washington. The NextData project has been indicated as an important Italian contribution to the international programme GEO/GEOSS. The NextData

project was presented in various public lectures in schools and museums. The volume "What is Global Warming" is being translated into English for the free distribution to schools in Nepal (Himalaya) and North Pakistan (Karakoram). Representatives of the project have participated in several public conferences on climate change in the mountains, presenting the NextData project.

4. INTERNATIONAL COLLABORATIONS

The atmospheric and air quality measurement activities have been carried out in the framework of international programmes such as **WMO-GAW** e **ABC-UNEP**, as described in the individual WPs.

Climate simulation activities have been carried out in the framework of the **CMIP5** program and of the European Consortium **EC-Earth**. Some of the climate simulations have been carried out in collaboration with the LRZ Supercomputing Center in Munich (Germany), in the framework of the **Gauss EXPRESS** project. Some of the regional climate simulations are part of the international programme **CORDEX**.

The activities on the different aspects of the hydrological cycle are closely linked with the Collaborative Project "Changes in the hydrological cycle" of the European Climate Research Alliance (**ECRA**), coordinated by Dr. Provenzale.

There are ongoing plans to link some of the NextData activities on cyrospheric dynamics and hydrology in the Himalaya-Karakoram to the activities of **ICIMOD** (discussion meetings in Kathmandu in September 2012).

In May 2012, several meetings with representatives of the **World Bank** and on the **InterAmerican Development Bank** took place in Washington, DC, to assess the feasibility of a joint project on the Bolivian Andes.

The NextData General Portal will be an important Italian contribution to the "Global Earth Observation System of Systems" (**GEOSS**) which is being built by the "Group on Earth Observations" (**GEO**). In particular, there will be a strong interaction between NextData and the **"Ecosystems" Task** of GEO, coordinated by Dr. Provenzale, especially for what concerns mountain ecosystems.

5. SCIENTIFIC ADVISORS OF THE NEXTDATA PROJECT

We defined the list of Scientific Advisors of the NextData Project. These are scientists of excellent international standard, who do not directly participate in the activities of NextData but are aware of the themes of the Project. Most Scientific Advisors are Italian scientists who work in foreign institutions or international bodies. The Scientific Advisors will help periodically assessing the progress of the Project activities and will act as reviewers for the new research proposals which will be presented at the call for proposals (see Section 6).

The Scientific Advisors of the NextData Project are:

Dr. **Gianpaolo Balsamo**
(land surface modelling and data assimilation; interaction of water, energy, carbon over land)
Model Division/Physics
European Centre for Medium-Range Weather Forecasts
Reading, UK

Prof. **Martin Beniston**
(climate dynamics, climate change impacts in mountain regions)
Director, Institute for Environmental Sciences (ISE)
University of Geneva
Site de Battelle / D, 7 route de Drize, CH-1227 Carouge / GE, Switzerland

Prof. **Annalisa Bracco**
(monsoon dynamics, ocean dynamics)
School of Earth and Atmospheric Sciences
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ES&T 311 Ferst Dr
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Prof. **Vittorio Canuto**
(climate modelling and dynamics)
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Prof. **Fabio D'Andrea**
(soil-vegetation-atmosphere interactions and climate dynamics)
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Paris cedex 05, France

Prof. **Klaus Fraedrich**
(climate dynamics, precipitation)
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Prof. **Marino Gatto**
(biodiversity, ecosystems)
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Politecnico di Milano
Via Ponzio 34/5, 20133 Milano, Italy

Prof. **Dieter Kranzlmuller**
(data distribution and archives, portals, data management)
Munich Network Management Team
Ludwig-Maximilians Universitat Munchen
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Prof. **Juerg Luterbacher**
(paleoclimate)
Department of Geography
Climatology, Climate Dynamics and Climate Change
Senckenbergstrasse 1, 35390 Giessen, Germany

Prof. **Paola Malanotte Rizzoli**
(oceanography, data assimilation, marine reanalyses)
Dept. of Earth, Atmospheric and Planetary Sciences
Massachusetts Institute of Technology
77 Massachusetts Avenue
Building 54-1416 (The Green Building), Cambridge, MA 02139, USA

Dr. **Claudio Mazzoleni**
(aerosols and climate)
Michigan Technological University
1400 Townsend Drive
Houghton, MI 49931, USA

Dr. **Renata Pelosini**
(impacts and applications)
ARPA Piemonte
Via Pio VII, 9, 10135 Torino, Italy

