

Paleoposition of Intertropical Convergence Zone in the east Pacific inferred from glacial-interglacial magnetic changes

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Magnetic properties are increasingly used for paleoclimatic and paleoceanographic studies. Utilizing recently developed proxies, an environmental magnetic study was conducted on the uppermost 12 m sediments of IODP Site U1337 in the eastern equatorial Pacific. This interval is above the Fe-redox boundary, and covers the last ~800 kyr. The site is located near the present southern boundary of the Intertropical Convergence Zone (ITCZ), and thus expected to be sensitive to variations of its position. Ratio of anhysteretic remanent magnetization susceptibility to saturation isothermal remanent magnetization (kARM/SIRM), first-order reversal curve diagrams, and IRM acquisition curves indicate that the magnetic mineral assemblage consists of dominant biogenic component and minor terrigenous component. Two groups, the biogenic soft (BS) and hard (BH), are identified for the biogenic component, which probably correspond to different magnetofossil morphology. The BH component, probably carried by elongated magnetofossils, increases in sediments of glacial periods, which are probably in less oxic conditions due to increased ocean productivity. This demonstrates that magnetofossil morphology, which can be discriminated by rock-magnetic technique, is a sensitive indicator of slight oxic-suboxic environmental fluctuations in sediments. Temporal variations of the terrigenous component, most likely transported as eolian dust, were estimated from kARM/SIRM ratio and S-ratio; significant glacial-interglacial variations occurred at Marine Isotope Stage (MIS) 10 and before, but not after. In addition, coeval upcore increases in sedimentation rates and the BH component were observed, suggesting increased productivity. These observations may indicate that the position of ITCZ was southward than today at ~250 ka and before.

Keywords: environmental magnetism, ITCZ, eolian dust, biogenic magnetite, IODP, east Pacific