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Sea-ice and subsurface temperatures in the outer Labrador Sea across four Heinrich events during MIS 3

Henrieka Detlef¹, Mads Mørk Jensen², Rasmus Andreasen¹, Marianne Glasius^{2,3}, Marit-Solveig Seidenkrantz¹, and Christof Pearce¹

¹Department of Geoscience, Aarhus University, Høegh-Guldbergs Gade 2, 8000 Aarhus C, Denmark

²Department of Chemistry, Aarhus University, Langelandsgade 140, 8000 Aarhus C, Denmark

³Arctic Research Centre, Aarhus University, Ny Munkegade 114, 8000 Aarhus C, Denmark

Heinrich events are characterised by the collapse of ice-sheets surrounding the North Atlantic, with Hudson Strait suggested as the prominent source region. Cryosphere-ocean interactions during stadial periods of the last glacial interval have been proposed as a potential trigger for ice-sheet collapse. Extensive sea-ice cover in the Labrador Sea, in combination with a reduced overturning circulation in the North Atlantic, might have caused the build-up of a subsurface heat reservoir by preventing the release and downward mixing of heat in the water column. Increased subsurface heat then caused/supported the destabilisation of the Laurentide ice sheet.

We present high-resolution records of sea-ice and subsurface temperatures in the outer Labrador Sea at IODP Site U1302/03 between 30 and 60 ka. The sea-ice record suggests that an extensive sea-ice cover established in the outer Labrador Sea around 0.8-0.9 kyr prior to the arrival of ice-rafted debris associated with Heinrich events. Subsurface temperatures also increase prior to the onset of Heinrich events, although the exact timing needs to be confirmed. As such, the sea-ice and subsurface temperatures support cryosphere-ocean interactions prior to the onset of Heinrich events.