Holocene hydrological balance of West Basin Lake, Australia. High resolution insight into regional climatic drivers with cross pacific correlations

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HOLOCENE HYDROLOGICAL BALANCE OF WEST BASIN LAKE, AUSTRALIA. HIGH RESOLUTION INSIGHT INTO REGIONAL CLIMATIC DRIVERS WITH CROSS PACIFIC CORRELATIONS

WEST BASIN PALAEOHYDROLOGY

ABSTRACT

Palaeohydrological response to internal and external climate forcing need to be understood in the context of current climate change and modelling future climate scenarios. One area that is particularly lacking in the global framework of Holocene climate reconstructions is from the southern hemisphere, and particularly from mainland Australia. It is unclear how the prominent drivers of present day climate, such as the El Niño Southern Oscillation in the pacific region have acted on longer centennial-millennial timescales. We explore these changes using a multi-proxy geochemical analysis of lacustrine organic matter from West Basin Lake, south-eastern Australia. The record is constrained by an age-depth model using newly acquired ^{14}C radiocarbon dates, an important feature in a study encompassing 10795 BP to Present. Our analysis reveals that the hydrological balance of West Basin was high, with a generally wetter climate between 10795-7000 BP before increasingly arid conditions established from 5000 BP- Present. Continuous and cross wavelet transformation shows a common millennial periodicity linking aridity in south-eastern Australia with increased precipitation in western South America. Aridity also appears linked to periods of increased total solar irradiance in the late Holocene suggesting that the intensification of El Niño Southern Oscillation at millennial scales may be driven by solar forcing.

KEYWORDS

Holocene, climate, stable isotopes, Australia, cellulose, ENSO, wavelets

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