

Distribution and Intensity of Extreme Winter Precipitation in Seasonal Forecasts

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Global climate models produce monthly and seasonal forecasts at coarse horizontal grid spacing that does not sufficiently resolve topography. Downscaling using regional climate models (RCMs) resolves topography in greater detail and thus allows for a better representation of precipitation intensity and frequency over topographically varying regions. This study examines monthly and seasonal statistics of the frequency and intensity of precipitation over the central Rocky Mountains of the United States in downscaled seasonal forecasts. We focus on extreme precipitation, defined here as greater than 50mm/day. We present results from five RCMs, run as part of the Multi-Regional climate model Ensemble Downscaling (MRED) project. The RCMs downscaled forecast produced by the National Centers for Environmental Prediction's (NCEP) Climate Forecast System (CFS) version 1 from 1983-2003. Our results cover the months of January through April and the the three-month seasons of January through March and February through April. Preliminary comparisons show a general overforecast in frequency and intensity of extreme precipitation in the RCMs compared to observational data, particularly in January and April. When comparing frequency and intensity of precipitation between months, some RCMs exhibit trends from January to April. For instance, the MM5 had more frequent, intense precipitation than the other RCMs and observations in January, but by April trended closer to observations. Two versions of the Regional Spectral Model (RSM) trended toward more frequent, intense precipitation by April. It is likely that the choice of the model configuration (e.g. convective schemes, model physics, etc.) plays a significant role. One of the objectives of the MRED project is to show that downscaling models yields skillful seasonal forecasts compared to observations and the NCEP CFS. While the CFS performs reasonably well for lighter precipitation events compared to observations, it does not forecast many extreme precipitation events. The RCMs, however, simulate these extreme precipitation events, albeit sometimes too intense and/or frequent.