

**CORDEX Arctic simulations with WRF**

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Two sets of Coordinated Regional Downscaling Experiment (CORDEX) Arctic simulations for the period 1989 to 2007 have been completed using the Weather Research and Forecasting (WRF) model. One simulation was run with specified SST, sea ice fraction, and lateral boundary conditions (from ERA-Interim). The second simulation was identical except it also included spectral nudging of wave numbers 1 and 2 in the top half of the model domain. Seasonal mean fields from these simulations were compared to the ERA-Interim data. Large circulation biases were found in the non-nudged simulation, particularly in the North Pacific. These circulation biases were nearly barotropic with the largest magnitude in the upper troposphere. The details of these circulation errors were explored in the context of the synoptic climatology of the model. The method of self-organizing maps (SOMs) was used to identify a set of synoptic patterns that span the range of synoptic patterns found in the two simulations and the ERA-Interim data. The frequency of occurrence of these patterns was compared between the two model runs and the ERA-Interim data to determine how the mean circulation errors are manifested in daily weather patterns occurring in the Arctic model domain.