

## **Continental Freshwater Routing during the 8.2 ka Cold Event**

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The cause of the 8.2 ka Cold Event has long been hypothesized to be a response to reduced Atlantic meridional overturning circulation (AMOC) caused by the drainage of Glacial Lake Agassiz ~8.47 kyr BP due to the collapse of the Laurentide Ice Sheet (LIS) over Hudson Bay. While ocean general circulation models have demonstrated an AMOC reduction forced by a large freshwater input, marine evidence of the Agassiz flood and subsequent North American continental routing is sparse and ambiguous. Here we use multiple proxies of terrestrial runoff to trace freshwater sources from North America and southern Greenland during 8.2 ka Cold Event. Our planktonic U/Ca records from Hudson Strait confirm the collapse of the LIS over Hudson Bay with an attendant increase in base flow discharge to the Labrador Sea of ~0.09 Sv (1 Sv =  $10^6 \text{ m}^3 \text{ s}^{-1}$ ). However, the revised age models for these cores date the opening of Hudson Bay at  $8.54 \pm 0.22$  kyr BP, earlier than previous dating. Our southern Greenland terrestrial runoff records from the Eirik Drift (Fe/Sr, K/Sr and Ti/Sr) all show a large, abrupt increase in glacial meltwater runoff at ~8.4 kyr BP continuing until 7.8 kyr BP spanning the cold interval as recorded in GISP2 and the northeastern North Atlantic, and the period of reduced AMOC. This interval of increased runoff is in excellent agreement with calibrated glacially reworked marine shells dates that indicate the southern Greenland Ice Sheet (GIS) was behind present margins between 8.4 and 7.8 kyr BP. We suggest that this abrupt retreat of the southern GIS may be in response to the collapse of the LIS over Hudson Bay due to attendant regional warming and shifts in atmospheric circulation. The retreat of the southern GIS thus provided a sustained freshwater flux closer to the region of deepwater formation that, combined with the Hudson Strait routing, may have reduced AMOC.