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Sedimentary cycles from the lower Oligocene Antarctic margin as a record of orbitally controlled ice sheet variability: a comparison of field data and numerical simulation

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Glacimarine sequences recovered during the Cape Roberts Project display a cyclical organization reflecting changes in relative sea-level associated with climatic cycles and/or cycles of glacial advance and retreat (CRP Science team, 2000). Based on available bio- and magnetostratigraphic data (CRP Science Team, 2001; Florindo et al., 2005) the CRP-3 core spans the upper part of Chron C13r to the uppermost Chron C12r. The sequence is, therefore, a unique archive containing information on ice-sheet volume changes across a major step of glaciation as revealed by the stable isotope record from oceanic sequences. Comparison of luminance and clast abundance records obtained from the CRP-3 core to the La2004 astronomical solution reveals a major change in sedimentation rate and in the response to orbital forcing thorughout chron C12r. In particular, a lower interval (34-33 Ma) where high abundance of sedimentary clasts occurs is characterized by a marked precessional signature and high sedimentation rate. From ca. 32 Ma upwards the record is dominated by obliquity and long eccentricity cycles and sedimentation rate is markedly reduced. These results are in line with modeling of orbitally forced changes in Oligocene Antarctic ice volume and sediment fluxes (Pollard and DeConto, 2003).