



Sedimentary evolution of Marginal Ganga foreland basin, India: Implications for peripheral bulge tectonics

Rupa Ghosh

Wadia Institute of Himalayan Geology, Dehradun, Sedimentology, Dehradun, India (rupaghosh2006@gmail.com)

Ganga foreland basin is a large asymmetrical basin, its formation begins during middle Miocene, associated with major thrust events. A major thrust event occurred during 500 ka when upper Siwaliks sediments were uplifted and Ganga foreland basin shifted towards craton, making a more wide and deep basin (Singh 1996). Henceforth it is formed due to flexing of Indian lithosphere in response of thrust fold loading in Himalaya. The more distal part of this basin, south of axial river Yamuna, records different fluvial subsurface sedimentary packages incorporating different sedimentary architecture that helps to understand dynamics of peripheral bulge in late Quaternary time period. Sedimentary architecture in conjunction with chemical index of alteration (CIA), paleocurrent direction and optically stimulated dating (OSL) from 19 stratigraphic sections helped reconstructing the variations in depositional environments vis-à-vis climate and peripheral bulge tectonics. Regional scale stratigraphy demonstrated three major units (i) paleosol; (ii) gravel; (iii) interfluvial succession. The lower unit paleosol comprising high chemical index of alteration values close to 70-80 and micro-morphological features reveals pedogenic calcrete, rhizoliths, mineralized organic matter and OSL age bracketed 200-100 ka, all these evidence supports formation of mature paleosol. Unconformably overlain by large scale gravel composed of sub-angular to sub-rounded clasts of granite, quartz, quartzite, limestone and calcrete. The gravel have low CIA value up to 55, rich in vertebrate fossil assemblages and mean paleocurrent vector direction is NE, which supports that gravel composed of material derived from Bundelkhand craton and have low chemical weathering. The top interfluvial succession of 10-15 m thick is composed of alternate dark and light bands of sheet like deposit of silty clay to clayey silt comprises sand lenses of red to grey color and displaying top most OSL age is 11 ka. The basal mature paleosol signifies a humid climate developed under low subsidence rate at >100 ka. After a hiatus represented by pedogenic surface deposition of unit-II (gravel) suggests uplift and increased relief in the peripheral bulge region resulting into large flux of coarse sediments from craton. This was accompanied by humid climate and braided rivers forming a craton derived north propagating fans. Similar depositional setup at the base Siwalik is termed as peripheral bulge unconformity.

References

Singh, I.B., 1996. Geological evolution of Ganga Plain—an overview. *Journal of the Palaeontological Society of India*, 41, pp.99-137.