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Reconstructing Australasian climate during the late Quaternary: a modelling study of the Australian palaeomonsoon using terrestrial and marine vegetation records

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During the late Quaternary, the Australian summer monsoon has varied both spatially and in intensity. Monsoon activity is thought to be paced by global glacial-interglacial variations, with limited activity during the glacial phases and reinvigoration during warm global interglacial phases. Although variations in the monsoon are likely to be strongly linked to insolation variations over glacial-interglacial time scales, it is clear that other interactions are likely to be important. For example, Southern Hemisphere insolation was at a minimum during the early Holocene, and hence the nearly simultaneous increase of precipitation in Asia and Australia during this time cannot be explained by solar forcing alone. It has also been hypothesized that the reduced intensity of the monsoon during the Holocene, compared with that of the Last Interglacial, is due to a feedback between vegetation and climate, caused by the reduced efficiency of evapotranspiration from woody vegetation that was altered and reduced through the landscape burning activities of the early indigenous Australians. Other factors, such as oceanic forcing, have also been postulated. Hence, we suggest that feedbacks and interactions exist between forcing mechanisms that include variations in interhemispheric connections, ocean changes and land surface exchanges.

In this study we use the Fast Ocean Atmosphere Model (FOAM), with vegetation input for various time slices derived from terrestrial and marine palynological records from around Australia, to reconstruct global climate over the last 60,000 years, with particular emphasis on the Australian palaeomonsoon. Ongoing research includes expansion and refinement of palaeodata to more accurately assess past climate-vegetation rela-

tionships. Further work includes the use of this palaeodata, contemporary observations and model experiments to improve current understanding of changes in the Australian summer monsoon during the late Quaternary, and underlying forcing mechanisms responsible for such change.