The Last Interglacial in the Labrador Sea: a sedimentary ancient DNA investigation

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The Last Interglacial (LIG, ~128–116ka) was characterized by a warmer climate, increased sea level, and a reduced Greenland ice sheet compared to today. Climate projections suggest our future climate may resemble LIG conditions if anthropogenic climate change progresses unabated. Previous studies have identified key shifts in the Labrador Sea oceanography and climate before, during, and after the LIG, making this time interval an exciting target for exploring high-latitude marine ecological dynamics. In recent years, the application of sedimentary ancient DNA (sedaDNA) has provided new glimpses into past ocean and climate conditions. Here, we have explored sedaDNA alongside other, traditional, paleoceanography proxies, to better understand the changing Labrador Sea biome across climate transitions and in a globally warmer world. We have generated a sedaDNA record from a giant piston core at the Eirik Drift (Labrador Sea). Our sedaDNA record, dating back to ~135 ka, was sampled at 4 cm depth intervals and covers the glacial-interglacial transition, as well as the LIG. SedaDNA was purified using a commercial spin column kit and analysed using a metabarcoding approach targeting the V7 hypervariable region of the eukaryote small subunit RNA. Illumina MiSeq analysis of metabarcoding libraries revealed PCR-amplifiable eukaryotic DNA throughout the investigated downcore section. Shifts in relative taxon abundance and alpha- and beta-diversity metrics paralleled shifts in foraminifer isotope records ($\delta^{18}$O), palynological assemblages, and biomarkers suggesting that the molecular genetic signal preserved in downcore sediments shows promise for identifying ecological shifts across the LIG. We are currently investigating the potential utility of specific taxa identified in the sedaDNA record to act as indicators of the glacial-interglacial transition. This study strengthens the growing potential of marine sedaDNA as a supplemental proxy for climate reconstructions in the Late Quaternary.