



Increased Arctic influence on the mid-latitude flow during Scandinavian Blocking episode

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Understanding the linkages between the Arctic and mid-latitudes is important to motivate improvements in the NWP capabilities in the Arctic. Recent studies have suggested that Arctic teleconnections affect the weather of the mid-latitudes on timescales relevant for medium-range weather forecasting.

In this study, we use several numerical experimentation approaches with a state-of-the-art global operational numerical weather prediction system to investigate this idea further. Focusing on boreal winter, we investigate whether the influence of the Arctic on mid-latitude weather, and the impact of the current Arctic observing system on the skill of medium-range weather forecasts in the mid-latitudes is more pronounced in certain flow regimes. Using so called Observing System Experiments, we demonstrate that removing in-situ or satellite observations from the data assimilation system, used to create the initial conditions for the forecasts, deteriorates mid-latitude synoptic forecast skill in the medium-range, particularly over northern Asia. By looking at the day-to-day variations in the linkages, we find that this deterioration is largest during Scandinavian Blocking episodes. The mechanisms behind the impact is 1) enhanced error growth in the European-Arctic sector of the Atlantic, as a result of increased baroclinicity in the region, and 2) high amplitude planetary waves allow errors to propagate from the Arctic into mid-latitudes. These conclusions are corroborated by numerical experimentation in which the Arctic is relaxed towards the best estimate of the atmospheric state. We also demonstrate that the linkage is enhanced during the Scandinavian blocking regime through a diagnostic analysis spanning several winters of the ERA5 reanalysis and reforecasts.