



The impact of regional Arctic sea ice loss on atmospheric circulation and the NAO

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Reduction of the Arctic sea ice cover can affect the atmospheric circulation, and thus impact the climate beyond the Arctic. The atmospheric response may, however, vary with the geographical location of sea ice loss. The atmospheric sensitivity to the location of sea ice loss is studied using a general circulation model in a configuration that allows combination of a prescribed sea ice cover and an active mixed layer ocean. This hybrid setup makes it possible to simulate the isolated impact of sea ice loss and provides a more complete response compared to experiments with fixed sea surface temperatures. Three investigated sea ice scenarios with ice loss in different regions all exhibit substantial near-surface warming which peaks over the area of ice loss. The maximum warming is found during winter, delayed compared to the maximum sea ice reduction. The wintertime response of the mid-latitude atmospheric circulation shows a non-uniform sensitivity to the location of sea ice reduction. While all three scenarios exhibit decreased zonal winds related to high-latitude geopotential height increases, the magnitudes and locations of the anomalies vary between the simulations. Investigation of the North Atlantic Oscillation reveals a high sensitivity to the location of the ice loss. The northern center of action exhibits clear shifts in response to the different sea ice reductions. Sea ice loss in the Atlantic and Pacific sectors of the Arctic cause westward and eastward shifts, respectively.