Late Permian-Early Triassic palynology of the Bowen and Sydney basins: results and implications of new CA-IDTIMS isotopic ages

D. Mantle[1], C.B. Foster[1, 2], R.S. Nicoll[1, 3], I. Metcalfe[4,5], J. Crowley[6], R. Mundil[7] & T. Kelly[1]

[1.] Geoscience Australia, Canberra Earth Sciences, Univ. New England, Australia

[2.] School of Earth and Environment, Univ. Western Australia

[3.] Research School of Earth Sciences, Australian National Univ., Canberra

[4.] Earth Sciences, Univ. New England, Australia

[5.] Earth and Planetary Sciences, Macquarie Univ., Australia

[6.] Department of Geosciences, Boise State Univ., Boise, U.S.A.

[7.] Berkeley Geochronology Center, Berkeley, U.S.A.

Palynology is the principal biostratigraphic tool employed to correlate among the thick fluvial to shallow marine successions of the Permian-Early Triassic of the Bowen and Sydney basins of eastern Australia. The regional palynofloras can be utilised for intra-continental comparisons but are only broadly correlative across Gondwana and rarely applicable as stage or sub-stage level global tie-points. High precision CA-IDTIMS dating of Middle Permian-Early Triassic ashfall tuffs in these basins has provided a unique opportunity to confidently tie the endemic fossil biota to the international timescale. Carbonaceous siltstones and coals bracketing the tuff beds have been processed for their palynological content thus enabling precise chronometric ages to be ascribed to the fossil biotas. Tying these biozones to the internationally accepted Geologic Timescale will greatly enhance the event and biozonation correlation to areas outside Australia. Chronometric tie-points can now be attached to the Early Triassic *Aratrisporites tenuispinosus* Zone and the Late Permian *Dulhuntyispora parvithola*, and *Praecolpatites sinuosus* zones. Initial results suggest significant modifications to the ages currently assigned to some of these zones; in particular the tops of the *Dulhuntyispora parvithola* and *Praecolpatites sinuosus* zones are younger than currently accepted.

The Early Permian glaciation of the Canning Basin, NW Australia: a sedimentological/ provenance analysis

J.R. Martin[1], J. Redfern[2], B.P.J. Williams, A.J. Mory[3] & M.S.A. Horstwood[4]

[1]Shell Development

[2]University of Manchester

[3] Geological Survey of Western Australia; The University of Western Australia

[4] NERC Isotope Geosciences Laboratory

Lower Permian glacial deposits in the Canning Basin belong entirely within the 800-m thick Grant Group, but interpreting the glaciogenic nature of this succession is difficult due to the complexity of many glacial depositional environments, limited outcrop and subsurface data and the lack of detailed biostratigraphy. Nevertheless, detailed facies analysis of the Grant Group integrated with evidence from a new detrital zircon dataset provides new data on the provenance of glacially derived clastic grains, with significant implications for models of regional scale evolution of the late Paleozoic ice age.

Eight facies associations are interpreted within a single depositional sequence that records the evolution from glacial maxima (erosion and ice-contact to proglacial fluvial sedimentation) through deglacial (marine flooding) to post-glacial (delta progradation) environmental conditions. This is analogous with late Cenozoic sequences documented from Antarctic and other high latitude epicontinental environments. The suite of sedimentary facies from the Grant Group indicates deposition within an epicontinental shelf surrounded by glaciated cratonic uplands, and an interplay between high sediment supply and fluctuations in glacioeustatic relative sea-level. The group contains sediment sourced from cratonic areas to the south and east of the basin. Based on current knowledge of the Pre-Permian geology of Australia some of the zircons, especially those that are close to the depositional age of the Grant Group that are unlikely to have been recycled, could have been derived from eastern Australia but whether transportation was entirely by ice is uncertain.