

RCM ensemble climate scenario generation and results from the Agricultural Model Intercomparison and Improvement Project (AgMIP)

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The Agricultural Model Intercomparison and Improvement Project (AgMIP) is a distributed climate-scenario simulation exercise for historical model intercomparison and future climate change conditions with participation of multiple crop and agricultural trade modeling groups around the world. The goals of AgMIP are to improve substantially the characterization of risk of hunger and world food security due to climate change and to enhance adaptation capacity in both developing and developed countries. AgMIP will place regional changes in agricultural production in a global context that reflects new trading opportunities, imbalances, and shortages in world markets resulting from climate change and other driving forces for food supply. Historical period results will spur model improvement and interaction among major modeling groups, while future period results will lead directly to tests of adaptation and mitigation strategies across a range of scales. AgMIP will act as a demonstration of a multi-scale and transdisciplinary impact assessment utilizing the latest methods for climate and agricultural scenario generation. This presentation describes the use of regional climate model ensembles to generate climate scenarios for AgMIP, using examples from the North American Regional Climate Change Assessment Program (NARCCAP), South American RCM experiments from CLARIS, and initial results over Africa from the Coordinated Regional Downscaling Experiment (CORDEX). Although all RCMs have inherent biases, an ensemble of RCMs adds value to global climate models through improved resolution of clouds and convective processes, high-frequency climate extremes, and enhanced representation of complex topography and coastlines with associated mesoscale circulations. AgMIP provides a useful platform to evaluate uncertainties in RCM ensembles through the lens of agricultural impacts, identifying a particular sensitivity to the distribution of rainfall events and placing climate uncertainties in the context of impacts assessment uncertainties from crop models and weather generator methodologies. AgMIP provides a demonstration of RCMs' added value, and establishes methods applicable to other impacts sectors.