

VARIABILITY OF THE AUSTRALIAN MONSOON AND INTERACTIONS WITH VEGETATION CHANGE OVER THE LATE QUATERNARY: SIMULATIONS WITH A COUPLED MODEL WITH DYNAMIC VEGETATION

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In order to provide a context for predictions of future changes in the Australian monsoon, it is important to understand the drivers of monsoon variability under a range of conditions. Reconstructing and simulating palaeoclimate over the late Quaternary (the last 70,000 years) can provide valuable insights into the response of the monsoon circulation and precipitation to changes in tropical SST, sea level, land surface characteristics and incoming solar radiation (insolation). In addition, changes in the type and distribution of vegetation may occur in response to monsoon variability, but may also play a role in altering the surface moisture balance, albedo or other characteristics of the monsoon region. Previous studies have hypothesized that such vegetation changes, due to early human burning of the landscape, may have altered the strength or extent of the Australian summer monsoon.

A set of simulations with the Fast Ocean Atmosphere Model (FOAM) coupled to a dynamic vegetation model (LPJ) are used to investigate the variability of the Australian summer monsoon and climate feedbacks associated with changes in vegetation type and distribution. Time slices simulations are carried out for 55, 35, 21, 11 and 6 thousand years before present, allowing the response of the monsoon to be investigated for a wide range of mean climates from the Last Glacial Maximum to the Holocene period. The impact of changes in the Asian monsoon circulation and El Niño-Southern Oscillation strength on the Australian monsoon are also considered. The model response is evaluated in comparison with proxy-based reconstructions of Australian monsoon variability and vegetation change.

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