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## Intermittency of Arctic-midlatitude teleconnections: the stratospheric pathway between autumn sea ice and the winter NAO

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An observed relationship linking Arctic sea ice conditions in autumn to the North Atlantic Oscillation (NAO) index the following winter has potential relevance for seasonal predictions of European and North American climate. The physical pathway most often invoked to explain this particular teleconnection passes through the stratosphere. A Causal Effect Networks (CEN) approach is used to explore this stratospheric pathway between late autumn Barents-Kara sea ice and the February NAO, focusing on its seasonal evolution, timescale-dependence, and robustness. This pathway is statistically detectable in the satellite period, explaining 26% of the interannual variability in the February NAO. However, a bootstrap-resampling test reveals that the pathway is highly intermittent: the whole pathway emerges in only 15% of the bootstrapped samples. The intermittent nature of the pathway is consistent with the weak signal-to-noise ratio of the atmospheric response in the sea ice perturbation experiments, and suggests that a background state is important in determining whether the pathway is active. Higher frequency synoptic interactions between Barents-Kara sea ice and sea level pressure over Urals potentially interfere with the stratospheric pathway. Such interference likely reduces the potential for using the ice-NAO relationship for predicting midlatitude winter climate. This study helps quantify the robustness of linkages within the stratospheric pathway, and provides insight into which linkages are most subject to sampling issues within the relatively short observational record.