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Extreme daily 2-m temperature and precipitation in the CORDEX Arctic domain using pan-Arctic WRF

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We analyze daily extremes of precipitation and 2-m temperature produced by a six-member ensemble using the Pan-Arctic WRF, which simulated 19 years on the CORDEX Arctic domain with ERA-Interim boundary conditions. Analysis focuses on four North American sub-regions defined using climatological records, regional weather patterns and geographical/topographical features. We compare simulated extremes with those occurring for each sub-region at observing stations in the U.S. National Climate Data Center's Global Summary of the Day. Our analysis focuses on seasonal variations in features of the extremes such as magnitudes, spatial scales and temporal regimes. Using composites of extreme events, we also analyze the processes preceding and producing these extremes, comparing circulation, pressure, temperature and humidity fields from the ERA-Interim reanalysis and the model output. The analysis helps to establish the physical credibility of the simulations for extreme behavior. In related work, we have examined the impact on simulated extremes of interior spectral nudging, a technique applied in many regional climate simulations. We have performed several shorter simulations using the pan-Arctic WRF, focusing on extremes in January and July under the influence of different nudging strengths, including zero nudging. Results to date indicate that the nudging strength has noticeable, potentially important impact on the magnitude of precipitation extremes, but limited impact on the magnitude of temperature extremes. Further analysis will explore the impact of nudging on the spatial structure and temporal persistence of extremes.