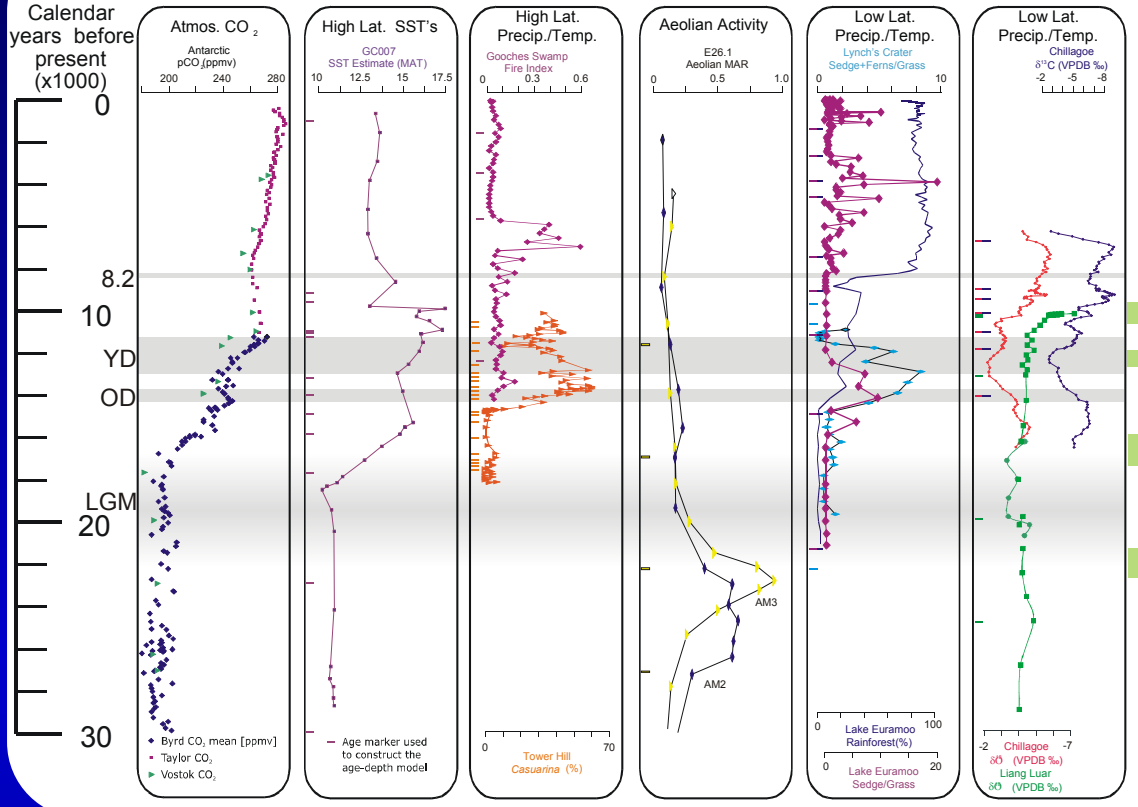
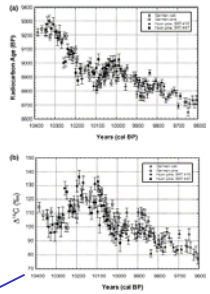
TIME SCALE

