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Precipitation intensity in an ensemble of downscaled seasonal forecasts

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Dynamical downscaling using regional climate models (RCMs) has the potential to produce improved representation of precipitation intensity and frequency in seasonal forecasts, owing to improved spatial resolution of dynamical processes and topography compared with global models. Ensemble forecasts also can improve on single-model forecasts by accounting for uncertainties in initial conditions and model formulation. This study examines results from an ensemble of downscaled seasonal forecasts, focusing on monthly and seasonal statistics of the frequency and intensity of precipitation. We present results from seven RCMs run as part of the Multi-Regional climate model Ensemble Downscaling (MRED) project. These RCMs downscaled forecasts produced by the National Centers for Environmental Prediction's (NCEP) Climate Forecast System (CFS) version 1 from 1983-2003 for the winter season (January through April) over the continental United States. Preliminary comparisons show a general overforecast in frequency and intensity of extreme precipitation (50 mm per day or greater) in the RCMs compared to observations, particularly in January and April. When comparing frequency and intensity of precipitation between months, some RCMs exhibit variations from month to month. For instance, the MM5 regional model had more frequent, intense precipitation than the other RCMs and observations in January, but by April was closer to observations. Two versions of the Regional Spectral Model (RSM) tended toward more frequent, intense precipitation by April. It is likely that the choice of the model configuration, such as representation of moist physics, plays a significant role in these differences. While the CFS global model performs reasonably well for lighter precipitation events compared to observations, it does not forecast many extreme precipitation events. The RCMs simulate these extreme precipitation events, albeit sometimes too intense or too frequent.