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Raman tomography of Himalayan-derived muds (Bengal Shelf)

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Raman mineral analysis (RaMAn) is an innovative, efficient and user-friendly technique representing the ideal tool to perform provenance analysis of silt-sized sediments, which represent most of the sediment flux in river systems and the predominant grain size in large deltas and submarine fans (Andò et al., 2011). RaMAn allows in fact the reliable recognition of detrital grains down to 5 μm in size. The Ganga-Brahmaputra estuary in Bangladesh represents the largest single entry point of detritus in the world oceans. Between 1 and 2 billion tons of sediment each year has been reaching the Bengal Sea during most of the Neogene, feeding the world largest submarine fan (Goodbred and Kuehl, 2000; Galy and France-Lanord 2001). In order to detect the compositional differences between the fluvial environment (Garzanti et al., 2010; 2011) and the deep sea (Thompson, 1974; Yokohama et al., 1990) as well as the mineralogical variability associated with hydrodynamic sorting in the delta plain and proximal shelf, we have determined the mineralogical composition of largely Himalayan-derived muds deposited on the Bengal Shelf. Mineralogical analyses were carried out separately for four grain-size classes of 4 samples: (5-10 μm, 10-15 μm, 15-32 μm, >32 μm). Each class was separated into low-density (<2.90 g/cm3) and high-density fraction (>2.90 g/cm3) by centrifuging in sodium polytungstate and recovered by partial freezing with liquid nitrogen. Accurate quantitative mineralogical data were obtained by identifying at least 100 grains on each slide. RaMAn resulted to be essential for confident mineral identification, and helped us to reveal the nature of altered and opaque grains that cannot be identified under the optical microscope.

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