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Sediment partitioning related to a deep structure in Northwestern Bengal during the Late Quaternary

Jean-Louis Grimaud (1,2), Céline Grall (3), Chris Paola (2), Steve Goodbred (4), Sadam Hossain (5), Ryan Sincavage (4), Jennifer Pickering (6,4), Michael Steckler (3), and Nano Seeber (3)

(1) PSL University, Mines ParisTech, Geosciences, Fontainebleau, France (jean-louis.grimaud@mines-paristech.fr), (2) St Antony Falls Laboratory, University of Minnesota, 2 Third Avenue SE, Minneapolis, & Department of Earth Sciences, University of Minnesota, MN 55414, USA, (3) Lamont-Doherty Earth Observatory, Columbia University, 61 Road 9w, Palisades, NY 10964, USA, (4) Vanderbilt University Earth & Environmental Sciences Department, 5726 Stevenson Center; 7th floor, Nashville, TN 37240, (5) Department of Geology, University of Dhaka, Nilkhet Road, 1000, Dhaka, Bangladesh, (6) Shell, Houston, TX, USA

Subsurface deformation is a driver for surface dynamics -such as the path selection of rivers- when deformation rates can outpace the autogenic mobility rate of rivers. Here we study the Late Quaternary Northwest Bengal -where the Ganges and Brahmaputra are entering the Ganges Brahmaputra Meghna (GBM) delta- by combining analyses of geophysical, geomorphic and borehole data. We show that the area between these two major rivers may be divided into two main geomorphic domains, namely the Tista megafan and Barind Tract. Analysis of soils and sediment facies distributions indicates that the former is a subsiding area filled with alluvial sediments by the Tista river system while the latter is characterized by a very low sedimentation rate and the development of mature soils at its surface. Gravity data analyses are in agreement with the Tista fan area subsiding and the Barind Tract being relatively uplifted. Provenance analysis based on bulk strontium concentration shows that the majority of sediments below the surface of the Barind Tract have a Brahmaputra signature (i.e. [Sr] > 100 ppm) as opposed to the megafan area (i.e. [Sr] < 100 ppm). This indicates that the Brahmaputra used to flow over the Barind Tract sometimes in the Pleistocene and has abandoned the area since. We therefore suggest that the uplift of the Barind Tract during the Late Quaternary favored the entrenchment of the Brahmaputra River to the East and of the Ganges River to the West, effectively pinning the two main sources of the GBM delta and affecting sediments delivery. Finally, a simple calculation of flexural loading suggests that the uplifting Barind Tract may correspond to the forebulge related to the loading of the Himalaya on the Indian plate.