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Downscaled seasonal forecasts using an ensemble of regional models

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The Multi-Regional climate model Ensemble Downscaling (MRED) project is a multi-institutional effort to evaluate the usefulness of dynamically downscaled global seasonal forecasts. Seven regional climate models have downscaled 10-member ensembles from the National Centers for Environmental Prediction (NCEP) Climate Forecast System (CFS) for each winter season (December-April) of 1982-2003. The target region for downscaling is the continental United States. MRED investigators also have developed methods and metrics for analysis of downscaled forecasts. These include an Added Value Index that quantifies skill improvement of a downscaled forecast compared to the corresponding global forecast. Results show that added value from downscaling depends on location, forecast variable, and lead time. Locations with added value are generally in the western United States, and added value tends to be greater for precipitation than for temperature. Downscaled forecasts have greatest skill for seasonal precipitation anomalies in strong El Niño events such as 1982-83 and 1997-98. In most circumstances area averaged seasonal precipitation for the regional models closely tracks the corresponding results for the global model, though with an offset that varies considerably amongst the regional models. There is large spread amongst the 15 CFS ensemble members and this carries through to the corresponding downscaled forecasts. Because of the strong dependence of downscaled results on the global model, future experiments should test the use of multiple global models downscaled by multiple regional models.