Oligocene record of East Antarctic ice sheet dynamics from Maud Rise and Kergulen Plateau, Southern Ocean

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The climate of the Oligocene epoch is understudied. The earliest Oligocene marks the beginning of the Cenozoic 'icehouse' climate regime, and is suggested to have featured large ice sheets on Antarctica (AIS) under higher-than-modern atmospheric pCO_2 levels. High-amplitude variability in the Oligocene deep-sea benthic foraminiferal oxygen isotope ($\delta^{18}O$) record suggests that these ice sheets were highly dynamic but cannot identify more specific information such as which regions of Antarctica experienced ice sheet advance and retreat on glacial–interglacial timescales.

To improve our understanding of the role of the AIS in the variability recorded by benthic $\delta^{18}O$ records, we focus on a ~2 Myr period during the mid-Oligocene glacial interval (MOGI) characterised by particularly large $\delta^{18}O$ fluctuations between 26 and 28 Ma [1]. We present high-resolution X-ray fluorescence scanning (XRF), benthic foraminiferal stable isotope and sediment-derived neodymium (Nd) datasets from Ocean Drilling Program (ODP) Site 689 (Maud Rise, Southern Ocean). Prominent orbital-scale cyclicity on both 100 and 40kyr timescales is present in both $\delta^{18}O$ and XRF records throughout our study interval. $\delta^{18}O$ values in this interval from Site 689 are significantly higher than existing records from mid- and low latitude ODP Sites 1264 and 1218. Sediment Nd isotopic compositions do not vary with $\delta^{18}O$ glacial-interglacial cycles at Site 689, suggesting that there is either (i) no change in provenance of materials being eroded onland during the advance and retreat of the AIS or, (ii) a stable AIS in the Dronning Maud Land region during our study interval. To test these competing hypotheses, we compare our records with new mid-Oligocene XRF, $\delta^{18}O$ and sediment Nd records generated from ODP Site 744 (Kerguelen Plateau, Southern Ocean), which monitors the Prydz Bay region of the AIS.

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