Temporal variations in sediment flux to the western Gulf of Mexico over multiple glacial-interglacial cycles

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Variability in sediment flux through a stream system over millennia or longer time periods is most commonly attributed to changes in climate, changes in stream base level, tectonic influences, or threshold mechanisms. These changes can induce process fluctuations in 1) catchment erosion, 2) proportions and durations of sediment storage, and 3) stream capacity. Sediment flux variations are therefore important records of landscape response to these changes. Geodynamics models require constraints of sediment flux over these timescales to compute the influence of denudation on orogenic processes, isostatic compensation, and style of crustal deformation. It is now clear that variations in sediment loading of salt-bearing continental shelves are a driving force of salt tectonics. Furthermore, sediment flux is an essential parameter in basin models used for petroleum exploration.

Establishing prehistoric long-term sediment flux rates from volumetric records (e.g., the volume of sand in the Mississippi Delta for a given time period) is problematic due to difficulties in dating subaqueous sediments and precisely accounting for material absent from the delta. We present a pilot study using cosmogenic ^{10}Be to obtain ~20 measurements of sediment flux from two non-glaciated river systems draining into the western Gulf of Mexico. Our results will constrain the magnitude of sediment flux variability over the past 5 million years and quantify the response of non-glaciated catchments to glacial-interglacial climate changes.

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