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Variation in Erosion Rates in Sikkim Himalaya for the past 5 Myr

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Around 2-4 Myr ago, an increase in the sediment accumulation rate as well as the grain sizes have been recorded globally irrespective of a variety of geological settings including active or inactive mountain belts. This observation has been interpreted as a worldwide increase in erosion rates. Several researchers have favored global climatic instability and oscillation between glacial and warm inter-glacial periods during Cenozoic, to be the responsible factor behind the increase in erosion rates. However, the way these sediment budgets have been acquired from coastal ocean basins have recently been questioned and a study using ocean dissolved $^{10}Be/^{9}Be$ record,- a proxy of weathering, yield a consistent rather than increased value for the last 12 Myr, which indicates significant constant erosion. Sediment budget estimates from Himalayan Foreland basin observed an abrupt increase in accumulation rates about 5 Myr ago. The Himalaya being the largest mountain chain evolved during Cenozoic is thus a good target to study temporal variation in erosion. The aim of this work is to contribute to the ongoing debate on the linkage between climate and erosion over geological past. Primarily we will analyze the uplifted sedimentary successions from Siwaliks along Teesta and Balason rivers coming out of the Darjeeling- Sikkim-Tibet (DaSiT) wedge. This work involves independent dating of the molassic sediments with the help of magnetostratigraphy, detrital thermochronology (AFT dating) for the better age control over parent rocks of the sediments and interpretation of exhumation history of Himalayan thrust systems and most importantly measurement of in-situ produced cosmogenic nuclide concentration of ^{10}Be from the sediments. In steady state, river sediments have a remarkable property of spatially averaging out the whole drainage basin and nuclide concentration is inversely proportional to the denudation rate. In a localized watershed, where drainage basin hypsometry is constant for the timespan of interest(no major change in size, drainage pattern and tectonic uplift), fairly non-glaciated and unaffected by global sea-level changes , such as in the Himalaya , a change in basinwide erosion rates obtained from ^{10}Be record through time will thus be a great independent test for these approaches.