Himalayan Geodynamic and Climate during Late Cenozoic Himalayan Foreland Basin

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To understand the response of tectonic and climate in the Cenozoic succession of Himalayan foreland basin between river Ravi and Ganga have been chosen. This stratigraphic succession deposited by high to low sinuosity streams and alluvial-fluvial fan between 11 and 0.78 Ma in response to episodic tectonic uplift and/or climatic perturbations. Temporal variability in fluvial architecture, mineralogical parameters (gravel composition, petrography and rock magnetic mineralogy) and stable isotopic geochemistry of pedogenic concretions, several phase of tectonic uplift along major thrust and climatic variation are identified. It infers that the major tectonic phase coincides with climatic perturbations and it seems that large-scale morphology of the mountain belt is the result of coupling between tectonic and climate. However, there is recent debate- whether morphology of mountains belt is climatic driven isostasy uplift or tectonic uplift. Theide et al. (2005) inferred that until Miocene, tectonic uplift was the dominant process. However, Pliocene onward, the climate and erosional driven isostasy uplift was responsible for mountain building activity. The gradual stratigraphic coarsening with average grain size; increase in channel body proportion, and distinct change in architecture at 10 Ma from mudstone to sandstone-dominated intervals coupled with 1.5-to 3 time increase in net sedimentation rate resulted change in the channel pattern from high- to low-sinuosity streams (Kumar et al., 2003a and b). These observations reveal that major uplift along Main Central Thrust have caused basin-ward thrust sheet migration and is responsible for a gradual change in the slope gradient and thus enhanced the sediment supply. This uplift also responsible for creating the orographic barrier and accelerated the monsoon rain system. Similarly, around 6 Ma, the sandstone mudstone cycle capped by thick conglomerate suggest widespread alluvial and fluvial fan sedimentation due to major deformation along Main Boundary Thrust and uplift of Lesser Himalayan succession (Kumar et al., 2003). Fluvial architecture during this time interval is mark by thickly bedded conglomerate having sheet geometry and their deposition in the form of coalescing fluvial fan. However tremendous spatial variation in fluvial architecture from Dehra Dun to Kangra sub-basin can not be explain through climate but reflect differential tectonic deformation along Main Boundary thrust and its imbricate thrust. Therefore, sedimentary record in the Himalayan Foreland Basin reflect first order control tectonic uplift and generation detritus and climatic activity mobilized the sediment in basin fill stratigraphy.

Keywords: Himalaya, Foreland Basin, Fluvial architecture, Tectonics, Climate

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