Sedimentation Patterns and Transport Pathways Linking River Mouth to Remote Depocenters in the Ganges-Brahmaputra Delta, Bangladesh

Rogers, Kimberly G.[1]; Goodbred, Steven L.[1] (1) Earth and Environmental Sciences, Vanderbilt University, Nashville, TN.

The combined Ganges-Brahmaputra Rivers in Bangladesh (GB) deliver more than 750 million metric tons of sediment annually to the world ocean through a highly energetic coastal zone, where sediments are reworked daily by tides, winds, waves, and annually by seasonal monsoons and cyclones. Sediment delivery to the coast has kept pace with sea level rise since the early Holocene, allowing subaerial growth of the delta. However, the abandoned lower delta is disconnected from any major distributary source of sediments, and therefore relies on sediment delivery from the ocean side via tides, cyclones and summer monsoons. The dispersal and transport mechanisms of these sediments beyond the river mouth have been only partially quantified. To further refine our understanding of the spatial and temporal distribution of sediment delivery to the lower delta, sediment traps were widely distributed across the abandoned delta just prior to the 2008 monsoon season, and recovered following cessation of floodwaters. Sediments recovered during the flood season were analyzed by gamma spectroscopy to determine whether they were fluvial- or marine- sourced. An innovative approach using short-lived radioisotopes as environmental tracers (7Be and 234Th) was used to differentiate between sediments instantaneously delivered to the abandoned GB lower delta plain during the flood pulse and those reworked onto tidal islands by dry-season tides and waves. Initial results indicate much higher annual accretion rates than previously thought and differing delivery pathways between the traditionally named “active” and “abandoned” portions of the delta. These results and other recent studies are changing the way we view the exchange of sediment across the terrestrial-marine boundary by introducing major alongshore and onshore components of river-sediment dispersal.