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The Paleogene record of Himalayan erosion, Bengal Basin, Bangladesh: implications for coupling between erosion, tectonics and marine geochemistry.

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A detailed knowledge of Himalayan erosion is critical to evaluating crustal deformation processes, and the proposed link between Himalayan erosion and both global climate and ocean geochemistry. The most commonly quoted age of India-Asia collision is ~50 Ma, yet the record of Paleogene Himalayan erosion is scant, either absent or of low age resolution. We identify sediments shed from the rapidly exhuming southern flanks of the eastern-central Himalaya at 38 Ma, in the >1 km thick deltaic Barail Formation of the Bengal Basin, Bangladesh. This formation was previously of disputed provenance and poorly dated. Our new biostratigraphic and isotopic detrital mineral ages date the Barail Formation as spanning Late Eocene to Early Miocene. New provenance data from the Barail Formation, (seismic, petrographic, geochemical, and Ar-Ar, U-Pb, ZFT, Sm-Nd and Re-Os isotopic ratios) are consistent with Himalayan, and inconsistent with Indian cratonic or Burman sources. Detrital mineral lag time data show that exhumation of the orogen was rapid by 38 Ma. Our identification of sediments shed from the rapidly exhuming southern flanks of the eastern-central Himalaya at 38 Ma extends the known and accessible erosion record in this region by 16 Ma, from the previous oldest record at 21 Ma in the foreland basin of Nepal. Discovery of Himalayan detritus in the Bengal Basin from 38 Ma brings the erosion record into better alignment with the time of marked rise in the marine $^{87}\text{Sr}/^{86}\text{Sr}$ record and with the known history of tectonism in the hinterland, allowing interactions between erosion, tectonics and marine geochemistry to be better evaluated.