



Outcomes from the 2004 OZ-INTIMATE Meeting

ANSTO, Lucas Heights:
6th – 7th September, 2004

Conveners – Simon Haberle, Henk Heijnis, David Fink, Chris Turney

WORKSHOP OBJECTIVES

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

WORKSHOP OUTCOMES

1.0 UNANIMOUS AGREEMENT

There was unanimous agreement that as an outcome of the OZ-INTIMATE initiative **one poster** should be produced by the OZ-INTIMATE community for the AQUA meeting in December.

- The poster will deal with continuous proxy records spanning 30 ka to late Holocene and will contain the Law Dome Antarctic and GRIP (INTIMATE) Northern Hemisphere Ice records for comparative purposes (**confirm with Vin**). Data is being contributed in the following form from workshop attendees who volunteered their data.
 1. an Excel file containing where appropriate one column with depth, a second with age (ka, ie. calibrated) and a third (and fourth) with the key proxy data you want to submit.
 2. in the same Excel file have an explanation of the data (i.e. a caption for the figure) and a list of the samples (age and depth) used to construct the age-depth model. This is so that on each diagram the location of each age determination can be shown.
- Preliminary event stratigraphy boundaries will be highlighted for discussion at the AQUA meeting in December. Note that a significant feature of the Australian data will be regional variations (spanning the tropics to Antarctica) in the data.

2.0 POSTER COORDINATOR

Person co-ordinating the production of the poster is: **Simon Haberle** (AQUA president and OZ rep.) All poster contributions will be clearly and openly acknowledged and/or referenced.

3.0 ASSOCIATED PUBLICATIONS

As with the NZ INTIMATE group there was a view that if we are going to the effort of producing a poster, then we should also target publications. If we can compile the poster satisfactorily, then we should target an immediate publication of its contents for one of the international Quaternary journals either independently or jointly with the NZ INTIMATE group (**discuss with NZ group co-ordinators**).

4.0 AUTHORSHIP

The authorship of papers derived from this project would include authors who make a substantial contribution plus “Australasian-INTIMATE members” All poster contributions will be clearly and openly acknowledged and/or referenced.

5.0 POSTER CONTENT

This poster will form the template for an event stratigraphy-focussed outcome. The poster will detail key continuous proxy records spanning early Holocene to c. 30 ka. Fragmentary terrestrial records (i.e. glacial advance/retreat, fluvial sequences, peat accumulation) will be incorporated where appropriate and quantitative estimates for key time periods (i.e. LGM SST's) will also be included. Short but high-resolution records such as those derived from tree-rings and corals will be displayed separately to illustrate the nature of ~annual to sub annual climate variability during the time period of interest. The poster can be updated on an annual basis to accommodate refinements or additional data.

Reference to protocols for various dating techniques used to produce these records will be highlighted

- ¹⁴C dating will follow the Lowe and Walker (2000) recommendations. In addition there was the suggestion we wait for INTCAL04 to deal with the 20-30ka ages (out in Oct/Nov 2004) and that in the mean time people can use the available calibration datasets (available for example in CALPAL) but be explicit about how their ages were arrived at. Whatever is used it will have to be changed when INTCAL04 comes on line as part of the periodic update of data. There was a preference for OxCal (though not at exclusion of CALIB) as a program to use given the Bayesian options built in. In addition there was discussion about marine reservoir correction (need to state what used and reason for this assumption) and southern hemisphere offset (recommended not to be used as is a dynamic but unknown variable through time).
- OSL/TL will follow standard reporting protocols outlined by Roberts/Rhodes (**Ed or Bert to provide a reference or comment**).
- TIMS U-series dating will follow standard reporting protocols outlined by (**Jian-xin or Kira to provide a reference or comment**)
- Cosmogenic dating will follow standard reporting protocols outlined by Fink/Barrows (**Tim or David to provide a reference or comment**).

5.1 The Continuous Records Considered For Inclusion Are:

Antarctic (Law Dome)

This to be coordinated by **Vin Morgan and Tas Van Ommen**. The record will be placed along GRIP (INTIMATE) $\delta^{18}\text{O}$ dataset from the Northern Hemisphere in the poster.

Marine

This is to be coordinated by **Will Howard** and **Paul Hesse**. They will decide on the key proxies to be included in the records from GC7 and E27-23 (Southern Ocean), SO-14-08-05 (Indian Ocean), E26.1 (Tasman Sea). Also recommend additional records that might be included in this or future versions of the poster.

Lake/Swamp records

This is to be coordinated by (in no particular order) **Rochelle Johnson, Geoff Hope, Peter Kershaw, Simon Haberle and Chris Turney**. The records will be essentially palynological and key proxies need to be selected. This should include one key proxy that is uniform across all sites (e.g. trees and shrubs vs. herbs) and up to 2 that are most significant in each site (e.g. chenopods at Tower Hill). Other proxies may also be considered (diatoms/ostracods). The main sites include Tower Hill and Caledonia Fen (Victoria), Bega Swamp (NSW), and Lynch's Crater, Lake Barrine and Lake Euramoo (Atherton Tablelands).

