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Evolving air-sea interaction due to sea-ice retreat points to a re-organisation of water mass transformation in the Nordic and Barents Seas

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The Nordic and Barents Seas play a critical role in the climate system resulting from water mass transformation, triggered by intense air-sea heat fluxes, that is an integral component of the Atlantic Meridional Overturning Circulation (AMOC). These seas are undergoing rapid warming, associated with a retreat in ice cover. Here we present a novel analysis, covering the period 1950-2020, of the spatiotemporal variability of the air-sea heat fluxes along the region's boundary currents, where the impacts on the water mass transformation are large. We find that the variability is a function of the relative orientation of the current and the axis of sea-ice change that can result in up to a doubling of the heat fluxes over the period of interest. This implies enhanced water mass transformation is occurring along these currents. In contrast, previous work has shown a reduction in fluxes in the interior sites of the Nordic Seas, where ocean convection is also observed, suggesting that a reorganization may be underway in the nature of the water mass transformation, that needs to be considered when ascertaining how the AMOC will respond to a warming climate.