



Marine signature of early Holocene glacial events of the eastern margin of the Laurentide Ice Sheet

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The gradual demise of the Laurentide Ice Sheet during the last deglaciation was characterized by large-scale and abrupt glacial events along its eastern margin. During the early Holocene, several episodes of iceberg and meltwater release originated from glacial advances and retreats mostly from the Hudson Strait region. Evidence for these events can be found in marine sediment cores from large areas of the Labrador Sea as increased input of ice-rafted debris and detrital carbonate. These events are especially clear from sites proximal to Hudson Strait and downstream the Labrador Current on the Labrador Shelf. In this study we present signals for several of such early Holocene ice sheet instabilities from more distal study sites. Sedimentological analyses of marine sediment cores from different bays in eastern Newfoundland revealed long distance transport of detrital carbonate during short-lived intervals of the early Holocene. The layers were investigated using a multi-proxy approach consisting of high resolution X-ray fluorescence (XRF) core scans, grain size analysis, quantitative X-ray diffraction (XRD), and biomarker analysis. The presence of detrital carbonate was most clearly found from elevated calcium – strontium ratios based on XRF core scanning results and further confirmed by increased content of calcite and dolomite and an ancient biomarker composition. Based on radiocarbon dating, the detrital carbonate layers can be linked to glacial events Heinrich 0, the Gold Cove event and possibly the Noble Inlet advance. The wide spread signature of these glacial events can be used for correlation of climate archives over a large geographic area. We propose that by detailed fingerprinting of the composition of these layers, they can be used as time-synchronous correlation tools, which may be used to infer past leads and lags in climatic and oceanographic variability as well as help to unravel unknown past marine radiocarbon reservoir ages in the Labrador Sea.