HIGH-RESOLUTION RECORDS

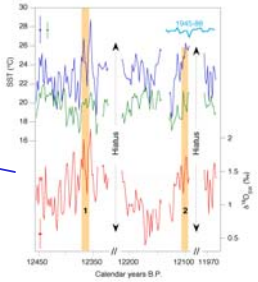
FRAGMENTARY RECORDS



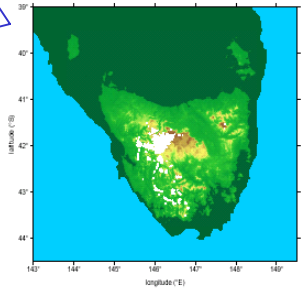


Huon Pine sections from Tasmania reveal ^{14}C variations for the period 10,400 – 9,600 cal BP (Barbetti *et al.* 2004). The high-precision radiometric ^{14}C data for SRT-416 are positioned by matching to the absolute German oak and German pine record, with ring 1 of SRT-416 placed at 10,120 cal BP. AMS data from SRT-447 are placed according to the secure tree-ring match with SRT-416. The data are shown in two plots, in (a) as radiocarbon ages and in (b) as $\Delta^{14}C$ values calculated from the radiocarbon ages and their respective placements on the cal BP time-scale. All uncertainties are 1 values.

The combined ring sequence extends over 680 years and allow an extended investigation of interhemispheric ^{14}C change. The offset is small between 10,300 and 10,100 cal BP (a period of rising atmospheric ^{14}C), but increases to 50 years or more between 10,100 and 10,000 cal BP (a period of falling atmospheric ^{14}C). It then decreases slightly over the next 300 years. This feature of hemispheric ^{14}C offset was also found during the Spörer, Maunder and Dalton minima of solar activity.



***Diploastrea* indicate that SSTs for the period 12,450–11,950 years BP were on average 4.5 ±1.3 °C cooler than at present at Vanuatu** (Corrège, T. *et al.* (2004). Time series of Sr/Ca SSTs (blue curve) and $\delta^{18}O$ SSTs (green curve) reconstructed at biannual resolution for the Younger Dryas *Diploastrea*. For comparison, the light blue curve (upper right corner) is the biannual instrumental SST record for Vanuatu for 1945–88. The dotted line is the arbitrary baseline $\delta^{18}OSW$ value for Vanuatu (1.4‰SMOW). Brown areas (marked 1 and 2) indicate intervals where the coral was analysed at monthly resolution. Vertical arrows indicate two century-long hiatuses identified by comparison of the uranium-series ages with the number of annual density band couplets.



Regional map showing the extent of glaciation and the coastline in Tasmania during the LGM (from Barrows *et al.* 2002). White circles are positions of cirques that were probably active during the LGM (Peterson and Robinson, 1968). White areas are maximum ice limits modifed from Derbyshire (1966) and Colhoun *et al.* (1996).

Exposure dating (using cosmogenic isotopes ^{10}Be and ^{36}Cl) of periglacial and glacial features shows two peaks of periglacial activity at 16.6 ± 0.7 ka, 21.9 ± 0.5 ka. This implies that LGM was brief.

The distribution of periglacial landforms provide good constraints on temperature change.

- 8-10 °C in E Australia (29-37 °S)
- 8-9 °C in SE Australia (37-40 °S)
- 5-7 °C in Tasmania (40-44 °S)

Regional reconstruction of LGM SST's from 165 cores around the Indo-Pacific is also underway (Barrows*).

OZ-INTIMATE 2004

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The objectives of the inaugural OZ-INTIMATE meeting held at ANSTO in September 2004 were: (1) identify and prioritise Australian onshore and offshore reference records for the OIS 2/1 transition, and (2) promote ways to effect high-precision and dating of key Australian onshore and offshore records for the determination of a regional event stratigraphy. At the meeting there was unanimous agreement between the c. 26 attendee's that a poster be produced by the OZ-INTIMATE community for discussion at the Decenber meeting of AQUA. This poster deals with continuous proxy records spanning 30 ka to the late Holocene and contains the Northern Hemisphere chronostratigraphic zones (grey bars: 8.2ka Cold Event, Younger Dryas YD, Older Dryas OD) and Antarctic ice records of CO_2 and the ACR (Antarctic Cold Reversal) for comparative purposes. Data has been contributed from workshop participants. The poster forms a template for an event stratigraphy-focussed outcome derived from key continuous proxy records spanning early Holocene to c. 30 ka. Fragmentary terrestrial records (i.e. glacial advance/retreat, tree-ring and coral data) have been incorporated where appropriate and quantitative estimates for key time periods (i.e. LGM SST's) are also included. Development of an event stratigraphy for the OZ and NZ 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.

