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Palaeontological characterisation and analysis of the AND-2A core, ANDRILL southern McMurdo sound project, Antarctica

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Palaeontological Characterisation and Analysis of the AND-2A Core, ANDRILL Southern McMurdo Sound Project, Antarctica

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Abstract – The palaeontological yield of the 1138.54 metre-long AND-2A sedimentary rock core provides unique documentation of Neogene environments in the Ross Sea region of Antarctica. Especially important is the biological legacy of the climatically crucial 'mild' middle Miocene phase. Diatom-bearing units provide key information for stratigraphic intervals never previously recovered from locations proximal to the Antarctic continent and constrain the age model for the AND-2A core. Benthic calcareous (and agglutinated) foraminifera were present at many levels; remarkable is the occurrence of planktonic taxa only seldom found in the Neogene nearshore record of the Ross Sea region. The sporadic occurrence of calcareous dinoflagellate remains (thoracosphaerids) is consistent with warmer-than-present seawater during the Miocene. Marine palynomorphs are almost ubiquitous, although their abundance and diversity are variable. Pollen and spores from the middle Miocene section suggest a mossy tundra vegetation and represent the first stratigraphically-constrained record of terrestrial vegetation in Victoria Land during this time. Fragments of lignin-rich organic matter (huminite-vitrinite and inertinite groups) are particularly predominant during the Miocene climatic optimum, and continue into the Pliocene. Macrofossils are reasonably common throughout the core. Polychaete worm tubes were almost ubiquitous. Especially remarkable is the bivalve record (mainly pectinids), with 4-5 different taxa pointing out a mild climatic situation in the Miocene nearshore.

INTRODUCTION

Drilling operations for the Southern McMurdo Sound (SMS) Project were conducted in the austral spring 2007 to recover the AND-2A core at 77°44.27'.76"S and 165°17'18.24"E. This core comprises 1138.54 metres of various types of sedimentary rocks with some volcanics encompassing lower Miocene to Quaternary successions (Fielding et al., Fig. 1, this volume; Acton et al., this volume, b) (Fig. 1).

The Core Characterisation Phase of the SMS Project was conducted by an on-ice Palaeontology Team that included seven specialists of taxonomic groups of recognised biostratigraphic and environmental utility in the Antarctic Cenozoic, and an off-ice team who produced results reported herein after the drilling phase was completed. The palaeontologic record of the AND-2A core is highly remarkable in terms of quality and quantity of fossils, with over 1200 samples collected on-ice, including those for off-ice specialists. The on-ice treatment of such a large set of samples was possible through the collaborative work of additional SMS on-ice personnel (J. Carnes, R. Frisch-Gleason, J. Hamre, L. Jovane, K. Mankhoff, K. Pound, J. Reed, E. Strada, P.-N. Webb, and R. Williams). It is worth mentioning the important role provided by using thin-sections (Fig. 2) to identify fossils in the AND-2A core, that were otherwise undetectable through visual inspection or washing; these on-ice thin sections were provided by S. Petrushak. Sample aliquots from intervals of presumptive critical palaeoclimatic significance were

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