



The influence of Arctic sea ice loss on mid-latitude climate in the cold session

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Since 1979, satellite observations have shown a rapid decline of the Arctic sea ice extent (SIE), but its role in the global climate is still under debate. To establish the direct influence of the sea ice loss on mid-latitude climate, we assume that it has the same impact on the atmospheric circulation as interannual pan-Arctic SIE fluctuations with identical spatial patterns. Lag regressions are used to estimate the atmospheric response to the latter and statistical significance is estimated using the false discovery rate. In the cold season, the temporal fluctuations of the November Arctic sea ice melting pattern are significantly correlated with a negative NAO signal 1 to 3 months later, seemingly propagating downward from the stratosphere in December to the troposphere in January and February. However, multiple regression shows that the November response is primarily due to concomitant eurasian snow cover changes, so that a field significant SIE influence is only found in January and February. A similar impact of SIE fluctuations in December is detected in February and March. Scaling then leads to an observational estimate of atmospheric response to the sea ice loss in the cold season.