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Evolution of the Middle Bengal Fan at 8°N in the Oligocene to Pliocene - Preliminary Results from IODP Expedition 354

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Three deep penetration and additional four shallow sites were drilled during IODP Expedition 354 in the Bay of Bengal at 8°N in February-March 2015 across a 320 km-long transect to study Neogene Bengal fan deposition. The three deeper sites located on top of the elevated crustal features of the Ninetyeast Ridge (Site U1451) and 85°Ridge (Site U1455/DSDP Site 218) as well as central between them (Site U1450) shall provide the stratigraphic framework for the Oligocene to Pliocene reconstruction of fan deposition and sedimentary fluxes driven by monsoon evolution and Himalayan erosion and weathering.

Based on shipboard biostratigraphy, drilled material reach back in geologic time to the late Miocene (Site U1450), middle Miocene (Site U1455) and Oligocene (Site U1451). While core recovery was generally severely reduced due to the presence of unconsolidated sand and silt units, half-length APC coring technology provided valuable sand samples/recovery down to ∼800 meters below seafloor. Increased compaction/diagenesis of units indicating the temporary absence of fan deposition due to major depocenter shifts, comprising of calcarous clay units of mostly pelagic origin, required a change to rotary coring between 600 and 800 mbsf, and thus the presence of sand is mostly uncertain for those deeper sections. However, derived from penetration rates, a high proportion of sand is anticipated back to early Miocene or Oligocene times.

The calcareous clay units serve as stratigraphic marker horizons, which turned out to be suitable for seismic correlation across the drilling transect. This in turn allows to determine sedimentary budgets and overall fan growth for numerous time slices. Recovered sediments have Himalayan mineralogical and geochemical signatures suitable to analyze time series of erosion, weathering and changes in source regions as well as impacts on the global carbon cycle. Miocene shifts in terrestrial vegetation, in sediment budget and in style of sediment transport have been tracked.

Moderate sedimentation rates. Preliminary seismic stratigraphy also reveals that crustal features evolved since the Miocene thus confining pathways for turbidite transport. The onset of channel-levee structures indentified since ∼10 Ma in the seismic records, is correlated with an increase in sediment flux from moderate rates on the order of 30 m/m.y. to an order of magnitude high accumulation rates during phases of sand lobe deposition and levee growth. Expedition 354 has extended the record of early fan deposition by 10 Ma into the Late Oligocene.