COLLAPSES OF THE NORTHWESTERN SECTOR OF THE LAURENTIDE ICE SHEET DURING THE LAST GLACIATION CONSTRAINED BY RAMPED PYROLYSIS ^{14}C SEDIMENT DATING IN THE WESTERN ARCTIC OCEAN

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ABSTRACT

Iceberg discharges from the Late Pleistocene Laurentide ice sheet (LIS) to the North Atlantic, known as the Heinrich events (HE), occurred before the abrupt warmings of the Dansgaard–Oeschger (DO) events. However, not all HE corresponded to DO warmings, which could be related to concurrent ice discharges from the northwestern LIS sector to the Arctic Ocean. These iceberg events can be tracked in the Arctic Ocean sediment records, but their relationship with DO events is unclear due to a lack of adequate age control in these mostly carbonate-free sediments. In this study, we develop new age constraints for LIS iceberg discharges to the western Arctic Ocean during the last glaciation by applying both conventional and ramped pyrolysis (RPO) ^{14}C dating. The latter method was developed by Rosenheim et al. (2008) for age estimation for the most reactive portion of bulk organic matter in carbonate-poor sediments.

Several sediment cores recovered from the western Arctic Ocean by expeditions on the icebreaker RV Araon and Healy were used for this study. Calcareous foraminifers, where available, were used for conventional ^{14}C dating. Samples for the RPO ^{14}C dating were pyrolyzed from room temperature to 900 °C, and the CO_2 release fractions separated at different temperatures were measured for Δ^{14}C. Cores were also analyzed for ice rafted debris (IRD) content, mineral composition, grain size and organic matter to investigate sediment provenance and depositional processes. Dolomite-rich IRD layers in glacial/deglacial sediments indicative of the Canadian Arctic Archipelago provenance were used to track LIS icebergs discharge events. Foraminiferal tests picked from two of the older dolomite layers were ^{14}C dated to 38 ka and 48 ka corresponding to H4 and H5 events, respectively. A distinct kaolinite-rich IRD layer was also recognized in the late MIS2 sediment. To estimate the age of this foraminiferal-barren layer, we applied RPO ^{14}C dating method. Based on the estimated offsets between the ages of CO_2 in pyrolized organic matter and conventional ^{14}C datings, the kaolinite-rich layer corresponds to the deglaciation period, possibly in relation to LIS meltwater drainage event.