

Summary report of the WCRP CORDEX South Asia Planning Meeting

25 – 26 February, 2012
Centre for Climate Change Research
Indian Institute of Tropical Meteorology, Pune, India

The World Climate Research Programme (WCRP) COordinated Regional climate Downscaling Experiment (CORDEX) South Asia Planning Meeting was organized at the Indian Institute of Tropical Meteorology (IITM) during 25-26 February 2012. Professor B. N. Goswami, Director, IITM welcomed the participants of the workshop. Given the importance of climate information and capacity building in the South Asian region, he pointed out that IITM was very pleased to co-ordinate the activities of CORDEX South Asia. The expert panel included twenty five participants from abroad as well as from IITM. The meeting focused on the themes of regional climate information needs and the framework for model simulations with follow up strategies for analysis, resource mobilization, communication and capacity building for vulnerability, impact, and adaptation. The presentations and panel discussions deliberated upon the current status, updates, and future strategies of the WCRP CORDEX program for the South Asian region – by taking into consideration the overall objectives, expected outcomes, timelines, co-ordinated efforts involving national and regional institutions for implementation of the program.

Dr. Michel Rixen, WCRP, WMO, Geneva, Switzerland conveyed the full support of WCRP for CORDEX South Asia. Although Dr. Rixen could not attend the meeting due to unavoidable circumstances, his presentation material was made available and presented at the meeting. Dr. Rixen emphasized the growing importance of regional climate science information and capacity building, which are top priorities of WCRP. He also noted that regional downscaling is a necessary way to address climate extremes and their impacts on major sectors of the economy. Understanding processes properly on all ranges of possible statistical outcomes, especially at the extremes, requires high resolution modeling. CORDEX-Africa is one very successful example of a regional climate downscaling effort, with modeling, projections, with impact/vulnerability/adaptation studies

Dr. Colin Jones, SMHI, Sweden, presented an update on CORDEX and emphasized the societal needs for regional downscaling over South Asia. He highlighted that the full benefits of regional

climate models (RCM) could be harnessed only through rigorous assessment (ie., analysis, verification and evaluation) of climate simulations from multiple models and validation with observations. He gave examples of regional climate assessments over the Europe and African regions and emphasized the importance of performing systematic diagnosis of model simulations for the South Asian monsoon region. Dr. Colin Jones suggested that the first step for the modeling framework would be to construct a matrix of different RCM's driven by different GCM forcing for CORDEX South Asia. Additionally, he highlighted the need to standardize the outputs from multiple models in the CORDEX format along with proper data archival.

Some of the modeling groups that participated in the meeting had already performed a few downscaling simulations in the context of CORDEX South Asia. The participants from the modeling groups included: Dr. Akio Kitoh, Meteorological Research Institute (MRI), Japan, Dr. Pankaj Kumar, Max Planck Institute, Hamburg, Germany, Prof. S.K. Dash, Indian Institute of Technology, Delhi (IITD), India, Drs. R. Krishnan and J.Sanjay, Indian Institute of Tropical Meteorology (IITM), Pune, India, Dr. Bodo Ahrens, Goethe University, Germany. The participants presented the details of model simulations and they expressed willingness to share the model data and contribute to the CORDEX South Asia programme.

In addition, the following special talks were delivered by experts on 25 February 2012 in different areas of the global and regional climate systems.

- *Prof. PV. Joseph, Nansen Centre, Kochi, India: **Outstanding issues on extremes in the South Asian monsoon climate.*** Prof. Joseph emphasized the importance of investigating regional monsoon processes and their variations (eg., monsoon onset, lows and depressions, active / break spells, extreme precipitation events, El Nino teleconnections, mid-latitude interactions) in the RCMs.
- *Prof. Ola Johannessen, NERSC, Norway: **Sea level change and Greenland Ice sheet.*** Prof. Johannessen provided a preview of the modeling and observational activities at NERSC, Norway and the NorESM (Norway Earth System Model). He indicated from his results on sea ice variations over Arctic which can have profound effect on temperature and

precipitation over East Asia. He also pointed out how the melting of Greenland ice sheet would affect the global sea level variations. He noted that observations and models differ in terms of the Indian Ocean sea level rise arising from Arctic Glacier melt and therefore need to be investigated more rigorously.

