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Early to Middle Miocene vegetation and climate of Wilkes Land, Antarctica (IODP 318)

U. Salzmann (1), F. Sangiorgi (2), P.K. Bijl (2), J. Pross (3), S. Schouten (4), L. Tauxe (5), J. Bendle (6), H. Brinkhuis (2), C. Escutia (7), and IODP Expedition 318 Science Party ()

(1) Geography and Environment, School of the Built and Natural Environment, Northumbria University, Newcastle upon Tyne, UK (ulrich.salzmann@northumbria.ac.uk), (2) Biomarine Sciences, Institute of Environmental Biology, Faculty of Science, Laboratory of Palaeobotany and Palynology, Utrecht University, Utrecht, The Netherlands, (3) Institut für Geowissenschaften, Palaeontology, University Frankfurt, Frankfurt, Germany, (4) NIOZ Royal Netherlands Institute for Sea Research, Department of Marine Organic Biogeochemistry, Den Burg, Texel, The Netherlands, (5) Geosciences Research Division, Scripps Institution of Oceanography, University of California, San Diego , (6) Department of Geographical and Earth Sciences, University of Glasgow, Glasgow, UK, (7) Instituto Andaluz de Ciencias de la Tierra, CSIC-Universidad de Granada, Granada, Spain

The question of whether continental Antarctic climate was warm enough to support a substantial vegetation cover during the Neogene is of great significance to the ongoing controversial debate on the behaviour of Antarctic land ice during the Miocene-Pliocene transition from dynamic to persistent ice sheets. Here we present palynological results from a Miocene sediment record provided by the Integrated Ocean Drilling Program (IODP) Expedition 318 to the Wilkes Land margin (East Antarctica). The reconstructed vegetation changes are compared with climate estimates derived from dinoflagellate cysts and MBT/CBT organic palaeotemperature proxies.

Analyses of pollen and spores indicate a low-diverse vegetation dominated by Podocarpus- and Nothofagus-trees and shrubs. Particular high Podocarpus percentages occur during the Middle Miocene Climatic Optimum (MMCO). For this time period MBT/CBT suggests a cool temperate climate with increased mean air temperatures (MAT). Dinoflagellate cyst assemblages, dominated by autotrophic species, are indicative of ice-free surface waters. After MMCO a subsequent decline in MAT is indicated by MBT and dinoflagellate cyst assemblages, though pollen percentages (e.g. Podocarpus/Nothofagus ratio) remain relatively stable. However, very high Nothofagus and low Podocarpus pollen percentages may suggest lower temperatures towards the end of the middle Miocene.