



## **The missing Northern European winter cooling response to Arctic sea-ice loss**

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Reductions in Arctic sea ice may promote the negative phase of the North Atlantic Oscillation (NAO-). It has been argued that NAO-related variability can be used as an analogue to predict the effects of Arctic sea-ice loss on mid-latitude weather. Since NAO- events are associated with colder winters over Northern Europe, a negatively-shifted NAO has been proposed as a dynamical pathway for Arctic sea-ice loss to cause Northern European cooling. This study uses large-ensemble atmospheric simulations with prescribed ocean surface conditions to examine how seasonal-scale NAO- events are affected by Arctic sea-ice loss. Despite an intensification of NAO- events, reflected by more prevalent easterly flow, sea-ice loss does not lead to Northern European winter cooling, and daily cold extremes actually decrease. The dynamical cooling from the changed NAO is “missing” because it is offset (or exceeded) by a thermodynamical effect owing to advection of warmer air masses.