

## Precession control on precipitation in the Western Pacific Warm Pool inferred from environmental magnetism

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The Western Pacific Warm Pool (WPWP) has highest water temperature in the global ocean, and its spatiotemporal variations have significant impacts on large-scale atmospheric circulation and global hydrology. An environmental magnetic study was conducted on ~10 sediment cores taken from the West Caroline Basin offshore northern New Guinea in order to constrain hydrological variability over the WPWP on orbital timescales. The sediment cores cover the last several hundreds of thousand years. The age control of the cores is based on relative paleointensity, which is tied to the oxygen isotope stratigraphy in some cores.

Magnetite dominates magnetic mineral assemblages of the studied sediments. This is evidenced by that IRM acquisition curves are mostly explained by a low-coercivity component, and that the Verwey transition was obvious in low-temperature measurements. Existence of the sharp central ridges on FORC diagrams and TEM images indicate the occurrence of biogenic magnetite. Compared with pelagic sediments from other regions, however, FORC diagrams show a larger contribution of an interacting PSD and MD component, and the ratios of ARM susceptibility to SIRM ( $k_{ARM}/SIRM$ ) are lower. These observations suggest a larger proportion of the terrigenous component in this region. This is probably due to a large terrigenous sediment input from nearby land, New Guinea, induced by high precipitation in the inter-tropical convergent zone (ITCZ).

Magnetic susceptibility and the  $k_{ARM}/SIRM$  ratio show strong correlation with northern-hemisphere summer insolation. Maxima in magnetic susceptibility and minima in  $k_{ARM}/SIRM$  correspond to insolation minima, which suggests a larger terrigenous input caused by higher precipitation at these times. Interestingly, in the western part of the West Caroline Basin magnetic susceptibility variations are dominated by the eccentricity periodicity (~100 ky) and mimic the oxygen isotope curves, but the precession periodicity prevails in  $k_{ARM}/SIRM$  ratios. These cores were taken at depths close to the CCD, and thus the magnetic susceptibility variations cannot be explained by dilution caused by changes in carbonate production/preservation. Sedimentation influenced by global sea-level changes may control the magnetic susceptibility variations; this part of the basin is adjacent to a wider continental shelf compared with the eastern part of the basin.