Reveal past ice-proximal ocean temperature change across a strong deglaciation, to better understand future ocean-forced ice retreat and sea level rise

Generate high-resolution organic biomarker data and apply TEX86 and associated proxies for subsurface temperature on unique sediment material.

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Project description

One of the main uncertainties of future long-term sea level change is the rate and amount of melt that will contribute to sea level rise from Antarctica. Parts of the west-Antarctic ice sheet already show dramatic mass loss, due to the warm subsurface temperatures in the region where major glaciers flow into the ocean. Urgent questions remain on how these processes will continue into the future: as one or several rapid, irreversible steps or a gradual retreat. Information on how sea level rise will proceed may be found in the reconstruction how past deglaciations in West-Antarctica unfolded. With this in mind, the PI was granted a research project in collaboration with the British Antarctic Survey to reveal how past deglaciation phases evolved in west-Antarctica, and what the drivers of that retreat were. The transition from the cold glacial maximum (marine isotope stage MIS6; ~170 kyrs ago) to the warmer-than-present MIS5e (140 kyrs ago), occurred rapidly (within 10.000 years) and caused strong sea level rise, from -150 meters to levels 6-9 meters above present. Using some unique sediment material, retrieved from the continental shelf offshore west Antarctica and the Antarctic Peninsula by the British Antarctic Survey, we have the opportunity to portray in detail how ocean temperature change is related to the landice loss across one of the strongest deglaciation phases in geologic history. This project will involve generating high-temporal resolution organic biomarker proxy data (TEX86) in the GeoLab, from piston cores that straddle the MIS6-5e glacial-interglacial transition. The lithological changes in the core reveal the stratigraphic position of the transition. Successful pilot data already shows temperature rise associated to MIS5e, but is as of yet of too low temporal resolution to show the timing of temperature change relative to the lithological change. The assistant will use the sediment samples available to provide a high-resolution image of the SST change across the deglaciation. We have sampled every cm in two piston cores, so there is plenty of material to work on.

Job requirements

This assistantship (5 months, 320 hours) mostly targets students from the Earth Sciences Master programmes Earth, Life and Climate and Marine Sciences. Ideally, the assistant is already trained and familiar with the organic geochemical sample workup (e.g., followed the course Organic Geochemistry, or generated biomarker data in thesis/guided research work), and if not, training will be provided. Next to the PI, a PhD student and postdoc who focus on a long-term Neogene SST record and on modern surface sediment samples in the same region, respectively, are available for daily supervision. Funding for the analyses is secured within the running NWO project.