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Influence of Arctic sea ice on predictability of the winter NAO in a dynamical forecast model

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Accurate seasonal and decadal forecasting leads to a wide range of socio-economic benefits and increases resilience to prolonged bouts of extreme weather. This work looks at how November Arctic sea ice, particularly in the Barents-Kara seas, may affect the winter northern hemisphere atmospheric circulation, using the UK Met Office Decadal Prediction System version 3. In particular, we focus on predictions of the winter NAO (North Atlantic Oscillation) at a lead-time of 1-3 months, given its importance for European winter weather. Using an ensemble of 40 hindcasts for the period 1979-2016, it is found that reduced November Barents-Kara sea ice is linked to a more negative winter NAO, and vice versa. Preliminary analyses suggest that subsampling ensemble members that better represent the observed November Arctic sea ice leads to significantly more skilful predictions of the winter NAO than provided by the full ensemble. By contrast, subsampling based on other metrics, including Atlantic sea surface temperatures, tropical precipitation and stratospheric polar vortex strength, appears to have no significant effect on NAO prediction skill. This suggests that efforts to improve the simulation of Arctic sea ice in dynamical forecast models could lead to better seasonal predictions of the NAO.