CORDEX and NARCCAP: Foundations in Reanalyses

William J. Gutowski, Jr.
Iowa State University

The Coordinated Regional Downscaling Experiment (CORDEX) is a program developed by the Task Force on Regional Climate Downscaling of the World Climate Research Programme. The Task Force's mandate has been to develop and apply a framework to evaluate regional climate downscaling techniques; foster an international coordinated effort to develop improved downscaling techniques and provide feedback to the global modeling community; and promote greater interactions among global climate modelers, downscalers and end-users. Within this mandate, the primary goal of CORDEX is to extend to a global framework the lessons learned from regional climate downscaling programs focused on one continent, such as the North American Regional Climate Change Assessment Program (NARCCAP). NARCCAP and CORDEX have both had an aim of evaluating the strengths and weaknesses of regional climate modeling. The evaluations have included analyses of climate processes and the utility of the downscaled output for climate impacts study, in both cases assessing the ability of regional climate models to replicate observed behavior. The foundation of these evaluations has been simulations using boundary conditions based on observations, i.e., derived from reanalyses.

NARCCAP used NCEP-DOE Reanalysis 2 to provide boundary conditions for 26-year (1979-2004) simulations on a North American domain. CORDEX is using the ERA-Interim Reanalysis to simulate 1987-2007 on several domains that cover nearly all major land areas of the planet. CORDEX domains include NARCCAP's North American domain. However, an initial region of emphasis is Africa, which has received less attention than most other continents in regional climate-change and climate-impacts research.

This talk will present examples of some of the wide variety of analyses performed by modelers and other interested groups using NARCCAP and CORDEX output, with emphasis on the ability of ensembles of models to encompass observed behavior in the climate system that is of interest to different disciplines. In both projects, baseline analyses have determined the ability of the participating regional models to simulate observed climatologies of fundamental fields such as surface air temperature, precipitation and upper air winds. As is typical in such cases, there is a tendency for the ensemble as a whole to perform better over a variety of variables than any single model. Supplementing these results are a rich variety additional analyses that examine quantification of uncertainty in climate downscaling, the models' capabilities in simulating extreme temperatures and precipitation, and the utility of model output for applications such as wind energy, water management, crop production and human health. With appropriate care, the downscaled information has value, but modelers and users from other disciplines must have substantial interaction to ensure good and appropriate use of the models' output.

Corresponding Author:

Name: William Gutowski
Organization: Iowa State University
Address: Department of Geological & Atmospheric Sciences
3021 Agronomy Hall
Ames, Iowa 50011
USA
Email: gutowski@iastate.edu