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Quantifying the influence of Atlantic heat on Barents Sea ice variability and retreat

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Sea ice responds to anomalous heating both from below and above, and is therefore a sensitive indicator of ongoing climate change. The recent Arctic winter sea ice retreat is most pronounced in the Barents Sea, where the sea ice area has reached the lowest levels for the last 60 years. Using available observations of the Atlantic inflow to the Barents Sea and results from a regional ice-ocean model we assess and quantify the role of inflowing heat anomalies on sea ice variability. The interannual variability and longer term decrease in sea ice area reflect the variability of the Atlantic inflow, both in observations and model simulations. Based on the simulated heat budget we find that ocean heat transport into the western Barents Sea sets the boundary of the ice-free Atlantic domain and, hence, the sea ice extent. Recent sea ice loss is thus largely caused by an increasing "Atlantification" of the Barents Sea.