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Links between Arctic sea-ice conditions and oceanic heat transport

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The ability to predict seasonal to interannual deviations of Arctic sea-ice conditions from the long-term trend would have considerable societal implications. For instance, there is increasing evidence for sensitivity of mid-latitude weather to sea-ice conditions in the Arctic, and the next decades will see intermittent navigability of shipping routes through the Arctic. We present evidence from ensemble predictions with a CMIP5 global climate model that, on seasonal to interannual time scales, anomalies in oceanic heat transport through Fram Strait and Barents Sea Opening are associated with anomalies in Arctic sea ice conditions. In the eastern Arctic, heat transport and sea-ice cover are negatively correlated, whereas in the western Arctic correlations are positive. We discuss the physical mechanisms responsible for this pattern, and implications for the large-scale atmospheric circulation. Because we find that oceanic heat transport anomalies in Fram Strait and Barents Sea Opening often precede sea-ice anomalies by several months, we hypothesise that ocean observations in these places could be beneficial to Arctic sea-ice predictions, and hence indirectly to seasonal predictions of European weather.