Southeast Asian monsoon variability during the past 800 kyr revealed by rock magnetic proxies

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Rock magnetic investigations were carried out on a sedimentary core taken from the Ninety-east ridge, the eastern equatorial Indian Ocean in order to reconstruct the Southeast Asia monsoon variability during the past 800 kyr. A 10.2 m long piston core MR0503-PC3 was recovered at a water depth of 4400 m, and consists of clay to silty clay with minor amount of nannofossil. An age model for the MR0503-PC3 core is established by correlating a relative paleointensity record of the core (Suganuma et al., in press) to the global stack of relative paleointensity records Sint-800 (Guyodo and Valet, 1999).

Temporal variations in rock magnetic parameters of the magnetic concentration (ARM and IRM), the grain size (Mrs/Ms), and the composition (S-0.3T and S-0.1T) show that the amount of fine-grained magnetite increases rapidly during the interglacial stages, and then gradually decrease toward the following glacial peaks. This indicates that the supply of fine-grained magnetite, probably originated to pedogenesis, increases during warmer periods. This suggests enhanced precipitation related to the intense Southeast Asian summer monsoon during the interglacial stages. During marine isotope stage (MIS) 15 to 11, gradual enhancement of fine-grained magnetite flux and stepwise increases of hematite and maghemite contributions are observed. These display an intensification of the Southeast Asian summer monsoons through this period and a dramatic prominence of the seasonal switch of summer/winter monsoon climate since MIS 14. The geographic variation in timing of the enhancement of precipitation through the Asian continent probably indicates a gradual expansion and intensification of the Asian summer monsoon during MIS 15 to 11. This specific change of the Asian monsoon activity is likely to be explained by a rearrangement of the global circulation from the interim state to the 100-kyr world proposed by Schmieder et al. (2000).