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# A chronostratigraphic framework for Neogene drill cores from McMurdo Sound, Antarctica and application to paleoclimatic and tectonic studies.

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New age and correlation models for Late Neogene drill cores from the McMurdo Sound Region (AND-1B, CIROS-2, and DVDP-10 and 11) have been developed using constrained optimisation, a computer assisted quantitative biostratigraphic technique. These models are used to establish ties between lithostratigraphic units and hiatuses in the cores and provide a mechanism to evaluate the regional signature of climatic variability and tectonic episodes during the Plio-Pleistocene. The models also allow us to focus on key events including warm periods and periods of increased basin subsidence. In addition these high-precision models allow us to examine the glacial-interglacial signature preserved during isochronous intervals at different locations in the basin and enable us to begin to evaluate regional response of the East and West Antarctic Ice Sheets to climate change.

Several regional seismic reflectors have been mapped throughout the southern portion of the Victoria Land Basin (VLB) and are tied to the McMurdo Sound drill cores. In this study we focus on a major sequence boundary (red reflector) that forms the base of a prominent interval of clinoform sets in the southern portion of the VLB. The age of the red reflector is 4.7-4.3 Ma based on a tie to AND-1B. Although the surface cannot be tied directly to coastal margin cores (CIROS-2, and DVDP-10 and 11) our correlation models provide a framework to examine the lithostratigraphic signature of the sediments that likely encase the sequence boundary at these sites. For example, a transition from marine to terrestrial sediments is preserved in DVDP-10. This transition occurred between 4.8-4.3 Ma and indicates that the red reflector is associated with relative sea-level fall resulting from ice-sheet growth and/or tectonic uplift. Age correlative sediments preserved in AND-1B indicate regional climatic warmth, which suggests that the red reflector is more likely related to a tectonic event than significant ice volume increase. Furthermore, the onset of sediment accumulation at CIROS-2 post-dates 4.5 Ma suggesting that local subsidence and creation of accommodation space began at this time.

In addition to age constraint on regional seismic reflectors, correlation models for the AND-1B and CIROS-2 cores provide an opportunity to examine sedimentation patterns across a coastal-offshore transect. Current models produce results that indicate an ‘alternating’ pattern of accumulation at each site. Intervals of increased sediment accumulation at the CIROS-2 site are often tied to condensed intervals at AND-1B and vice versa. These accumulation patterns may reflect glacial-interglacial dynamics, tectonic episodes, or a combination of both. Ongoing integrated studies will focus on producing models to further examine and explain these observations.