Summary Report on 2nd workshop of APN Project

ARCP2010-04CMY-WANG

Building Asian Climate Change Scenarios by Multi-Regional Climate Models Ensemble

Feb. 26-17, 2011
Jika International Hotel, Melbourne, Australia

Project Title: Building Asian Climate Change Scenarios by Multi-Regional Climate Models Ensemble

Reference Number: ARCP2010-04CMY-WANG

Project Leaders:

Dr. Shuyu Wang
Institute for Climate and Global Research, Nanjing 210093, China
Prof. Dong-Kyou Lee
School of Earth and Environmental Sciences, Seoul National University, Seoul 151-742, Republic of Korea

Introduction:

The second project workshop on APN project "Building Asian Climate Change Scenarios by Multi-Regional Climate Models Ensemble" was held in Conference Center of Jika International Hotel, Melbourne, Australia, at February 26-27, 2011. 35 participants from 7 countries attended the workshop, including the project scientists from 11 research teams, invited scientists, and observers (see Appendix 1 for participant list).

The workshop is designed to inform the participating teams on the execution and progress of the APN project, and to discuss the future activities to fulfill the objectives of APN project.

The workshop was greatly supported by local host Dr. John L. McGregor and his team. MAIRS (Monsoon Asia Integrated Regional Study) also provides….

Outcomes of the workshop:

1, Project progress report

1.1, Review of project

1.1.1, Objectives, activities and expected outcomes of the project

The objectives of the project are:

- To provide the high confident scenarios of regional climate change in Asia based on an ensemble of the results from multi RCMs.
- To provide a scientific base for impact, assessment communities and policy makers so that better understanding of monsoon Asia climate change will be achieved, by adequately detect and assess the sources and magnitudes of uncertainty in Asian climate change projection.
- To set up a regional climate modeling network and establish connection with other regional climate research networks around the world on the base of data and technique

sharing.

The activities of the project include:

- Projecting high resolution regional climate change for 2040-2070 for Asia by using the ensemble of nice regional climate models;
- Based on the RCM simulations, detecting and assessing the sources and magnitudes of uncertainty in Asian climate change projection;
- Calculating the change and variance of controlling climate factor of Asian climate, i.e., Asian monsoon system, and its impacts on Asian climate;
- Exploring and developing new methods and techniques for regional climate model outputs ensemble.

The expected outcomes from the project are:

- Database and related documentations which compliment model-simulated climate change climatology as well as variability for Asia will be produced;
- Scientific reports and papers will be generated on the subjects of high resolution climate change scenarios for Asia; the uncertainty in regional climate model downscaling; and the change and variance of Asian monsoon system, etc;

1.1.2, Participating Models

Totally twelve models from eleven groups take efforts to complete the project integration. The participating models and teams are listed as following:

- **ReGCM4/WRF**, School of Atmospheric Sciences, Nanjing University, China
- **ReGCM3**, National Climate Center, Chinese Meteorological Administration, China
- **RIEMS**, Institute of Atmospheric Physics, Chinese Academy of Sciences, China
- **SNU RCM**, School of Earth and Environmental Sciences, Seoul National University, Republic of Korea
- **YSU_RSM**, Department of Atmospheric Sciences, Yonsei University, Republic of Korea
- **MM5**, Korea Meteorological Administration, Republic of Korea
- **NHRCM_MRI**, Meteorological Research Institute, Japan
- **NIED_RAMS**, Flood and Landslide Research Department National Research Institute for Earth Science and Disaster Prevention, Japan
- **CCAM**, Marine and Atmospheric Research, the Commonwealth Scientific and Industrial Research Organisation, Australia
- **IRAM**, Department of Meteorology, School of Ocean and Earth Science and Technology, University of Hawaii, USA
- **WRF**, Iowa University, USA

1.1.4, Required model outputs

Each participating modeling group will deliver the following outputs from the simulation:

- **For daily average**, the following surface and upper-level variables are required:

Surface variables (daily)	Upper-level variables (daily)
1. Maximum temperature 2. Minimum temperature 3. Sea level pressure 4. Snow water equivalent 5. Surface maximum wind speed	Layer: 200, 500 and 850hPa 1. Zonal wind 2. Meridional wind 3. Geopotential height 4. Temperature 5. Relative humidity/Specific humidity

- **For 3-hourly,** the following surface and upper-level variables are required:

Surface variables (3-hourly)	Upper-level variables (3-hourly)
1. 2m temperature 2. Relative humidity 3. Convective precipitation 4. Large scale precipitation 5. Evaporation 6. 10m wind (U,V) 7. Surface upwelling shortwave radiation 8. Surface downward shortwave radiation 9. Surface upwelling longwave radiation 10. Surface upwelling longwave radiation 11. Latent heat 12. Sensible heat 13. Column soil moisture 14. Total runoff	1. TOA upwelling shortwave radiation 2. TOA upwelling longwave radiation 3. Cloud fraction 4. Precipitable water

1.2, Progress of individual research group

During the second project year, seven models from six groups (CSIRO, NJU, SNU, YSU, MRI, CMA, IAP) completed the ECHAM5 downscaling runs, which are *required for building ensembled Asian climate change projection*. Five models will finish the integration in near future.

