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The Environmental impact of the 8.2 and 9.2 kyr events in the UK.

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The instability of the Early Holocene climate in NW Europe is due in part to the impact of freshwater pulses in the North Atlantic disrupting thermohaline circulation and reducing the northward transport of heat. Two of the most significant climatic episodes are the 8.2 and 9.2 kyr events, characterised by significant oxygen isotopic excursions in NW European lacustrine and speleothem records, the Greenland Ice-core record and changing SSTs in the North Atlantic sector. Assessing the impact of these two events on terrestrial systems is problematic due to the difficulty in identifying their signature in terrestrial archives.

A sub-decadal oxygen isotope record from a Holocene micrite core from Hawes Water NW England provides unambiguous evidence for two significant isotopic excursions equivalent to the 9.2 and 8.2 kyr events. Lasting 50 and 150 yr respectively they are characterised by a slight cooling of around 1.6oC in mean July air temperatures (chironomid inferred). The environmental impact of each event was minimal, with no evidence for any significant changes in the range or abundance of plant taxa and no evidence for catchment instability. These results support the idea that the 8.2 and 9.2 kyr events are primarily a reflection of the changing isotopic composition of meteoric precipitation (δ18Op) and in the UK at least were of limited environmental significance.

Analysis of subpolar gyre behaviour and atmospheric circulation across preindustrial control simulations from CMIP5, suggest that the negative isotopic excursions recorded at Hawes Water most likely reflect the influx of isotopically lighter moisture from the Arctic. An influx of freshwater down the Hudson River and into the North Atlantic Current could result in the development of low pressure anomalies over Scandinavia, bringing arctic air and moisture to the UK. This could be expected to produce the relatively minor decline in summer temperatures but would result in the significant negative shift in the isotopic record at Hawes Water.