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High resolution record of the Last Glacial Maximum in eastern Australia

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A continuous, high resolution (average ca. 22 year) record encompassing the Last Glacial Maximum (LGM) has been developed using multiple proxies (aeolian sediment flux, grain size, pollen and charcoal) in lake sediment from Tortoise Lagoon (TOR), North Stradbroke Island, Queensland, Australia. The presence of Asteraceae tubiliflorae and spineless Asteraceae (common indicators of glacial conditions in Australia) at TOR indicates significantly cooler temperatures (mean annual temperature up to 6oC lower than today).
In addition to the palaeoclimatic reconstruction, a record of palaeodust transport pathways for eastern Australia was developed using ICP-MS trace element analysis and geochemical "fingerprinting" of TOR aeolian sediment to continental dust source areas. Vectors between dominant dust source areas and North Stradbroke Island allowed the reconstruction of the position and intensity of LGM dust transport pathways. Furthermore, changes in likely synpotic scale conditions can be postulated based on the position of the dust transport corridors.
Similarities between the vegetation at TOR during the LGM and that at temperate sites e.g. Caledonia Fen, Victoria (Kershaw et al. 2007), Redhead Lagoon, New South Wales (Williams et al. 2006) and Barrington Tops, New South Wales (Sweller and Martin 2001) suggests that this record reflects regional conditions across southeastern Australia. The TOR record also correlates well with that from nearby Native Companion Lagoon which suggests that the LGM was actually an extended period of ca. 8 – 10 kyr, characterised by 2 periods of increased aridity (ca. 30 – 26.5 kyr and 21 – 19.5 kyr) (Petherick et al. 2008). A growing number of records from across the Southern Hemisphere e.g. New Zealand (Suggate and Almond 2003; Alloway et al. 2007; Newnham et al. 2007), Chile (Denton et al. 1999), Antarctica (Röthlisberger et al. 2002; EPICA 2006) and Australia (Smith 2009) also show evidence that the LGM encompassed a longer period of time than traditionally accepted, and was not uniformly cool and dry.

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