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Extremely humid abrupt climate events, Asian monsoon system and diagenesis of biogenic magnetite detected by magnetic properties and XRF core scanning of IODP Site U1471, in the Maldives.

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The Indian monsoon is directly related to the seasonal inversion of the winds driven by the latitudinal migration of the Intertropical Convergence Zone. Over a long-term period, the Asian monsoon system is strengthened during interglacial periods (hot and humid) and weakened during glacial periods (cold and dry). Over the last 500 kyr, global climate has oscillated with a periodicity of ∼100 kyr, being controlled mainly by orbital forcing. Contribution of fluvial sediments occurs mainly in the northwestern part of Arabian Sea, with reduced amounts to the southeast, where the Maldives Archipelago is located. Satellite data of eolian dust seasonal distribution show that the Maldives are strongly influenced by the winter monsoon with north-easterly winds, making this an ideal region for obtaining records of dust and to study arid conditions in the Indian-Asian landmass. We present non-destructive high-resolution X-ray Fluorescence core data, and rock magnetism data from the uppermost twenty meter sediment record recovered at Site U1471 during IODP Expedition 359 in the Maldives Archipelago, comprising a continuous 500 kyr record. We constructed an age model by correlating the Sr data to the LR04 δ18O bentic stack. Our high resolution XRF data and the good correlation with the LR04 data allowed us to identify Marine Isotope Stages (MIS) 1 to 14. Paleoclimatic proxy data, as the Al/Si, Fe/K, and Sr/Ca ratios indicate extremely abrupt humid events, especially during the MIS 5-6 climate transition. The cross-correlation between Fe and Sr data shows that Indian-Asian landmass arid conditions respond to insolation ∼5 kyr before sea-level. Rock-magnetic data indicate a strong magnetite reduction diagenesis and forming of iron sulphide associated with the methane sulphate transition in the sedimentary column; below this transition the variability of magnetic parameters is reduced, but still preserving the variations of the pre-diagenesis signal. First Order Reverse Curve and X Ray Absorption Near the Edge data indicate the presence of biogenic magnetite at the top of the sediment column, but the reducing environmental conditions in the sediment restricts the presence of magnetite to the upper 4 m of the core.