Speleothems

This is to be coordinated by **Jian-xin Zhao and Kira Westaway**. The records include Chillagoe (north Queensland) and SPJ3-Gua Gebang (Java) and SP15-Liang Luar (Flores). The data will be expressed either as $\delta^{18}\text{O}$ and/or $\delta^{13}\text{C}$.

5.2 Fragmentary Terrestrial and Short/High-resolution Records Considered For Inclusion Are:

- **Sea level records** - to be coordinated by **John Chappell**
- **Dune field and fluvial records** to be co-ordinated by **Ed Rhodes and John Chappell**
- **Glacial records** to be coordinated by **Tim Barrows and David Fink**
- **Peat accumulation records** to be coordinated by **Geoff Hope and Peter Kershaw**
- **Tree-ring record** published from Huon Pine (Tasmania) in Barbetti et al. (2004). This will be co-ordinated by **Michael Barbetti and Quan Hua** (*to be confirmed*).
- **Coral records** published from New Caledonia (**Thierry Correge**) and New Guinea (**Mike Gagan or John Chappell**) that fall within the time period of interest (*to be confirmed*).

Fragmentary records will need to be displayed on the continuous timescale figure. One way would be to state a time range for the event being dated (e.g. last glacial advance maximum) and this could be plotted as a single solid bar on the continuous timescale. The associated histogram or age distribution curve that produced this time range estimate can be plotted in a separate window in the poster.

The short high-resolution records (corals and tree-rings) available within the time period of interest should be displayed separately to illustrate the nature of ~annual to sub annual climate variability.

5.3 POSTER Inset Maps

Small inset maps to be formulated for the Poster will show:

- Location of sites for proxy records (**Simon Haberle**)
- Shorelines, Glacial extents at LGM and SST's (**Tim Barrows**)
- Vegetation at LGM and late Holocene (**Peter Kershaw or Geoff Hope**)

5.4 Issue For Further Discussion

Essentially each record could appear as a 'panel' with (a) proxy record and (b) 'event interpretation' as part of the caption or inserted next to the curve. All OZ-INTIMATE participants will have an opportunity for input as various drafts of the Poster are circulated.

Development of an event stratigraphy for the OZ based records will be a longer term process that is the aim for presentation at the 2007 INQUA Cairns symposium, though an event stratigraphy should be developed well in-advance of the Cairns meeting.

While there was general agreement that the remit of the group should be extended to cover the period 30-10 ka, the implications of developing high-precision radiocarbon dates back to 30ka (i.e. cost of dating) and the extent to which meaningful comparisons could be made with the North Atlantic group were not fully explored. This will have to be a major consideration of both the NZ and Oz INTIMATE groups at the AQUA conference in December 2004.

The recent announcement of the ARC Research Networks in "Environmental Futures Network" (<http://nesuab.ees.adelaide.edu.au>) and "Earth Science Systems Network" (<http://www.es.mq.edu.au/physgeog/staff/ap/ACSN/>) will also be potentially very beneficial to this project. These networks are funded to the level of ~\$400k/year for 5 years and support workshops/meetings only to tackle key issues (such as our INTIMATE project). We will be working to get the Australasian INTIMATE project supported under one or both of these and hopefully have something to say about this at AQUA. This will be very important in terms of getting the two groups (perhaps with North Atlantic reps down the track) together one or two more times prior to 2007 Cairns INQUA.

7.0 IMMEDIATE TIMELINE

- **POSTER DATA– End September, 2004:** All continuous proxy record data and fragmentary record data (identified above) to Simon Haberle (simon.haberle@anu.edu.au) for compilation.
- **POSTER DRAFT- Mid October, 2004:** Draft Poster to be circulated to all OZ-INTIMATE members for comment.
- **December, 2004:** Presentation of Poster at the Australasian INTIMATE Meeting in Tasmania.

8.0 ACKNOWLEDGEMENT

We would like to acknowledge ANSTO for providing support and a location for the OZ-INTIMATE meeting and INQUA for providing financial support. The format of this report follows the NZ-INTIMATE workshop report and thanks goes to Brent

Alloway for providing us with a copy of this prior to the production of our workshop report.

9.0 REFERENCES

- Barbetti, M., Hua, Q., Zoppi, U., Fink, D., Zhao, Y., and Thomson, B. (2004) Radiocarbon variations from the Southern Hemisphere, 10,350–9700 cal BP. *Nuclear Instruments and Methods in Physics Research B* **223–224**, 366–370.
- Lowe, J.J. and Walker, M.J.C. (2000) Radiocarbon dating the last Glacial-Interglacial transition (ca 14-9 ¹⁴C ka BP) in terrestrial and marine records: the need for new quality assurance protocols. *Radiocarbon* **42**, 53-68.

