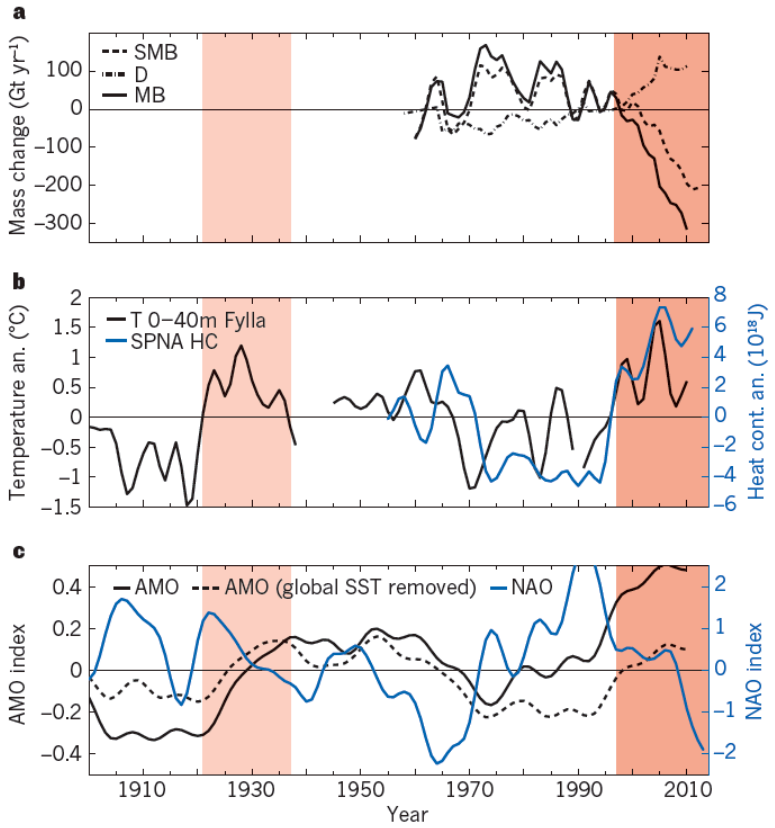
North Atlantic warming and the retreat of Greenland's outlet glaciers

Objective

Mass loss from Greenland ice sheet quadrupled from 1992-2001 to 2001-2011, resulting in net contribution to sea-level rise of approximately 7 mm over the 1992-2011 period, roughly twice the Antarctic contribution. The chain of events and physical processes remain elusive.

Approach

Increased submarine melting at termini of Greenland's marine-terminating outlet glaciers thought to have triggered glacier's retreat and ice loss. Anomalous inflow of subtropical waters lead to warming of the subpolar North Atlantic, due to atmospheric circulation changes, multi-decadal natural ocean variability, and a long-term increase in the North Atlantic's upper ocean heat content since the 1950s.



Impact

Future climate projections raise the potential for continued increases in warming and ice-mass loss, with implications for sea level and climate, requiring improved understanding of forcing mechanisms and processes.

Straneo, F., and P. Heimbach (2013). North Atlantic warming and the retreat of Greenland's outlet glaciers. Nature, 504(7478), 36–43. doi:10.1038/nature12854