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Studies from the Cape Roberts Project Ross Sea, Antarctica
Scientific Report of CRP-2/2A

Part I
Geophysics and Physical Properties
Sedimentary Environments

EDITORS

Peter J. Barrett & Carlo Alberto Ricci

CO-EDITORS

Frederick J. Davey, Werner Ehrmann, Michael J. Hambrey, Richard D. Jarrard, Jaap J.M. van der Meer, J. Ian Raine, Andrew P. Roberts, Franco Talarico, David K. Watkins

Cape Roberts Project
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TERRA ANTARTICA (ISSN 1122-8628) - established in 1994 - aims to favour the exchange of ideas and results in the field of Antarctic Earth Sciences. Contributions to the development of Antarctic Geology, Geophysics, Glacial Geology, and Glaciology from related areas, bordering Sciences, and technological advancement are expected. The Journal is open to the international community and is distributed worldwide. It publishes two issues per year. Additional thematic issues, devoted to specific topics and meetings, can also be published.

Publications should be in the form of articles, short notes, letters, and summary reports. Review papers on relevant topics may be accepted.

The Editorial Advisory Board will undertake the responsibility of refereeing procedure for the manuscripts. Guest-editors will undertake the responsibility of refereeing procedure for manuscripts for thematic issues.

The two issues will appear the first within the end of June and the second within the end of December. Instructions for contributors are reported on the inside back cover.

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Museo Nazionale dell'Antartide '*Felice Ippolito*'
Sezione Scienze della Terra - Università degli Studi di Siena
Via del Laterino 8, 53100 Siena (Italia)
e-mail terranta@mna.unisi.it
fax ++39-0577-233.817

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Part I

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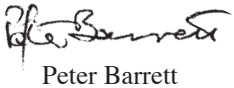
Foreword

This pair of issues of *Terra Antartica* (Volume 7, Numbers 3 and 4) present the scientific results of the second drilling season of the Cape Roberts Project. This project has brought together the Antarctic programmes of Australia, Germany, Italy, New Zealand, UK and USA (and for the first time the Netherlands) to take a series of cores off the Antarctic coast from a drilling rig set on the fast sea-ice to investigate the climatic and tectonic history of the region (Barrett & Davey, 1992; International Steering Committee, 1994). In this second season the project drilled 16 km off Cape Roberts in 178□m of water to a sub-bottom depth of 624 m with 95% recovery (Cape Roberts Science Team, 1999), coring through 27 m of poorly consolidated Pliocene and Quaternary sediments, and into strata from early Miocene to early Oligocene in age (19 to *c*. 31 Ma).

The papers in these two issues represent a significant advance on the Initial Report through further sampling and analysis, and more integration of results. Seismic surveys are reviewed, core properties and down-hole logging data further assessed, and additional sample material analysed for microfossil content, chemistry and mineralogy. Sedimentary facies and sequence analysis follow the pattern set from the previous drill hole (Powell et al., 1998; Fielding et al. 1998), and record a pre-Pliocene sequence of 22 glacial cycles. Chronology is provided by biostratigraphy, Sr isotopes and magnetostratigraphy, and by Ar dating of tephras and volcanic clasts back to 25 Ma. This achieves a precision for late Oligocene and early Miocene strata well beyond anything achieved to date from the Antarctic margin, sufficient to suggest that the cycles of advance and retreat of the ancient Antarctic ice sheet oscillated with Milankovitch frequencies, like the Quaternary glaciations of the Northern Hemisphere. Microfossils indicate a persistent shallow marine environment for the drill site and record a coastal vegetation representing a cooling from cool temperate to subpolar for the Victoria Land coast during Oligocene and early Miocene times. Provenance studies provide independent support for the transition from a cool to a cold coastal climate, and also record the unroofing of the adjacent Transantarctic Mountains.

During the review and finalisation of these manuscripts the third and final hole of the Cape Roberts Project was completed, coring through the oldest Cenozoic strata (*c*. 34 Ma) and into Devonian basement (Beacon Supergroup sandstone) to a record depth of 934 mbsf (Cape Roberts Science Team, 2000). The tectonic history of the basin margin can only be partially developed without full consideration of these new data, and CRP-2/2A results represent to some extent a report in progress. However, with this pair of issues the characterisation of the palaeoenvironmental record for the Antarctic margin from CRP-2/2A for most of Oligocene and early Miocene times can be considered relatively complete. Although much work is now focussed on the pair of Scientific Report volumes for CRP-3, studies still continue on the description of the many new fossil taxa and other phenomena discovered in CRP-2/2A.

It is our pleasure to acknowledge the work of drilling and logistic support team for producing such good core from CRP-2 and 2A under difficult circumstances, the support of personnel from McMurdo and Scott Base, the oversight of the Operations/Logistics Management Group and the International Steering Committee, and finally the work of the authors themselves and their reviewers. Further information on the Cape Roberts Project can be found at www.geo.vuw.ac.nz/croberts/.



Peter Barrett

Carlo Alberto Ricci

November 2000

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