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Late Holocene thermohaline perturbation of the N-Atlantic Subpolar Gyre linked to exceptional Greenland Ice Sheet melting between 4.4 and 4.0 ka BP

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Knowledge of the impact of past climate warming on Greenland Ice Sheet stability is an important issue for assessing thresholds that are critical for a potential ice sheet collapse. For the late Holocene, evidence has recently been found of a so-called 4.2 ka BP event(1) including a prominent warming spike in several ice core records from Greenland and Canada (Agassiz). Also lake records from both Northwest(2) and South Greenland(3) support pronounced summer warming during that time. After c. 4.0 ka BP NW Greenland July air temperature dropped by about 3^{o} C. Coeval with this exceptional atmospheric warming anomaly over northern Canada and parts of Greenland, abrupt cooling and freshening affected the N-Atlantic subpolar gyre where Labrador Sea deep convection ceased(4). Northern N-Atlantic climate generally deteriorated. With our contribution we present Holocene sub-bottom profiling and sedimentary shelf and fjord records from Southwest Greenland and Disko Bay that indicate exceptional Greenland Ice Sheet melting 4.4-4.0 ka BP at a rate and magnitude not recorded since early Holocene deglaciation. Extremely strong melt water discharge resulted in erosion of fjord sediments(5) and local deposition of up to several meters thick meltwater sediment on the shelf(6-8). Timing of this melting event corresponds to a significant anomaly in hydrographic parameters of the Labrador Current off Newfoundland(9,10), which is concluded to have resulted in thermohaline perturbation of the N-Atlantic Subpolar gyre.

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