The MRED project: Ensemble downscaling of global seasonal forecasts

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The Multi-Regional climate model Ensemble Downscaling (MRED) project addresses the question, Can ensembles of regional climate models provide additional information from global seasonal forecasts made by coupled atmosphere-ocean models? MRED uses nested regional models to downscale ensembles of global retrospective seasonal (December-April) forecasts from the NOAA Climate Forecast System global model, using eight regional models at approximately 32 km node spacing. Each regional model downscales a 15-member global model ensemble every year from 1982 to 2003. MRED thus produces a 120-member ensemble for each season (15 global model simulations each downscaled by 8 regional models). Preliminary results show that dynamical downscaling can add realistic regional detail to global seasonal predictions. For example, in the strong El Niño events of winter 1982-83 and 1997-98 the regional models produce details of the heavy precipitation over California that are lacking in the global forecast model. This is attributed mainly to better resolution of terrain in the regional model, as observed precipitation was closely related to regional topography. Nonetheless the large-scale features of the precipitation field remain tied to the global model so that the skill of downscaled forecasts ultimately depends on the ability of the global model to predict large-scale atmospheric and oceanic states. Skill also is highly variable from one ensemble member to another and only becomes apparent in the ensemble mean and other aggregate measures.