



A new high-resolution glacial marine stratigraphic record of Antarctic glacial and climate history for the last 10 million years: (2) A preliminary paleoenvironmental analysis of the ANDRILL McMurdo Ice Shelf Project drill core.

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In the austral summer of 2006-2007 the ANDRILL Program undertook its first drilling project on the McMurdo Ice Shelf in the northwest part of Ross Ice Shelf where it has been pinned by Ross Island for the last ~8ka. The drillsite was situated above flexural moat basin adjacent to Ross Island that had formed in response to Quaternary volcanic loading of the crust, superimposed on more regional subsidence associated with Neogene extension of the Terror Rift. Multichannel seismic reflection surveys linked to a regional stratigraphic framework implied accumulation of a 1km-long record spanning the last 5-10Ma. The site was above an 85m-thick ice shelf over an 840m-depp water column. The drill system employed a wire-line diamond coring system through a sea-riser, which was kept free from the ice shelf, by a hot-water over-reamer. The drilling recovered 1285m-thick succession of probable Late Miocene to Recent, cyclic glacial marine sediment with interbedded volcanic sediments, lava and tuffs contributed from the surrounding alkalic volcanoes of the McMurdo Volcanic Group. The core recovery was better than 98%.

The drillcore contains a variety of facies that show significant environmental changes through time. These facies were attributed to a set of depositional processes and possible range of depositional environments using a criteria including texture, internal structures, contacts geophysical properties, composition, and paleontological components. These facies were then grouped into four different facies successions or motifs

that are repeatable through the core and are thought to represent different styles of environmental change through time. One motif represents environmental changes associated with cold polar ice, another with warmer (polythermal) ice with interglacials being dominated by pelagic diatomites, another warmer (polythermal) ice with interglacials being dominated by glacial marine hemipelagites. Some transitions within and between motifs are very abrupt with rapid facies changes or dislocations; others are more gradual with many physical amalgamations or progressive, logical facies successions. The full MIS succession has great potential of meeting the original goals of assessing the magnitude and time of response of the Antarctic cryosphere during different stages of late Neogene climate changes.