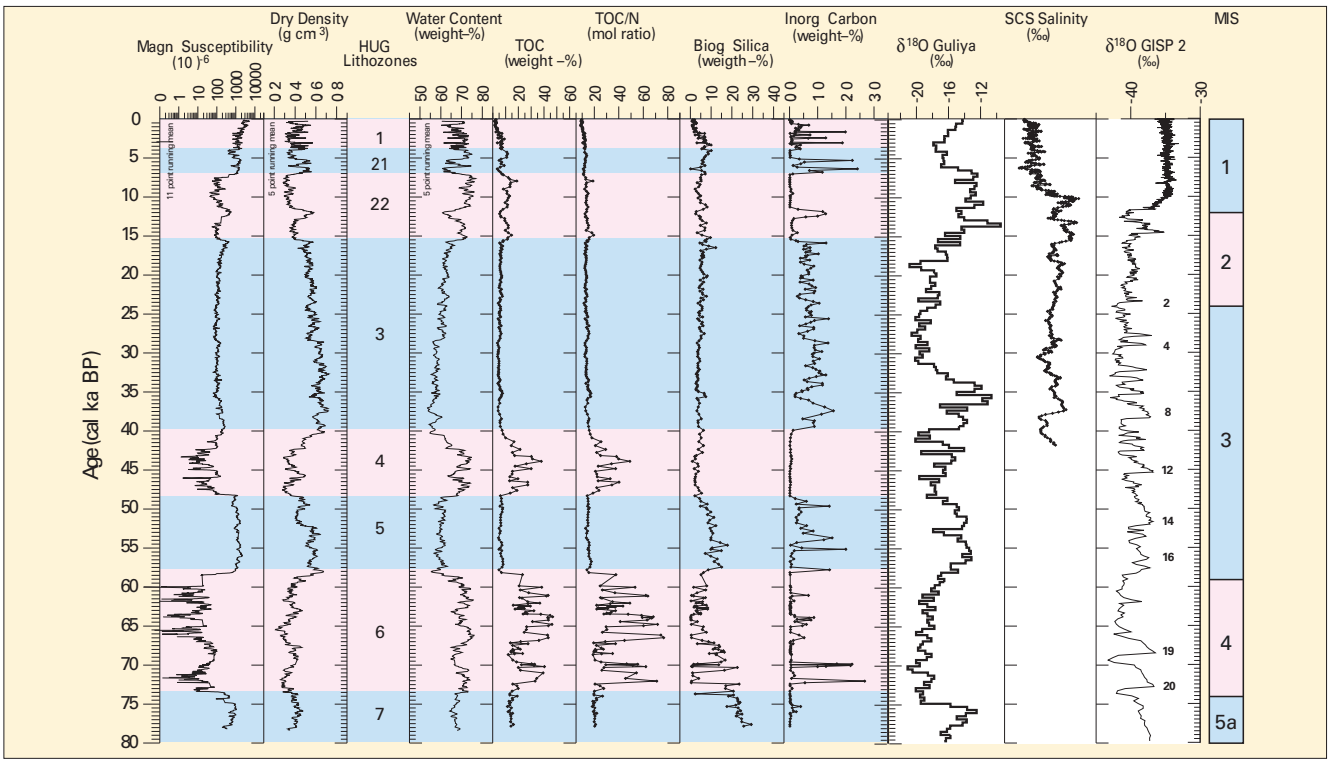

Fig. 2. Comparison of lake sediment data from Huguang Maar, ice core data from Guliya Ice Cap (Thompson et al., 1997) and Greenland (NOAA-Greenland Ice Core CD-ROM), and sea surface salinity data from the South China Sea (Wang et al., 1999).

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Pollen Records of the Last Glacial Cycle in the Southern Hemisphere Tropics of the PEPII Transect

Sander van der Kaars[1], Peter Kershaw[1], Nigel Tapper[1], Patrick Moss[2], Chris Turney[3]

[1] Monash University, Australia. Sander.vanderKaars@arts.monash.edu.au, Peter.Kershaw@arts.monash.edu.au, Nigel.Tapper@arts.monash.edu.au
[2] University of Iowa, US. Patrick.Moss@uiowa.edu
[3] Royal Holloway, University of London, UK. Chris.Turney@rhul.ac.uk

There is increasing interest in the role of the tropics, especially the maritime continent at region centred on Indonesia, in the search for a fuller understanding of global climate change. In addition to its importance as the 'boiler–box of the world', this region is a major player in both El Niño–Southern Oscillation (ENSO) variability and the Asian-Australian summer monsoon system. The critical location of the region in relation to the Indonesian Throughflow section of the thermo-haline conveyer belt provides it with the potential to alter both atmospheric and oceanic global circulation systems.

Due to perceived difficulties in working within lowland humid ecosystems, it is only recently that intensive and sustained research has been undertaken on the region as a whole. The potential for continuous, high resolution palaeoecological records from an abundance of sediment–filled volcanic craters on land and deep troughs between the many island systems is enormous. These sites allow comparison between environments on land and in the ocean and, in the case of pollen, comparison of local and regional vegetation histories with good chronological control provided by oxygen isotope data from the ocean records.

