



North Atlantic variability and its links to European climate over the last 3000 years

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The subpolar North Atlantic is a key location for the Earth's climate system. In the Labrador Sea, intense winter air–sea heat exchange drives the formation of deep waters and the surface circulation of warm waters around the subpolar gyre. This process therefore has the ability to modulate the oceanic northward heat transport. Recent studies reveal decadal variability in the formation of Labrador Sea Water. Yet, crucially, its longer-term history and links with European climate remain limited. We present new decadal-resolution marine proxy reconstructions which suggest weakened Labrador Sea Water formation and gyre strength with similar timing to the centennial cold periods recorded in terrestrial climate archives and historical records over the last 3000 years. These new data support that subpolar North Atlantic circulation changes, likely forced by increased southward flow of Arctic waters, contributed to modulating the climate of Europe with important societal impacts as revealed in European history.