



## **A deterministic mechanism for the Atlantic multidecadal variability**

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Previous studies reported a quasi-periodic multidecadal mode of climate variability with a  $\sim 70$  year period, which shows maximum amplitudes in North Atlantic. Based on observational data and previous numerical simulations we propose a deterministic mechanism for the Atlantic multidecadal oscillation resulting from ocean-atmosphere-sea ice interactions. The atmospheric response to midlatitudes anomalous sea surface temperatures at midlatitudes linked to large-scale ocean circulation, is characterized by a wave number 1 structure and favours the sea-ice export from the Arctic ocean. This affects the fresh water balance in the northern North Atlantic and consequently the strength of the large-scale ocean circulation. It generates sea surface temperature anomalies with opposite sign in the North Atlantic and completes half of the cycle. The feedback includes a memory which is attributed to the adjustment time of the Atlantic meridional overturning circulation to high latitude freshwater flux anomalies resulting from sea ice export from the Arctic region.