Summary pollen records from paired terrestrial and marine sites in Indonesia and northeastern Australia for the last glacial cycle are shown in Figure 1. These represent four of the seven long pollen records covering the last one to three glacial cycles prepared from this region to date (Figure 2). The West Java record is a compilation of the lower montane diagram from the Bandung Basin (van der Kaars and Dam 1995) with the LGM and Holocene filled in by

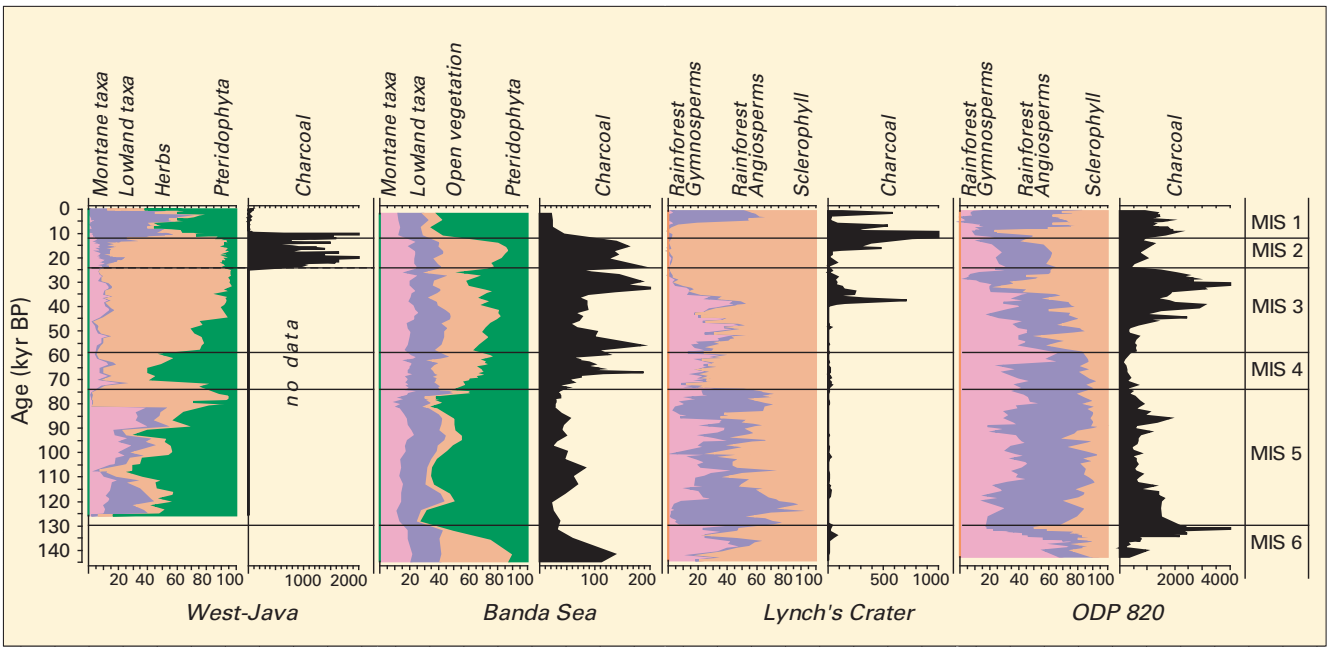

Fig. 1. Summary pollen and charcoal records of the last glacial/interglacial cycle from terrestrial and marine cores in the Australian region.

the lowland record from Rawa Danau (van der Kaars et al. in press, van der Kaars in prep), while the Banda Sea record is from van der Kaars et al. (2000). The last glacial cycle of the terrestrial Lynch's Crater record and marine ODP 820 record have been compiled by Moss and Kershaw (2000). All records are derived from, or are adjacent to, areas naturally supporting rainforest given a mean annual precipitation of at least 2000 mm. The chronologies applied to the originally published records have been retained here but are amenable to some modification.

All records show that there has been marked climate change over the last glacial cycle. The degree of replacement of rainforest (montane, lowland and pteridophyte taxa) by herbaceous vegetation in Indonesia and by eucalypt (sclerophyll) woodland in Australia during glacial periods MIS 6 and 4–2, suggests precipitation was reduced by some 30–50%. The terrestrial records suggest that during these periods rainforest may have had a very restricted distribution. However, the marine records indicate more substantial rainforest survival. The precipitation signal is much more evident than that for temperature, although a 6°C reduction for the LGM at submontane altitudes in Java is inferred.

Charcoal records indicate that burning has been a feature of wet tropical environments through at least the last glacial cycle, with fire activity generally higher during drier glacial periods. The data from the terrestrial records though, suggest that fire within rainforest has been very limited. All records show some sustained change in vegetation. Examples include the replacement of gymnosperm-dominated drier rainforest by sclerophyll vegetation in Australia and by reduced representation of *Dipterocarpaceae* in the Banda region, that might be associated with increased burning levels between about 50,000 and 35,000 years ago. In the absence of evidence for significant global climate change at this time, these changes have been attributed to the impact of humans as they spread through this region. However, the apparent impact in Australia before Indonesia, based on recent AMS redating of the Lynch's Crater record and evidence for similar sustained changes at the end of MIS 6 in the ODP 820 record, well before archaeological evidence for people, makes a solely human cause improbable. Instead, the possibilities of environmental changes caused by alterations to ENSO and monsoon activity, as a result of tectonic and volcanic impacts on the Indonesian Throughflow, are currently being investigated.

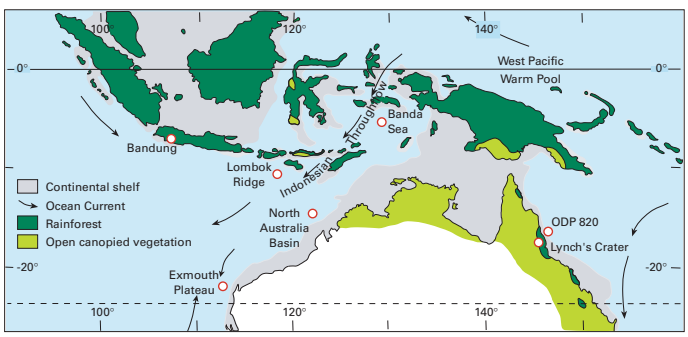

Fig. 2. Location map of long Quaternary pollen records .

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