



Provenance of the Thin Mud Facies in the lower Ganges-Brahmaputra delta

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The Sundarbans is one of the largest coastal wetland sites in the world and covers an area of approximately one million hectares of the western delta of the Ganges and Brahmaputra (G-B) rivers (located across Bangladesh and India). Since the late Holocene (c. 5,000 yrs BP), the western delta has not been directly fluvially sourced, due to the Ganges shift towards the east, in present-day Bangladesh. The depositional facies (Thin Mud Facies: TMF) of the late-Holocene abandoned western region (West Bengal Sundarbans) is derived from dominant estuary-tidal dynamics, however the provenance of the associated TMF sedimentation in this far western zone in the Sundarbans is as yet equivocal. In this study, sediment cores from the West Bengal Sundarbans (Saptamukhi-Thakuran estuary) were examined for grain-size distributions (GSDs), mineralogy through X-ray diffraction (XRD), and geochemistry through X-ray fluorescence (XRF). The mineralogy and geochemistry of the Holocene sediment from the West Bengal Sundarbans can be characterised as intensively weathered, terrestrial sediment derived from the Ganges River, principally the Ganges Alluvial Plain (GAP). We propose that sediments of the TMF are derived from the weathering and transport of Himalayan derived sediments. The sediment provenance indicates a continuing G-B sediment source, which moves westward along the Bay of Bengal, from the active delta front and is then reworked over the far-western abandoned delta by tidal–estuarine forcing. The model proposed in this study is that there is a gradual (or rapid) loss of the westerly tidal transported sediment plume along the Bay of Bengal coastline. This study offers an insight into the relationship between provenance of fine silts and clays and depositional processes operating in a complex deltaic environment.