Simon Haberle

(OZ-INTIMATE rep) on behalf of the OZ-INTIMATE community

9th September, 2004

Workshop Participants (* presenters)

- Tim Barrows***, Department of Nuclear Physics, Research School of Physical Sciences and Engineering, The Australian National University.
- John Chappell***, Research School of Earth Sciences, Australian National University.
- Eric Colhoun**, Department of Geography, University of Newcastle.
- Russell Drysdale**, Department of Geography, University of Newcastle.
- Keith Fifield**, Department of Nuclear Physics, Research School of Physical Sciences and Engineering, The Australian National University.
- David Fink**, The Australian Nuclear Science and Technology Organisation.
- Simon Haberle**, Department of Archaeology and Natural History, RSPAS, Australian National University.
- Henk Heijnis**, The Australian Nuclear Science and Technology Organisation.
- Anne Henderson-Sellers**, The Australian Nuclear Science and Technology Organisation.
- Paul Hesse***, Department of Physical Geography, Macquarie University.
- Geoff Hope***, Department of Archaeology and Natural History, RSPAS, Australian National University.
- Will Howard***, ACE CRC, University of Tasmania.
- Quan Hua***, The Australian Nuclear Science and Technology Organisation.
- Rochelle Johnston***, School of Geography and Environmental Science, Monash University.
- Peter Kershaw***, School of Geography and Environmental Science, Monash University.
- Vin Morgan***, ACE CRC, University of Tasmania.
- Ed Rhodes***, Research School of Earth Sciences, Australian National University.
- Bert Roberts**, School of Earth and Environmental Sciences, University of Wollongong.
- Chris Turney***, School of Earth and Environmental Sciences, University of Wollongong.
- Kira Westaway***, School of Earth and Environmental Sciences, University of Wollongong.
- Colin Woodroffe**, School of Earth and Environmental Sciences, University of Wollongong.
- Jian-xin Zhao***, Advanced Centre for Queensland University Isotope Research Excellence, Department of Earth Sciences, University of Queensland.

PROGRAMME:

Monday 6th, September

9.45-10.00am *Objectives and Overview* (Simon Haberle)

10.00-11.00am *Marine Records*

- Will Horward* *et al.*, “Paleoceanographic constraints on glacial-interglacial carbon cycling on the Subantarctic South Tasman Rise.”
- Tim Barrows* and Steve Juggins, “Sea-surface temperatures around the Australian margin and Indian Ocean during the Last Glacial Maximum.”

11.00-11.30am **Coffee Break**

11.30-12.00am *Marine Records*

- Paul Hesse* and Tim Barrows, “Silk Purse ≠ Sow’s Ear: Difficulties in obtaining a high resolution record of dust flux from low sedimentation rate deep-sea sediments.”

12.00-12.30am *Ice-Core Records*

- Vin Morgan* and Tas van Ommen, “A Small Piece of the Puzzle of Climate Change.”

12.30-1.00pm *Glacial Records*

- Tim Barrows* & Keith Fifield, “Late Pleistocene glaciation of Australia.”

1.00-2.00pm **Lunch**

2.00-3.00pm *Aeolian/Fluvial Records*

- John Chappell*, “Enlarged rivers and shifting sand: hydrologic contrasts at the LGM in Australia.”
- Ed Rhodes*, “Limits of precision and accuracy using OSL dating.”

3.00-3.30pm *Lake/Palynostrat. Records*

- Rochelle Johnston* *et al.*, “A high resolution, multiproxy record of the Last Glacial Maximum to Holocene transition from the volcanic lake sediments of Tower Hill, southeastern Australia.”

3.30-4.00pm **Coffee Break**

4.00-4.30pm *Lake/Palynostrat. Records cont.*

- Chris Turney* *et al.*, “Synchronous climatic changes in the Southwest Pacific during the Last Termination?”

4.30-5.30pm *Day 1 Summary*

Tuesday 7th, September

9.00-10.00am *Lake/Palynostrat. Records cont.*

- Peter Kershaw* *et al.*, “The Australasian INTIMATE project: palaeoecological records from Australia with high potential.”
- Geoff Hope* *et al.*, “The end of the Pleistocene from Bega Swamp, southern New South Wales.”

10.00-11.00am *Speleothem Records*

- Jian-xin Zhao* *et al.*, “Speleothem records for the Last Glacial - Holocene transition - case studies from China, New Zealand and northern Australia.”
- Kira Westaway* *et al.*, “Reconstructing palaeoenvironments affecting human occupation and dispersal either side of Wallace’s Line, Indonesia: preliminary results for OZ-INTIMATE.”

11.00-11.30am **Coffee Break**

11.30-12.00am *Coral Records*

- John Chappell*, “The LGM sealevel lowstand: duration, isostatic variation and further exploration.”

12.00-12.30am *Discussion*

12.30-1.30pm **Lunch**

1.30-2.30pm *Open Session*

5 minute rejoinder from each speaker & key proxy comparison using transparencies.

2.30-3.30pm *Synthesis and Recommendations*

3.30-4.00pm **Coffee Break**

4.00-4.30pm *Synthesis and Recommendations*

includes International and national program linkages

a) CcASH (Fink)

b) PAGES (Kershaw)

c) New ARC Research Network announcements (Haberle)

4.30 pm **Close**