

**WMO/ICSU/IOC
WORLD CLIMATE RESEARCH PROGRAMME**

**JSC-31/Doc. 4.10
(25.1.2010)**

JOINT SCIENTIFIC COMMITTEE

Item number

**THIRTY-FIRST SESSION
ANTALYA, TURKEY
15-19 FEBRUARY 2010**

**Report on the first year of activities of the TFRCD
(Submitted by Drs Filippo Giorgi and Colin Jones)**

Report to JSC-31 on the first year of activities of the TFRCD

Filippo Giorgi and Colin Jones

After the deliberations of the WGCM-12 meeting in Paris, 2009 a Task Force on Regional Climate Downscaling (TFRCD) was formed in December 2009 under the auspices of WCRP with the mandate of designing a program to:

- a) Build a benchmark framework to evaluate and possibly improve available RCD techniques.
- b) Organize an international coordinated framework to produce an improved generation of multi-model RCD-based high resolution climate projections/predictions over regions worldwide for input to impact/adaptation work and to the IPCC AR5 process
- c) Promote greater interactions between climate modelers and end-users to better support impact/adaptation activities within the AR5 framework, and promote greater involvement of scientists from developing countries in this process.

The TFRCD was initially composed by the following members: Filippo Giorgi (Italy) Co-chair, Colin Jones (Sweden) Co-chair, Jens Christensen (Denmark), Greg Flato (Canada), William Gutowski (U.S.A.), Bruce Hewitson (South Africa), Won-Tae Kwon (South Korea), Rene Laprise (Canada), James Murphy (U.K.), Isabelle Nyang (Nigeria), Krishna Kumar (India), Claudio Menendez (Argentina). Subsequently, Phil Duffy (U.S.A.) was added at the request of the IPCC WGII Co-chair (Chris Fields), R. Laprise withdrew from the Task Force and no contact was possible with Isabelle Nyang.

The TFRCD was given an initial one-year term essentially to carry out two tasks: 1) initiate the three activities a)-c) above; and 2) make a recommendation on its future long term functions and structure. It met twice, first in Toulouse on 11-13 February 2009 during a WCRP workshop on regional downscaling, and then in Lund on 4-8 May 2009 during a workshop on regional climate modeling. It held a teleconference on September 14, 2009 and then communicated through email.

The CORDEX framework

The first of the two tasks above was completed through the inception of the Coordinated Regional Climate Downscaling Experiment (CORDEX). CORDEX was designed to provide a framework for researchers involved in regional climate downscaling to i) benchmark and evaluate their model in a well designed common framework (point a of the mandate above); and ii) coordinate the production of regional climate change projections with other groups internationally (point b of the mandate above). As a matter of analogy, CORDEX is intended to play the role currently played by AMIP and CMIP5 for the global climate modelling community. A complete Phase I of the project has been designed and is currently described in the CORDEX web-site: http://wcrp.ipsl.jussieu.fr/RCD_project/CORDEX/CORDEX_html.

The initial experiments of the Phase I CORDEX will be devoted to the evaluation of the model performance using ERA-Interim lateral boundary conditions. Towards this purpose regional analysis teams are being assembled whose task is to collect available observations and design a set of suitable metrics and diagnostics for the different regions. These diagnostics, which should focus on those aspects that are expected to benefit most

from a regional downscaling approach, will be communicated to both WGCM and WGNE. CORDEX has arranged with ECMWF Data Services that all groups contributing to CORDEX research can access the full resolution ERA-interim data set. To help non-European groups gain access to this data, a number of copies of the ERA-interim data for 1989-2008 inclusive (~1.5 TB of data) have been made on USB disks and are in mail circulation to CORDEX modelling groups. It has been decided that the first focus region for CORDEX will be Africa. Some modeling groups have completed or are in the process of completing the ERA-Interim runs over an all-Africa CORDEX domain. In addition, under the leadership of B. Hewitson, a diagnostic package is being devised for the Africa simulations. It has been proposed to hold a workshop either in Cape Town (S. Africa) or in Gaborone (Botswana) in the March-April 2010 framework to discuss these first CORDEX results and to finalize a set of diagnostics to evaluate the models.

Once the model evaluation phase is completed, the model projection/prediction phase will begin, where the RCD tools will be driven by CMIP5 global model large scale fields. In this regard, the CMIP5 mandatory data request included the requirement that GCM groups produce fields suitable for downscaling the following; 1 member of the RCP4.5 and RCP8.5 simulations (1950-2100), at least three members for the initialized hindcasts 1980-2010 and 1990-2000 and at least three members of the 2005-2035 initialized predictions. GCM groups participating in CMIP5 have been generally positive to this request and have committed to produce such fields, which will also be of interest to other research areas (e.g. Chemical transport modelling). Concerning the storage of data, discussions are under way to have databanks at DMI (Denmark) and possibly KMA (Korea). The output format for CORDEX will follow the CMIP5 protocol as closely as possible.

