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Frequency Change in Blocking-related Winter Cold Days in Europe between Periods of Low and High Arctic Sea Ice

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Over the last decades the change in the Arctic climate resulted in related sea-ice retreat and a much faster warming of the Arctic compared to the global average (Arctic amplification). These changes in sea ice can affect the large-scale atmospheric circulation over the mid-latitudes, in particular atmospheric blocking, and – mediated by the changes in blocking – the frequency and severity of related extreme events. As a step towards a better understanding of changes in weather and climate extremes over Central Europe (C-EU) associated with Arctic climate change, we study the linkage between periods of low and high Arctic sea ice area and the frequency of winter cold days in C-EU. Since frequency of winter cold days in C-EU is associated with atmospheric blocking, especially over the Ural and Scandinavian region, we investigate frequency changes of cold days with respect to the occurrence of blocking in different Euro-Atlantic regions by composite analysis based on ERA5 reanalysis data.

To separate the resulting changes from the global warming trend and associated Arctic sea ice loss, monthly sea ice area data is first detrended and then divided by the median into two parts representing either low or high sea ice periods. The frequency of occurrence of cold days with respect to both sea ice periods is then calculated and compared. The same procedure is applied to cold days occurring during a blocked day in certain regions to analyze the change of linkage between atmospheric blocking and cold days induced by different sea ice area periods. Preliminary results indicate an increased occurrence of cold days in Central Europe during low sea ice periods, which is enhanced during the occurrence of Ural Blocking.