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A sedimentary ancient DNA approach to elucidate the Labrador Sea paleoceanography over the last ~130,000 years

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Long sedimentary ancient DNA (*sed*aDNA) records from the marine environment are at present a curiosity and their utility in paleoceanographic research is not yet fully explored. Nevertheless, a few studies indicate that this ecogenetic repository represents an untapped source of new information with which paleoclimatic and paleoceanographic variability can be more deeply explored. We have generated a *sed*aDNA record from a 19.6 m-long sediment core in the Labrador Sea (Eirik Drift, south of Greenland). The record extends from the early Holocene to Marine Isotope Stage 5 (ca. 130,000 years ago), and we characterized several important climatic transitions in this time interval using stable isotope stratigraphy, ice-rafted detritus counts, and dinoflagellate cyst census counts. The primary goal of this investigation was to query the *sed*aDNA record for a biological indication of the last and penultimate deglaciation, as well as Heinrich events identified between 65,000 and 25,000 years ago. Our metabarcoding strategy targeted a broad diversity of eukaryotic organisms through amplification of the V7 hypervariable region of the small subunit ribosomal RNA (SSU rRNA) gene. The preliminary *sed*aDNA results indicate that eukaryote ancient DNA is present in all samples investigated, including those dating back to Marine Isotope Stage 5. Furthermore, we identified abundance shifts in Protaspidae (cercozoa), diatoms, dinoflagellates, and marine stramenopiles (amongst others) that may be linked to changes in paleoceanography during the last two deglaciations as well as Heinrich events (HE3, HE4).