In the development of the CORDEX Phase I plan, active input was requested and obtained from the impact community, which for example resulted in the selection of the time slices to simulate and the variables to output. In addition, domains encompassing all land regions of the World and a relatively coarse model resolution (50 km) were selected for the initial CORDEX experiments in order to foster the involvement of a wider community, in particular from developing countries. Both these strategic decisions were specifically made in order to address point c) above of the TFRCD mandate.

In order to inform both the regional downscaling communities and the wider community engaged in impact and adaptation work, TFRCD members were active in presenting the CORDEX plans in a range of international conferences. These included the European Geophysical Union General Assembly 2009 in Vienna (19-24 Sept, 2009), the Third World Climate Conference 2009 in Geneva (1-4 Sept. 2009), the GREENHOUSE 2009 conference in Perth (23-26 March 2009), the EU-Africa information day in Brussels (18 Sept. 2009), the IPCC First Scoping Meeting in Venice (1-17 July, 2009), the grid Computing Conference in Losjini (24-28 August 2009), the Arctic System Modeling Workshop III in Montreal (July 2009), a seminar at GISS (July 2009), the AGU Fall Meeting in S. Francisco (Dec. 2009), the EWACC conference in Nicosia, Cyprus (January 2010). CORDEX is also described in an article of the special July 2009 issue of the WMO Bulletin (Giorgi, Jones, Asrar, WMO Bulletin, 58, 175-183.).

Plans for different CORDEX-related meetings are in place. In addition to the Africa workshop mentioned above (Spring 2010), a workshop is being planned on June 11-14 2010 in Lille, France, under the auspices of WCRP and the IPCC WGI and WGII. This workshop aims at discussing how to facilitate the use of climate information for impact and adaptation studies, in particular within the IPCC framework. CORDEX will also be discussed within this context, as a means to facilitate a link between GCM projections and

the regional information requirements of impact and adaptation groups. A plan is also in place to hold a TFRCD meeting, if the TFRCD mandate is extended for one year (see below). Another workshop is being planned at ICTP in the Spring of 2011 to review the first CORDEX results which by then should be available from different modeling groups, not only for the ERA-Interim runs but also for an initial set of CMIP5-driven climate projections.

Past experience and future of the TFRCD

In general, the experience during the past year was very positive. The design and inception of the CORDEX project in a relatively short time is a remarkable result, which built upon a tremendous interest and enthusiasm by the regional downscaling community, especially the regional modeling one. A number of groups have expressed their interest in participating in CORDEX (on a purely voluntary and unfunded basis) and in fact it appears that the CORDEX framework is becoming a reference for new groups entering this area of research. The GCM community has also been quite responsive in terms of committing to provide data for regional model nesting and the development of statistical downscaling techniques. CORDEX simulations have been referenced to as important base information in a number of European Union Framework 7 research proposals, including a number of specific EU-Africa research applications. Similar efforts are underway in both North America and Asia to secure both a longer term funding base for CORDEX activities and to link CORDEX results into a range of applied climate change research projects. All these results provide encouraging indications concerning the success of CORDEX as a long term activity. Based on these results we believe that CORDEX is a useful, if not necessary, enterprise to better understand and improve regional climate downscaling with good chance of success. Therefore, we strongly recommend that it be continued under the supervision of a coordinating body within WCRP.

This implies a possible evolution of the TFRCD. In this regard, three options were discussed within the TFRCD:

- 1) Formation of a standing or long term working group similar to WGCM or WGNE.
- 2) Formation of a smaller body (5-6 people) within WGCM
- 3) Continuation of the ad hoc Task Force, perhaps with a modified structure, participants and scope

The discussion within the present TFRCD did not lead to a consensus position on this issue. On the one hand, the experience during the past year showed that a regular active participation by all members of the task force was not achieved, a result that might call for a smaller body. On the other hand, it was also felt that a broad body would be more effective in fostering a widespread participation by the scientific community, in particular from developing countries and from the statistical downscaling community. A broader TFRCD would also allow a more effective communication with the end user community. It was indeed noted in the discussion that the activity c) above (involvement of the end user and developing country communities), which should be viewed as a long term priority no matter what the future of the TFRCD is, should be strengthened.

Based on these considerations, our recommendation is that the term of the TFRCD be extended for one year to allow a better development of the CORDEX project and the inception of mechanisms to foster a more widespread participation of the scientific and end-user community, particularly from developing countries. This will provide more robust information concerning the optimal path to follow in terms of coordination of future downscaling activities. It will also allow this decision to be taken in view of the current

discussions on possible changes in the structure and scope of WCRP. A one year extension might require changes in the TFRCD composition in view of the resignation of one member, the inability to contact another one and the possibility of shifting some of the foci of the TFRCD activities.