Terra Antartica
2001, **8**(4), 583

TERRA ANTARTICA
AN ANTARCTIC EARTH SCIENCE JOURNAL

Chronology and Chronostratigraphy for CRP-3

Introduction

CRP-3 has proved to be the most difficult of all three holes to date. A robust chronology is established for the upper part of the hole, but despite an excellent magnetostratigraphy some uncertainty remains in the lower part resulting from a lack of biostratigraphic or other independent datums. The chronological data currently available are presented here in 4 papers, one on the age of an igneous intrusion into basement sandstone, and the other three on various aspects of the age of the Cenozoic section.

Fitzgerald processed samples for zircon and apatite for dating a basic intrusion in the Devonian sandstone at the bottom of CRP-3. He found insufficient material in the highly altered intrusion, but extracted apatite from the adjacent sandstone that yielded an age of 101±6 Ma. This showed that the intrusion could not have been part of Cenozoic rifting, as some had suspected. Also, similarities in chemistry with dolerites in the Transantarctic Mountains suggest that it is of Jurassic age.

Papers on the Cenozoic section begin with Lavelle's report of strontium isotopic ages from the upper 200 m of CRP-3. Five carbonate shell fragments were dated from four horizons: 11, 30, 48 and 190 mbsf, of which only the youngest was large enough to be considered in place. Its age is 30.9±0.8 Ma, indistinguishable from ages on the lower fragments and consistent with the first appearance of *Cavitatus jouseanus* at 48 mbsf (*c.* 31 Ma, Harwood & Bohaty, this volume).

Florindo et al. present magnetic polarity stratigraphy for the entire core down to 789 mbsf, subdividing the sequence into 4 magnetozones. The upper zone, R1, can be confidently correlated with MPTS Chron C12r on account of the consistent biostratigraphical and Sr isotope ages within the interval. Below this, magnetozones N1 and R2 are tentatively correlated with Chrons C13n and C13r, indicating an age of 33.5 Ma (base of C13n) for the base of N1 at 627 mbsf. Two alternative correlations are offered for N2, a 29-m-thick interval near the base of the Cenozoic section; it is either a cryptchron in the latest Eocene or is Chron C15n at *c.* 34.7 Ma.

The final paper, by Hannah, Florindo, Harwood and Fielding, summarises the available information on the chronostratigraphy for CRP-3. They note the well-established diatom and nanno datums, as well as the Sr ages, all of which support the correlation of upper magnetozone R1 with Chron C12r, and the magnetostratigraphic correlations of Florindo et al. to the base of N1 (627 mbsf, 33.5 Ma). They conclude that, on the basis of current data, the base of the Cenozoic sequence could be almost as young as 33.5 Ma, if the basal magnetozone N2 is a transient, and the lower 160 m were deposited rapidly without time breaks (not impossible considering the mix of sandstones and conglomerates). They also conclude that the top of N2 (at 760 mbsf) might be as old as 34.7 Ma, if correlated with the top of Chron 15n, implying a much reduced sediment accumulation rate. There is also some currently equivocal biostratigraphical data at about this level. A bed at 781 mbsf contains well-preserved marine palynomorphs that do not include (and hence are likely to be younger) than the Late Eocene Transantarctic flora, but the precise last appearance of this flora is not well known. Finally samples from the same beds have yielded a sparse but varied terrestrial flora, which can be interpreted as indicating either slightly warmer conditions or reworking from older strata. It is to be hoped that, within the next decade, new studies of CRP-3 core or new cores elsewhere (or both) will indicate which chronology is the right one.

Peter J. Barrett
Michael R.A. Thomson
Kenneth L. Verosub