Tropical Convection Variability in the West Pacific Warm Pool since the Last Glacial Maximum

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The tropical West Pacific is a major centre of tropical convection, supplying heat and moisture to the mid and high latitudes. Proxy records of convection since the LGM demonstrate that the Asian monsoon systems respond to high latitude climate dynamics. However the regional resolution of reconstructed precipitation patterns over the past ~20 kyr remains poor with relatively few continuous records existing. In this study, we present high resolution stable isotope, X-ray fluorescence (XRF) core scanning and palaeoproductivity records from IMAGES Core MD06-3075 (6°29 N, 125°50 E, water depth 1878m) recovered from the Davao Gulf on the southern edge of Mindanao aboard the R/V Marion Dufresne. This site is located within the West Pacific Warm Pool (WPWP) and is therefore ideally placed to capture the precipitation response of the tropical West Pacific, linked to oscillations in the mean position of the Intertropical Convergence Zone (ITCZ) and El Niño Southern Oscillation (ENSO). Planktonic oxygen isotope records demonstrate a signal consistent with northern hemisphere ice core records. During Heinrich Stadial 1, XRF records of terrigenous flux (log(Fe/Ca) and log(Ti/Ca)) show a peak, indicative of increased precipitation and runoff. This is corroborated by reduced primary productivity caused by increased surface water stratification due to freshwater runoff. This is interpreted to reflect a southward shift in the mean annual ITCZ position and increased convective rain over Mindanao. During the Bølling-Allerød interstadial, conditions are reversed with a general decrease in terrigenous runoff and consequent increase in productivity, before returning to wetter conditions during the Younger Dryas. These results suggest convective variability in the WPWP since the LGM is closely linked to abrupt changes in northern hemisphere climate.