Prof. **Franco Siccardi**
(hydrological cycle, precipitation, extreme events)
Dipartimento di Informatica, Bioingegneria, Robotica e Ingegneria dei Sistemi (DIBRIS)
Università di Genova, Italy

6. CALL FOR PROPOSALS FOR THE SECOND YEAR

With the goal of further broadening the national scientific community participating in the Project and covering topics which are outside the main expertise of the present partners, on 20 November 2012 we issued an invitation to submit scientific proposals on specific themes of interest to the NextData Project. The call was published on the web site of CNR, on the site of CNR-DTA and on the web site of the NextData Project. The call closed on 25 January 2013 and the selection of the accepted proposals will be carried out in February and March 2013. The call was open to networks coordinated by a CNR Institute, with the possible participation of non-CNR subjects as partners in the network.

The topics of the calls are:

(1) Design, development and implementation of the General Portal of the NextData Project, with specific attention to the harmonization and interoperability of the thematic archives and complying with the indications of international programmes such as GEO/GEOSS (WP2.6).

(2) Estimate of snow resources and of their change in the Alps, supporting accurate and reliable ground measurements and the estimate of the associated uncertainty, the use of

satellite data and the implementation of snow cover models, to obtain future estimates of snow cover in the Alps (WP2.1, WP2.6).

(3) Estimate of the state and recent evolution of cryosphere in the Italian Alps and construction of a national data base of glacial resources, also to develop quantitative models of the future evolution of Italian glaciers (WP2.1, WP2.6).

(4) Realization of a set of global and hydrostatic and non-hydrostatic high-resolution regional climate simulations for the areas of interest of the Project (Hindu-Kush Karakoram Himalaya, Alpine region, Africa, Mediterranean). Comparison with observational data available in the framework of the NextData Project (WP2.5, WP2.6).

(5) Reconstruction of paleoclimate and paleoenvironment from stratigraphic variations in parameters measured in mountain lake sediments, to build models for the climate system which take into account data from remote regions (WP2.3, WP2.6).

(6) Reconstruction and integrated analysis of paleoclimatic conditions, with particular attention for the last Millennium, by an interdisciplinary effort able to integrate the information from different paleo-archives such as ice cores, peat bogs and sediments, and to reconstruct anthropic pressures. Both the recovery of new data and the analysis of existing data are considered (WP1.4, WP2.3, WP2.6).

(7) Estimate of the high-resolution spatial distribution of the standard monthly temperature and precipitation values for high-elevation Alpine areas (elevation above 1500 m amsl). Reconstruction, at the same spatial resolution, of the last 50 years of temperature and precipitation variability for mountain areas of particular interest (eg, National Parks) (WP 2.1, WP2.6).

7. ACTIVITIES OF THE SECOND YEAR

The specific research activities planned for the second year (2013) are described in detail in the reports for each WP.

At the overall Project level, during the second year the **first version of the General Portal** will be implemented. This will be open to all participants in the NextData Project, to be subsequently open to the scientific community in the following years. Possibly, a new WP will be created for the activities specifically related to the General Portal.

Two general meetings of the participants in NextData will be organized. In addition, the **first international scientific conference of the NextData Project**, open to the national and international scientific community, will be organized.

Some of the **pilot studies** will be completed and the pilot studies listed in the Executive Plan will be started.

The **proposals for new research activities will be selected**. This will allow for involving new scientific subjects in the activities of the NextData Project and to enlarge the spectrum of topics considered in the Project (recent paleoclimate, glacier database, regional climate simulations, high-resolution climatology in Italian mountains, snow measurements).

New calls for scientific proposals will be issued, to complete the construction of a national "Network of Excellence" for the measurement, data archiving and scientific research on climate and environmental change in mountain regions and on recent paleoclimatic variability in the Mediterranean area.

In particular, we shall **start new activities** on data measurement, recovery, archiving and scientific research on the **hydrological cycle in mountain areas** (with specific focus on the Alps and Apennines), and on the dynamics of **mountain ecosystems**, considering both plant and animal components and possibly activating new WPs on these topics.

The **training activity** will be continued, with the activation of Doctorate, Post-Doc, Post-Master and research fellowships, and with the summer school on "Climate change and the mountain environment". The feasibility of a periodic summer school on the mountain environment will be assessed.

Dissemination will be continued and strengthened, by popular articles, public conferences, the realization of a short documentary movie on mountain ecosystems and photographic exhibitions on different aspects of the mountain environment.