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

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A rock magnetic investigation was carried out on a sedimentary core taken from the distal portion of the Bengal Fan in order to reconstruct the South Asian monsoon variability during the past 800 kyr. The 10.2 m long piston core MR0503-PC3, recovered at a water depth of 4400 m, consists of clay to silty clay with minor amounts of nannofossils. An age model for the MR0503-PC3 core is established by correlating a relative paleointensity record of the core (Suganuma et al., 2008) to the global paleointensity stack Sint-800 (Guyodo and Valet, 1999). The age model is consistent with the published ages of tephra layers intercalated in the core, and show continuous sedimentation during the past 800 kyr.

Temporal variations in rock magnetic proxies for the magnetic concentration (ARM, IRM, and HIRM), the grain size (Mrs/Ms), and the composition (S-0.3T and S-0.1T) show that the amount of fine-grained magnetite increased during interglacial stages, and then gradually decreased toward the following glacial maxima. This indicates that the supply of fine-grained magnetite probably originated from areal expansion and/or increased pedogenic activity in the Ganges and Brahmaputra rivers catchment. Increases during warmer periods suggest intensification of the South Asian summer monsoon during interglacial stages. During marine isotope stages (MIS) 15 to 11, enhancement of fine-grained magnetite and increased hematite and maghemite contributions are observed. These suggest a significant intensification of the South Asian summer monsoon during this period. Our record and other paleoclimatic reconstructions mainly from the low and mid latitudes suggest that a major climatic event possibly occurred prior to the mid-Brunhes event (MBE), but the timing is not synchronous.