Abstract template

This first page is for our information purposes only. Do not delete it!

Begin your abstract on the next page.
Maximum is 2 pages in the given layout including figures and tables.

Here, please indicate below:

This abstract is intended for
• Oral presentation x
• Poster presentation

(type an x after your choice)

This abstract fits best into the topic (see the conference website for more information):

1. Regional Climate and Earth System Models
2. Very-high-resolution RCMs
3. Challenges for RCM Evaluation and Application
4. RCM Ensembles x

(type an x after your choice)

Corresponding author (if not First Author):

Name:
e-mail:
An overview of the SOUSEI multi GCM/RCM dynamical downscaling ensemble

Asuka Suzuki-Parker1, Izuru Takayabu2, Ryo Mizuta2, Hiroyuki Kusaka3, Koji Dairaku4, Suryun Ham5, Sachio A. Adachi6, and Noriko N. Ishizaki6

1 Graduate School of Life and Environmental Sciences, University of Tsukuba, Tsukuba, Japan (suzuki.asuka.fp@u.tsukuba.ac.jp)  
2 Meteorological Research Institute, Japan Meteorological Agency, Tsukuba, Japan  
3 Center for Computational Sciences, University of Tsukuba, Tsukuba, Japan  
4 Department of Integrated Research on Disaster Prevention, National Research Institute for Earth Science and Disaster Prevention, Tsukuba, Japan.  
5 Atmosphere and Ocean Research Institute, University of Tokyo, Kashiwa, Japan  
6 Japan Agency for Marine-Earth Science and Technology, Yokohama, Japan

1. Introduction

Today, there are a number of multiple GCM/RCM dynamical downscaling (DDS) ensemble projects throughout the world. These projects include ENSEMBLES, NARCCAP, and CORDEX series to name a few. Selections of GCMs and RCMs have depended on projects’ goals and technical aspects (e.g., GCM data availability GCM-RCM compatibility, and computational resources, etc.). However, there are emerging evidences that in comparison to RCMs, variations in GCMs contribute to the ensemble spread more than those in RCMs (e.g., Deque et al. 2007). Yet how best to select GCMs for ensemble downscaling experiments remain as a very active discussion point within the DDS community. The authors have been conducting the SOUSEI multi GCM/RCM DDS experiments for Japan. In our project, GCM selection is made based on a cluster analysis of tropical SST change in CMIP5 GCMs. In this presentation, we will provide an overview of the SOUSEI multi DDS experiment, including GCM selection and its consequences, and some preliminary results from downscaling.

2. Experimental design

The SOUSEI multi GCM/RCM downscaling ensemble is comprised of three GCMs (MIROCS, MRI-CGCM3, and CCSM4) and four RCMs (MRI-NHRCM, NIED-RAMS, Tsukuba-WRF, and AORI-RSM) (Figure 1). Domain configuration is commonly set as Japan and its vicinity at 20km horizontal resolution (Figure 2). Simulation periods are also the same for all ensemble members; 1981-2000 under AR5 historical scenario, and 2081-2100 under RCP4.5 scenario.

SST changes are considered to be important for regional climate changes. From this reason, we selected GCMs based on a cluster analysis on SST future change in CMIP5 GCMs. Here, GCMs are classified into three clusters according to their spatial distribution of tropical SST change under RCP4.5 scenario (Figure 3). For the SOUSEI DDS ensemble, one GCM is selected from each of the three SST clusters. SST change in MIROCS is characterized by a profound increase in eastern tropical Pacific, whereas MRI-CGCM3 has higher increase in Indian ocean and western tropical Pacific. CCSM4 has relatively more uniform SST increase throughout the tropics. Summer-time future precipitation change in these GCMs around Japan also exhibits marked differences.

3. Lookout

The SOUSEI DDS simulations are still underway. Our ensemble design, with all of the three GCMs downscaled by all RCMs resulting a “filled GCM/RCM matrix”, allows us use Analysis of Variance (ANOVA) to attribute GCM and RCM variations to the ensemble spread. Some preliminary analysis, depending on the data availability, will be given using the downscaled seasonal mean temperature and precipitation.

Acknowledgment

This work was supported by the SOUSEI Program of the Ministry of Education, Culture, Sports, Science, and Technology. The CCSM4 data was obtained from the Research Data Archive at the National Center for Atmospheric Research, Computational and Information Systems Laboratory, Boulder, CO [available online at http://dx.doi.org/10.5065/D6TH8JPS.] Accessed July-August 2014.

References

Figure 1. Schematic diagram of the SOUSEI multi DDS experiment.

Figure 2. RCM domains for the SOUSEI multi DDS experiment.

Figure 3. Cluster tree diagram for future tropical SST change in CMIP5 GCMs under RCP4.5 scenario