- *Dr. Lasse Petterson, NERSC, Norway: **Impacts of Climate Change on Marine and Coastal Ecosystems.*** Dr. Petterson shared his experience in observational monitoring and high resolution ocean modeling for climate impact assessment of marine ecosystems and adaptation studies in the Indian Ocean.
- *Dr. M. Rajeevan, Ministry of Earth Sciences, India. **Evaluation of regional climate models.*** Dr. Rajeevan discussed RCM evaluation strategies and development of various verification metrics suitable for CORDEX South Asia region. He emphasized the need for careful evaluation and uncertainty quantification from the RCMs for policy and decision making.
- *Dr. Joakim Langner, SMHI, Sweden. **Climate Change Adaptation.*** Dr. Langner discussed the impact of climate change on water resources and air quality. He stressed the need to work on RCM biases prior to using RCM outputs for impact assessment of hydrological resources.
- *Dr. Christine Chan, ADB, Manila. **Regional Climate Data Consortium.*** Dr. Chan talked about regional flood vulnerability, and extreme events in China and India, and the need for high-resolution climate projections with quantified uncertainties for better disaster management. She also expressed ADB's interest and support for hosting the CORDEX South Asia climate data portal at IITM which would be useful for impact assessment of high priority areas covering the major river basins in Southeast Asia and Himalayas.

The second day of the meeting on 26 February 2012 deliberated on the framework and follow up strategies for implementing CORDEX South Asia. Dr. Colin Jones, SMHI, Sweden, gave a presentation describing the framework for the CORDEX model simulations and suggested possible timelines for the multi-model simulations, verification and metric design from the

WCRP modeling groups, data analysis and archival. During the discussions, it was agreed that September 2012 would be a reasonable timeframe for completing the RCM evaluation runs and historical runs for CORDEX South Asia region. The targeted timeline for the future projection runs and publication of results was agreed around April 2013. Dr. Jones offered to provide the necessary software support for participating groups for converting RCM outputs as per standard CORDEX format. He also suggested exploring the approaches adopted by climate impact assessment projects like Agricultural Model Intercomparison and Improvement Project (AGMIP) and Consultative Group on International Agricultural Research (CGIAR).

The panel discussion on follow-up strategies for implementation of CORDEX South Asia was chaired by Prof. PV Joseph, Prof. Ola Johannessen, and Dr. R. Krishnan. The panel members were Drs. A. Kitoh, L. Petterson, J. Langner, S. K. Dash, K. Ashok, and C. Chan. Dr. Michel Rixen and Dr. Bruce Hewitson, University of Cape Town, South Africa, joined the panel discussion through video conferencing and offered valuable comments. In keeping with the main objective of the CORDEX program to nurture knowledge, expertise and science based information that matches community / user expectations, the discussions highlighted the role of bottom-up and inclusive approach in meeting the end-user requirements. The importance of involving all stakeholders in the South Asian region was also strongly highlighted. The follow-up on commitments and timeline strategies for modeling, analysis and data dissemination activities was moderated by Drs. J. Sanjay, A. Kulkarni, and M. Mujumdar, together with expert suggestions from Dr. Colin Jones and Dr. Rajeevan. The main outcomes of the discussions are as follows:

- Various climate modeling groups have agreed to contribute to CORDEX South Asia simulations. These include (*CCCR / IITM Pune, IIT Delhi*) from India, *SMHI Sweden, CSIRO Australia, Met.Office Hadley Centre UK, MRI Japan, Bjerknes Centre (BCCR) Norway, (MPI, Hamburg and Goethe University)* from Germany.
- The main model simulations for CORDEX South Asia domain would include (a) Evaluation run using ERA-Interim boundary conditions (1989-2008) (b) Historical / Control run for the period (1950 – 2005) with boundary conditions from CMIP5 global

models (c) Future scenario run (2006 – 2100) - eg. RCP4.5 with boundary conditions from CMIP5 global models

- Some of the useful metrics for analysis and verification of the RCM simulations over the South Asian region were discussed and broadly agreed upon during the workshop.
- With regard to the co-ordination of CORDEX South Asia, it was recommended that one of the Earth System Grid (ESG) data nodes would be hosted at the Centre for Climate Change Research (CCCR), IITM, Pune, India.
- In recognizing the importance to produce publications for the forthcoming IPCC AR5, the participants were encouraged to submit papers relating to model simulations and analysis of available results over the South Asian region before summer 2012