



Using NWP to assess the influence of the Arctic atmosphere on mid-latitude weather and climate

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The influence of the Arctic atmosphere on Northern Hemisphere mid-latitude tropospheric weather and climate is explored by comparing the skill of two sets of 14-day weather forecast experiments with the ECMWF model with and without relaxation of the Arctic atmosphere towards ERA-Interim reanalysis data during the course of the integration. Two pathways are identified along which the Arctic influences mid-latitude weather, one pronounced one over Asia and Eastern Europe and a secondary one over North America. In general, linkages are found to be strongest (weakest) during boreal winter (summer) when the amplitude of stationary planetary waves over the Northern Hemisphere is strongest (weakest). No discernable Arctic impact is found over the North Atlantic and North Pacific region, which is consistent with predominantly southwesterly flow. An analysis of the flow-dependence of the linkages shows that anomalous northerly flow conditions increase the Arctic influence on mid-latitude weather over the continents. Specifically, an anomalous northerly flow from Kara Sea towards Western Asia leads to cold surface temperature anomalies not only over Western Asia but also over Eastern and Central Europe. Finally, the results of this study are discussed in the light of potential mid-latitude benefits of improved Arctic prediction capabilities.