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Contribution of Clay mineralogy of Bengal Fan deposits at 8°N for understanding of Himalayan provenance and environmental conditions

Pascale Huyghe (1), Christian France-Lanord (2), and Iodp Expedition 354 scientists ()

(1) University of Grenoble, Institut des Sciences de la Terre, Grenoble, France (pascale.huyghe@ujf-grenoble.fr), (2) CRPG CNRS/U. Lorraine, Vandoeuvre-les-Nancy, France

The IODP 354 expedition (February-March 2015) focused on the middle part of the Bengal Fan (8°N). Seven sites were drilled along a 320 km- long transect and provided good recovery and excellent data to study both provenance of the material from the Himalayan orogeny and palaeoceanography linked to the Asian monsoon.
Neogene sediments consist of an alternation of rapidly deposited, silty to muddy turbidites (10-100 cm/kyr) forming levees of channels intercalated with minor slowly deposited hemipelagic clays (1-2 cm/kyr), which may be found over the whole investigated area. Thick interlevee sand sheet units also occur between channel levees. The turbiditic sand, silt and clay have mineralogical signatures very similar to those of the modern Ganges and Brahmaputra rivers and are therefore relevant for reconstructing time series of erosion, weathering, and changes in Himalayan sources regions. Hemipelagic calcareous clays may provide additional information on environmental conditions throughout the Himalayan basin.
Preliminar shipboard XRD analysis revealed that the clayey assemblages of sediments are relatively constant through the Neogene. Turbidite clay assemblages are dominated by detrital illite and chlorite as observed in the modern Himalayan rivers, suggesting that erosion conditions were relatively steady over the last 25 Ma. Hemipelagic clay assemblages vary from 1) identical to the illite-chlorite rich clays of turbidites, characteristic for Himalayan rivers, to 2) smectite rich assemblages enriched in iron and depleted in potassium, representing either more extreme sorting of the same material or input from another source.
Further detailed investigation using decomposition of X-Ray diffraction (XRD) patterns reveals much more complex clay assemblages, especially great quantities of mixed-layers, the quantity and mineralogy of which varies and differs in the three depositional units as determined by turbidites levees, hemipelagic clayey beds and interlevees sandy sheets. Specific surface-area measurements of clay material (BET) analysis is in progress and should help determine the mineralogical reactions leading to these complex assemblages.