



Dinoflagellate cyst assemblages from the Southern Ocean during the Oligocene Icehouse: tracers for Antarctic Sea ice, productivity and oceanic frontal systems?

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The Oligocene Epoch (33.9-23 Ma) is the time interval in the Cenozoic that saw the establishment of a continental-scale Antarctic ice-sheet. Numerical modelling studies suggest that alongside, first sea-ice conditions may have started along the East Antarctic Margin. Integrated Ocean Drilling Expedition 318 drilled the Antarctic Margin in 2010, and recovered sediments from this early phase of Antarctic glaciation. With this record, we can now evaluate the robustness of the results of these numerical models with field data. Particularly the sediments recovered from Site U1356 yield a thick and relatively complete (albeit compromised by core gaps) Oligocene succession that is chronostratigraphically well-calibrated with use of nannoplankton- dinocyst- and magnetostratigraphy. Notably, this record yields well-preserved dinoflagellate cysts (dinocysts). Dinocysts are the fossilizable remains of dinoflagellates, some of which are today specifically linked to the high (seasonal) productivity of the ecosystems associated with sea-ice and oceanic fronts. Up to now, well-calibrated and complete records of dinocyst assemblages beyond the Pleistocene become progressively scarcer going further back in time. In the earliest Oligocene, just after the onset of Antarctic glaciation, we document the installation of dinoflagellate cyst assemblages that bear remarkable similarity with those of the present-day Southern Ocean. We interpret this as a regime-shift in plankton communities in response to the installation of the seasonally highly productive sea-ice ecosystem. Following this initial installation, we document variable dinocyst assemblages during the remainder of the Oligocene. These patterns argue that changes in sea-ice extent, and/or the intensity of the vertical mixing of the water column occurred in response to the waxing and waning of the Antarctic ice sheet and feedbacks.

I will present a paleo-environmental reconstruction of the Oligocene Southern Ocean surface waters offshore the Wilkes Land Margin, inferred from dinocyst assemblages from U1356. This provides a first image of the evolution of Southern Ocean surface water ecosystems in response an apparently dynamic Oligocene East Antarctic Ice sheet.