***OZ-INTIMATE Workshop Participants/Contributors.**
Tim Barrows, Manu Black, John Chappell, Eric Colhoun, Russell Drysdale, Keith Fifield, David Fink, Simon Haberle, Henk Heijnis, Anne Henderson-Sellers, Paul Hesse, Geoff Hope, Will Howard, Quan Hua, Rochelle Johnston, Peter Kershaw, Scott Mooney, Vin Morgan, Gerald Nanson, Ed Rhodes, Bert Roberts, Chris Turney, Chris Waring, Kira Westaway, Nicki Williams, Colin Woodroffe, Jian-xin Zhao.

Key Sites: (Map; yellow dot = in progress; red dot = data provided)

Antarctic Ice records: Propose to use Law Dome $\delta^{18}O$ for independent Antarctic palaeoclimate record for comparison with OZ-INTIMATE records (Morgan*).
Sites GC007 and E27-23: SST reconstruction for the Southern Ocean using modern analogue approach (Howard* and Armand*). SST's increase by ~6°C between 18.5-15ka.
Gooches Swamp: A peat swamp 960 m altitude in the Sydney Basin shows a record of fire sensitive vs. fire tolerant vegetation (fire index) and may be a proxy for palaeo-precipitation through the pollen record (Black* and Mooney*). The record suggests low fire-high precipitation during the late glacial and peaking in the early Holocene.
Tower Hill: Multi-proxy analysis of lake sediments infilling the Tower Hill volcanic crater have yielded data on palaeo-precipitation, temperature (*Casuarina* %) and salinity (Johnson*). Similar records are being worked on from Lake Surprise and Caledonia Fen.
Site E26.1 and SO-14-08-05: Dust influx in the Tasman Sea (cores AM2 and AM3) and the Indian Ocean derived from central Australian sources are being reconstructed using Mass Accumulation Rate estimates (Hesse*).
Lynch's Crater and Lake Euramoo: Multi-proxy analysis of lake/swamp sediments infilling the Lynch's Crater and Lake Euramoo (also Lake Barrine and a new record from PNG, Aguai Ramata) volcanic craters on the Atherton Tablelands have yielded data on palaeo-precipitation, temperature and past fire regimes (Haberle* and Kershaw*).
Chillagoe and Liang Luar: Speleothem records of $\delta^{18}O$ and $\delta^{13}C$ from Chillagoe, east of Atherton, considered to show a cold reversal between 10.3-14.3ka (Zhao*). Increased precipitation is considered to be reflected through increasing $\delta^{18}O$ after 10.2ka at Chillagoe and Liang Luar (Westaway*), in western Flores, Indonesia.
Aeolian and Fluvial records: OSL and radiocarbon dates are accumulating from dune and river sites in central Australia (eg. Simpson Desert, Murray River) providing a window into climate change in central Australia (Rhodes*, Chappell*, Nanson*).


Chillagoe speleothem


Huon Pine section

Key References:
Barbetti, M. *et al.* (2004) Radiocarbon variations from the Southern Hemisphere, 10,350–9700 cal BP. *Nuclear Instruments and Methods in Physics Research B* 223–224, 366–370
Barrows T, et al. (2002). The timing of the Last Glacial Maximum in Australia. *Quaternary Science Reviews* 21, 159–173.
Barrows, T. T., and Juggins, S. (in press) Last glacial maximum sea-surface temperatures around the Australian margin and Indian Ocean. *Quaternary Science Reviews*.
Corrège, T. *et al.* (2004) Interdecadal variation in the extent of South Pacific tropical waters during the Younger Dryas event. *Nature* 428, 927-929.
Hesse, P *et al.* (2004) Late Quaternary climates of the Australian arid zone : A review. *Quaternary International*, 118-119, 87-102