According to the presentations given by scientists of project research groups, it can be summarized that,

- **Simulation results *have been validated and intercompared*** to fulfill the project's objectives
- **Analyses** related to Asian regional climate studies, such as model physical system, method and technique in downscaling, have been carried out and presented.
- **Potential project *application have been developed***, either by directly using RCM in related researches, such as ecology, hydrology, etc, or by applying RCM results in impact, assessment studies,

All presentations can be downloaded from website www.mairs-essp.org.

2, Future activities

For next step analysis, following issues have been discussed on the workshop:

- Specify the sub-regions for validation and intercomparison
- High-resolutions or nested simulations for a certain area
- Focus on specific geographical areas for common interests**.**

To achieve the scientific goals and produce the expected outcomes, the discussion focuses on: 1) the progressing of the project; 2) next steps to implement the project objectives, i.e., analysis plan, design of new sensitive runs, result publication, etc.; and 3) the potential development and application of the project results.

The discussion session was chaired Dr. Shuyu Wang, Prof. Dong-Kyou Lee and Dr. William Gutowski.

The summary of project progress during 2010 was first given by Dr. Shuyu Wang. Totally 7 out of 12 models finish the ECHAM5 downscaling for both current and future climate runs, and 5 more will complete the integration in next a few months.

Then the discussion was centered on the following questions:

2.1 Data submission and data exchange policy

Modeling groups which finish the integration will mail the simulation results to IAP and NJU by July 1, 2010.

Gridded observation (CRU, APHRODITE, etc), station data from China (Dr. Deming Zhao), Japan (Dr. Kurihara) and Korea (Prof. Lee) will be distributed to project groups by the time of June, 2010. Dr. Togtohyn Chuluun will be contacted for the observation in Mongolia. MAIRS IPO will provide necessary help in collecting observation data in India. START Southeast Center will provide data over Southeast Asia region.

As for data exchange, **c**urrent data protocol allows data sharing within group members. Suggested by William Gutowski--- data sets should be released to the public asap with fair warning. According to M. Manton, regional climate models project is seen as pilot for CORDEX, and open to the public eventually. It's advisable to ask for registry as documentation on who, which organization and what application. Dr. Gutowski encouraged an open access policy, while Lee resisted this idea since all data sets come from various funding sources. Linda then gave the APN data policy: mega data web portal with registration, and, climate models ensemble would be most desirable to open up for open access. In addition to registry and a section tied to data policy on publication guidance (such as acknowledgement, optimal application etc.) is also needed.

2.2 Sub-regions

Monsoon impacts are different from region to region. Regions can be sub-divided as Indian Monsoon (India), East Asia Monsoon (North China/Korea/Japan, Center China, South China) Tibet, Pacific, South Asia (region 1, region 2) and Arid/semi arid region. After discussing Johnny's contributed chart, sub-regions are modified and adopted as shown in ppt. file

2.3 Future runs and analysis

The future runs focus on the high-resolution or nested simulation over interested areas.

-- high resolutions or nested simulations over interested areas.

-- possibility of more integration with IPCC AR5 GCM

-- focus on specific geographical areas for common interests?

Papers to be included in IPCC AR5 should be accepted By early March 2012. Time is getting very pressing. All is confined by funding purpose and usually for domestic (national) regions and demands. Lee will be leading a sub-group on this high-resolution runs to solicit research initiatives.

On possible topic: subtropical cyclone. 20 km or, over Tibetan Plateau

2.4 Leading teams for detailed analysis and ensemble analysis

1. by tasks: standard observation, ensemble, data analysis, impact study
2. by regions: 10 regions

2.5 Next workshop

Next workshop will be tentatively scheduled in February in South Korea. Specific location and host university will be further finalized.

2.6 Publication

On publication. Data to be sent in by June 1. Lee will provide a general format for each team as drafting guideline

2.7 Future collaboration

On future collaboration. National project (Nanjing University) is currently conducted by Kuo KD to better understand climatic impact of human induced LUCC and East Asia regional climate. A user group is also formed led by Li (NZ). Added by Linda, CORDEX will be having a meeting next month, it would be most ideal to be integrated and included in eventually

Acknowledgment:

The workshop was funded by APN, and locally supported by CSIRO. Special thanks to Dr. John McGregor for ensuring the workshop's success. Dr. Ailikun and Ms. Ying Yang from MAIRS IPO provided great support in organizing the workshop. Additional supports come from each participating groups.