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Using cosmogenic and geochemical data to understand the evolution of modern Himalayan megafans.

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Megafans are very large (10's to 100's of km2) alluvial accumulations deposited in foreland basins by laterally mobile river systems. They are located at the topographic front of large mountain belts and in areas subjected to marked seasonal rainfall such as the Himalaya. They may thus be considered in the geological record as marking drainage of significant relief submitted to a monsoonal climate (Horton and Decelles 2001, Leier et al. 2005). Several megafans are present in the Ganga plain, associated with rivers draining vast catchments of the central Himalaya. The easternmost ones are the Kosi and the Tista megafans. Many questions arise from the comparison of their catchment area (size and elevation), their sedimentary characteristics (mean grain size) and finally their recent evolution. While the Kosi megafan is currently still aggrading (Chakraborty, 2010), the Tista megafan located 150 km further east has recently been incised by about 30 meters (Chakraborty & Ghosh, 2010). We combine several methods to consider these questions and to understand which tectonic and climatic parameters impose the major controls on the development of modern Himalayan megafans. Cosmogenic isotopes (10Be, 26Al) are used to date the abandonment of the tree different lobes of the Tista megafan and determine both present-day and paleo-erosion rates averaged over the source area. These data are combined with existing and new 14C and OSL ages of the deposits in order to compare erosional and depositional fluxes through time. In addition, isotope geochemistry (εNd and 87Sr/86Sr) of the Tista megafan deposits provides information about sediment provenance through time and its variation in response to climatic conditions.