

TOWARDS AN AUSTRALIAN EVENT STRATIGRAPHY FOR THE LAST TERMINATION

Summary of Oz-INTIMATE workshop,
ANSTO Lucas Heights, 6-7 September
2004

Twenty-four Australian researchers attended the first Australian INTIMATE workshop meeting, hosted by ANSTO. There were two objectives of the meeting:

- **Identify and prioritise Australian onshore and offshore reference records for the OIS 2/1 transition**
- **Promote ways to effect high-precision and dating of key Australian onshore and offshore records for the determination of a regional event stratigraphy**

The workshop spanned two days, of which more than half the time comprised presentations of records from across the southwest Pacific region. The records spanned the full range of depositional environment covered by INTIMATE, namely ice, marine and terrestrial. **Simon Haberle** (ANU) started the meeting off by reminding the participants of the aims of the workshop and highlighting earlier work undertaken in the North Atlantic region (Lowe *et al.*, 2001). Due to the limited resolution of many of the sequences spanning the Last Termination, many presentations attempted to place this period in the context of higher-resolution records from earlier periods.

Researchers from the marine realm started the presentation of records. **Will Howard** (University of Tasmania) presented the latest data from the South Tasman Rise that included quantified temperature reconstructions for the Last Termination.

Paul Hesse (Macquarie University) presented dust records from offshore Australia and pointed out the difficulties of getting high-resolution samples from relatively low sedimentation sequences. **Tim Barrows** (Australian National University) presented the latest quantified reconstructions of sea surface temperature during the height of the LGM for the Australasian region, noting the greatest cooling was in the southwest and the coldest phase predated the $\delta^{18}\text{O}$ maximum by over 2000 years. **Vin Morgan** (Australian Antarctic Division) represented the ice community and presented the latest results from Law Dome, which through methane synchronization with the GRIP (official timescale) record demonstrated the Antarctic Cold Reversal commenced prior to the onset of GI-1 in Greenland. Numerous types of terrestrial records were presented at the meeting. **Tim Barrows** (Australian National University) reported the latest cosmogenic results of moraine and periglacial features in Kosciuszko and Tasmania, showing the only major advance during the Last Termination was centred on 16,800 ^{10}Be and ^{36}Cl years. **John Chappell** (Australian National University) presented results demonstrating that fluvial systems were considerably more active during Stage 2, due largely to more effective runoff (compared to present day). This was followed by **Ed Rhodes** (Australian National University) who presented the latest results from OSL dating of sand dunes from the Simpson Desert that appeared to record discrete periods of activity during the Last Termination. The palynological records obtained from lakes and bogs comprised a significant portion of the meeting. The first results were presented by **Rochelle Johnston** (Monash University) who reported data from Tower Hill (Victoria) that spanned the Last Termination and showed significant changes in effective precipitation through this

period. The last talk of the first day was made by **Chris Turney** (University of Wollongong) who presented a transect of multi-proxy results from five sequences across the southwest Pacific spanning the Last Termination.

The second day commenced with further presentations of palynological records obtained from lakes and bogs. **Peter Kershaw** (Monash University) highlighted the potential of a highland site in Victoria, Caledonia Fen, for reconstructing changes during the Last Termination. **Geoff Hope** (Australian National University) presented a high-resolution pollen record (sampled at 2mm) from Bega Swamp that displayed sustained environmental changes during what appeared to be the Last Termination. These talks were followed by two speleothem presentations. **Jian-xin Zhao** (University of Queensland) presented records from China, northern Queensland and New Zealand that showed complex changes through the Last Termination, potentially reflecting contrasting North Atlantic and Antarctic influences. **Kira Westaway** (University of Wollongong) presented new records from Java and Flores that demonstrated broadly synchronous trends across the Last Termination. **John Chappell** (Australian National University) completed the presentations by reporting some of the latest work on reconstructing changes in sea level, including the commencement of global sea level rise at 19 cal ka.

The second part of the meeting involved detailed discussions about necessary protocols for the Australian INTIMATE group. A major part of the discussion was the development of a protocol for age-depth models, particularly using radiocarbon. Chronological control had formed a significant part of many of the presentations. There was widespread agreement that for the 20-10 ka period, the

group should use the INTCAL98 dataset until INTCAL04 becomes available. The use of calibration programs was discussed and preference was made for either CALIB4 (<http://depts.washington.edu/qil/>) and OxCal (<http://www.rlaha.ox.ac.uk/orau/oxcal.html>) though everyone agreed they had to state which program had been used. Marine reservoir ages were noted to be of particular concern for this period. It was agreed that the marine reservoir correction available on the [web](http://radiocarbon.pa.qub.ac.uk/marine/) (<http://radiocarbon.pa.qub.ac.uk/marine/>) should be used. There was widespread support for the reporting of all original radiocarbon ages (uncorrected) for recalibration by future workers (if necessary). It was agreed that the group would follow the recommendations (or variation of) of Lowe and Walker (2000) for the reporting of radiocarbon ages. Protocols for the other dating methods (U-series, OSL and cosmogenic) would be drawn up for the AQUA meeting in Tasmania (December 2004).

There was some discussion that the remit of the group should be extended to cover the period 30-10 ka, though the implications of developing high-precision radiocarbon dates back to 30ka and the extent to which meaningful comparisons could be made with the North Atlantic group were not fully explored. In the discussion, Vin Morgan agreed to transfer the Law Dome dataset onto the GRIP (INTIMATE) timescale to allow Southern Hemisphere workers in the future to directly compare their records to Antarctica and the North Atlantic group.

Comparisons of many of the datasets were made though it became clear that due to the absence of quantified palaeoclimate estimates (apart from the oceans) and the chronological uncertainties associated with the records that high-precision comparison

between the datasets and further afield was not possible. However, some clear trends were noted, the most notable of which appears to have been significant warming and major ice retreat in many of the records at 15 cal ka. Much work has yet to be done but the meeting was an important first step for developing records of international importance during this crucial period.

Chris Turney
(University of Wollongong)

References

- Lowe, J.J., Hoek, W.Z. and INTIMATE group (2001) Inter-regional correlation of palaeoclimatic records for the Last Glacial-Interglacial Transition: a protocol for improved precision recommended by the INTIMATE project group. *Quaternary Science Reviews*, **20**, 1175-1187.
- Lowe, J.J. and Walker, M.J.C. (2000) Radiocarbon dating the last glacial interglacial transition (ca. 14-9 ^{14}C ka BP) in terrestrial and marine records: the need for new quality assurance protocols. *Radiocarbon*, **42**, 53-68.



Participants at the Oz-INTIMATE workshop, ANSTO, Lucas Heights, 6-7 September 2004.