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Neogene Himalayan tectonics inferred from changes in the sources of sediment to the Bengal fan from IODP Expedition 353-354

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An unambiguous Neogene and Quaternary sequence of clastic sedimentation in the middle Bengal fan has been retrieved by IODP Expedition 354. The Sr-Nd isotopic fingerprint of silicate fraction, turbiditic sediments have clear Himalayan origin. The turbidites' chemical composition showed virtually no differences with the modern Himalayan river sediments, with no significant variation through time[1]. In details, however, the isotope geochemistry defines a systematic consistent with subtle variations in the composition of the sources of the sediments. Mineralogical effects, such as nuggets effects and the predominance of some heavy minerals in the isotopic budget of some elements[2] and sedimentological sorting[3] are also prone to modify the Sr-Nd isotopic fingerprint of deep-sea turbidites. In the Bay of Bengal, such effects generate anti-correlated changes but the extend on εNd is rather small, at most 1εg???? between coarsest and fine layers within the same tubidite. The analysis of 75 samples of coarse silt across the transect cored by Exp. 354 at 8˚N and U1444 hole from by Exp. 353 at 14˚N define temporal changes that are insensitive to the sampling location and attribute to changes in the tectonic regime in the Himalayan range. In particular, the activation of the MBT and associated exhumation of the Lesser Himalayan sequence (LHS) is marked by a drop in the εNd by up to 2.1εg???? starting around 7.6Ma. The rise in the proportion of LHS material is then stopped around 6.0Ma, likely to correspond to the activation of the MCT1 in the range. For the older period, only one record from U1451 is available and might be more subject to changes in the sediment supply within the Bengal Fan. Nevertheless, the middle Miocene is dominated by material derived from the high Himalayan crystalline series related to exhumation along the MCT with rising contribution through time (until ∼10Ma) of the Trans-Himalaya batholith and the significant erosion of the southern Tibet.

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