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Refining the Bengal Fan stratigraphy – A first correlation of IODP Expedition 354 results and seismic data from the Bay of Bengal

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The Bengal Fan covers the floor of the entire Bay of Bengal from the continental margins of India and Bangladesh to the sediment-filled Sunda Trench off Myanmar and the Andaman Islands, and along the west side of the Ninetyeast Ridge. The deposition and progradation of the Bengal Fan started in the Eocene after the collision of India with Asia resulting in the build-up of the Himalaya and the formation of a large proto-Bay of Bengal. Continued convergence of the Indian and Australian plates with the Southeast Asian plate reduced the size of the bay and focused the source of turbidites finally into the present Bengal Basin, Bangladesh shelf, and the shelf canyon “Swatch of no Ground”. Today, the Bengal Fan is mainly fed by the sediment load of the Ganges and Brahmaputra rivers, which drain the Himalayas at its southern and northern slope, respectively, and deliver their load to the delta in the Bengal Basin, to the Bengal Shelf and to the deep sea fan.
Thus the Bengal Fan is a suitable recorder to study interactions among the growth of the Himalaya and Tibet, the development of the Asian monsoon, and processes affecting the carbon cycle and global climate. Because sedimentation in the Bengal Fan responds to both, climate and tectonic processes, its terrigenous sediment records the past evolution of both the Himalaya and regional climate. This evolution is also expressed in the stratigraphy of the fan in terms of unconformities and key horizons, average sedimentation rates as a function of distance from the basement ridges at 85°E and 90°E and the presence or absence of channel-levee systems.
The histories of the Himalaya/Tibetan system and the Asian monsoon require sampling different periods of time with different levels of precision. Therefore IODP Expedition 354 drilled in February-March 2015 a seven site, 320 km-long transect across the Bengal Fan at 8°N. This strategy has been chosen because sediment transport took place by turbidity currents following transport channels leading to deposition on and between levees. As a consequence, depocenters were laterally shifting over hundreds of kilometers on millennial time scales. To archive a spatial and temporal overview of this primarily turbiditic depositional system, three deep penetration and additional four shallow holes were drilled. By that Expedition 354 has extended back the record of early fan deposition by 10 Ma into the Late Oligocene. As result of this drilling, numerous stratigraphic marker horizons across the transect could be identified, cored and dated. In combination with the available seismic data collected during the RV Sonne cruises SO125 and SO188, a detailed reconstruction of channel-levee growing, migration, abandonment, reoccupation and overall uniform growth of the fan can be carried out.