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Inter-model variability of precipitation in results from the North American Regional Climate Change Assessment Program (NARCCAP)

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We assess inter-model variability of precipitation in regional climate model (RCM) results from the North American Regional Climate Change Assessment Program (NARCCAP). NARCCAP is using six nested RCMs at 50 km resolution to provide climate change projections for North America. The use of a multi-model ensemble allows NARCCAP to provide information on model-induced uncertainty, which has not previously been available for decadal-scale simulations over North America.

Simulations that nest the six RCMs within reanalyses of observations show that inter-model spread of observed precipitation varies geographically and seasonally, depending largely on terrain and the degree of synoptic coupling. Results for precipitation are most consistent among models along the west coast of the U.S. and Canada, where coastal terrain has a strong effect on precipitation. The models also tend to agree for situations when precipitation anomalies are influenced by well-defined large-scale circulation anomalies. Dynamically subtler precipitation anomalies, such as the ENSO-induced precipitation anomaly in the southeastern United States, have much greater variability from model to model. Two major precipitation anomalies in the central U.S. that are included within the period of record, the strong drought of summer 1988 and the record flood of summer 1993, also are well reproduced despite the lack of orographic forcing in that region. Comparison with results from previous shorter term (60-day) simulations show that results of the NARCCAP simulations are at least as accurate as the short-term simulations. This may be attributable to the effect of soil

moisture "spinup" such that longer term simulations have allowed each model's soil moisture to become more consistent with the model's land surface parameterization and antecedent conditions.