



## **Dynamical sea-ice feedback for the Atlantic thermohaline circulation: Lessons from climate model perturbation experiments**

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The Great Salinity Anomaly (GSA) in late 1960s manifested in the North Atlantic as an excess of freshwater of about 2300 km<sup>3</sup> and could affect the large-scale thermohaline circulation. It was suggested that this anomaly originates in the Arctic but its cause is not yet understood. Here, we show in climate sensitivity experiments that a moderate reduction of the Atlantic thermohaline circulation causes atmospheric conditions responsible for enhanced sea-ice export from the Arctic and Greenland-Island-Norwegian (GIN) Sea to the Irminger Sea. Based on simulations with a coupled atmosphere-ocean-sea ice model, it is suggested that the GSA was a response to large-scale circulation changes rather than the origin of it. As a feedback, the increased freshwater transport induces an increase in salinity and convection in the GIN Sea, stabilizing the large-scale ocean circulation. Finally, the climate change scenario is compared to instrumental and proxy data for the period of the GSA and the 8.2 kyr event which is a distinct example of rapid climate change that occurred in the relatively stable Holocene period.