Project of strategic interest NEXTDATA

Scientific Report for the reference period **01/01/2012-31/12/2012**

Unit CMCC

WP 2.5 - Archive of numerical simulations and projections

1. Scheduled activities, expected results and Milestones (as indicated in the Executive Plan)

Coordinate the activities of the WP.
Contribute to the census of global and regional numerical simulations and reanalyses to be made available to users (including the scientific community).
Contribute to the harmonization of storage and data access protocols.
Contribuite to the definition of the "scientific quesitions" at the base of the WP coordinated simulation experiments. The major goal of these simulations is to produce and make available high-quality data for the investigation of physical and dynamical climate processes for the areas of interest of the project (mountain areas with a complex orography and Mediterranean region).
Contribute to the definition and preparation of the numerical experiments to be carried out in the framework of the project.

Milestone M2.5.1 (Month 12): Completion of the census of climate simulations and harmonization of storage protocols; definition of "scientific questions" and simulation strategies.

2. Deliverables expected for the reference period

- Deliverable D2.5.1: Report on a census of available climate simulations
- Deliverable D2.5.1: Report on the scientific questions

3. Activities conducted during the reference period

3.1 Research activities

During the first year, CMCC has coordinated the activities of WP2.5, organizing five WP meetings, coordinating the partners contributions to the achievement of planned objectives and the completion of related deliverables. More specifically, in these meetings, the WP partners have discussed and defined the:

- methodology for the census of the model numerical simulations and reanalyses to be made available in the framework of the project;
- harmonization of storage and data access protocols and the integration of the data server with the project data portal;
- design of the WP coordinated model experiments.

In addition, CMCC contributed to the census of the available global and regional numerical simulations and reanalysis as described in the Project Executive Plan, providing information on the data available at the Centre, the memory requirements, the size and description of the individual files. The Center has coordinated the census activities carried out by the WP partners, summarizing the results in the project deliverable D2.5.1.

CMCC has contributed and coordinated the work and the discussion aimed at the definition of the numerical simulations for the areas of interest for the project. In particular, the CMCC has designed a series of numerical experiments to be conducted with the atmospheric limited area model COSMO (Rockel et al., 2008), implemented non-hydrostatic and with different horizontal resolutions (from 14 km to 8 km). The experiments will be carried out by forcing the regional model with different boundary conditions (e.g., "perfect bounday conditions" from re-analysis and boundary conditions from simulations and projections of climate change). These simulations will provide data sets that will allow to investigate the hydrological cycle in the Alpine region and its possible changes induced by global warming. In particular, the scientific question we want to address with these experiments concerns the possible role that natural variability might have in modulating the signal of climate change in the region, especially in relation to the water cycle. CMCC also will perform simulation experiments of the climate of the recent past, present and future of the Mediterranean area. These simulations will be made with high-resolution coupled regional model developed by CMCC within WP2.5. The objective of these experiments is to reproduce the main modes of variability of the basin during the 20th century and assess how they might be affected by climate change. These activities are part of the CMCC contribution to the project deliverable D2.5.2 on the scientific questions to be addressed with the model data produced, collected and made available within WP2.5.

Finally, during the first year, CMCC has begun a series of analyzes of extreme events in the Mediterranean in a series of simulations performed by the CMCC under different international programs (eg. CIRCE and CMIP5) to characterize the signal of change climate in the region.

3.2 Applications, technological and computational developments

CMCC has developed a regional coupled ocean-atmosphere model of the Mediterranean region, composed by the limited area atmospheric COSMO model and by the NEMO-MFS model of the Mediterranean Sea. The atmospheric component is implemented with a 25 km resolution, whereas the ocean component has a horizontal resolution of about 7.6 km and 71 vertical levels. The coupled model will be used to make the climate simulations for the Mediterranean area (including the Alpine region) planned within the framework of the project.

The raw outputs of the climate simulations performed with the CMCC models (CMCC-CM, CMCC-CSM e CMCC-CESM) in the framework of the CMIP5 programme have been post-processed and a subset of variables (following CMIP5 recommended output fields and time frequencies) have been converted to CMOR2 netcdf format.

At CMCC boundary conditions were prepared to conduct high resolution simulations (14 to 7 km) for the Alpine area with the limited area atmospheric model COSMO-CLM. Preliminary

tuning test have been done to check the prformance of the model on the domain of interest.

Finally, a THREDDS data server has been installed at the Center, in order to provide the access to the CMCC climate data to the other participants in the project, and in preparation of the necessary infrastructure for data access through the project general portal. As agreed with the other WP partners, the server implements the protocol OpenDAP, which provides access to a catalog of metadata. The transfer of the CMCC data made available to the scientific and user community (as described in the deliverable D2.5.1) has been started.

3.3 Formation

None.

3.4 Dissemination

None.

3.5 Conferences, Workshops, Meetings

None.

4. Results obtained during the reference period

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

A large amount of climate data (both simulations and re-analyses) has been produced, collected and organized during the first year of the project. The results of this work have been summarized and illustrated in the project deliverable D2.5.1 (Report on a census of available climate simulations). CMCC has also started the archiving of the data on the server that will be one of the nodes of the network at the base of the project data portal.

4.2 Publications

None.

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

A detailed list and description of the data made available to the project partners and users is provided in the project deliverable D2.5.1 (Report on a census of available climate simulations).

4.4 Completed deliverables

In the course of the first year project the partners have completed the project deliverables :
- Deliverable D2.5.1: Report on a census of available climate simulations
- Deliverable D2.5.1: Report on the scientific questions

as scheduled in the project implementation plan.

5. Differences between planned and performed activities/results/deliverables

None.

6. Expected activities for the following reference period

In the course of the second year of the project, all of the WP2.5 partners will contribute to the following activities:

- continue the production of global and regional numerical simulations targeted to regions of interest of the project, including specific experiments with dynamics of aerosol;

- complete the provision of the contents of the archive of numerical data, with a particular focus on the Mediterranean area, the Alpine region and the region HKKH;

- implement high-resolution numerical models at the local scale, not hydrostatic, for the simulation of the dynamics of climate and environment in mountain areas with complex orography;

- organize meetings (at least two) of the project researchers, in order to discuss the climate experiments to be performed and analysed, and the usability of numerical data.