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Understanding sedimentary provenance and sub-surface lithostratigraphy of Central Gangetic Basin

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River Ganges, being one of the largest trans-boundary river, flows along the northern part of the Indian subcontinent contributes sediment to, one of the largest alluvial basin in the world, the Indo-Gangetic basin. The basin is composed of sediments sourced from the Himalayas and also from peninsular India. This river has experienced rapid and multiple migrations through its geological history and varied fluvial geomorphic processes, tectonic controls and complex climatic interplay have led to the deposition of different lithofacies within this Central Ganges basin (CGB). A provenance study has been started in the CGB in order to understand its geological evolution and reconstruct the regional paleo-environment through subsurface lithostratigraphy. Initial X-ray diffraction data of borehole sediments in CGB shows dominant presence of quartz, feldspar, mica and heavy minerals in varying proportions at different depths. Substantial amounts of kaolinite, smectite, illite and montmorillonite are found in descending proportions within the upper clay layers, where abundance of kaolinite is significantly higher over the other minerals. The upper layers till ~30m comprises of clay having particle size of 2.42 μ m- 3.12 μ m, below which are mostly silt and sand layers ranging from 16.4 μ m -1.63mm, with fine intercalations of gravel and clay layers in-between. The upper layers are dominated by muscovite indicating a Himalayan origin of the sediments, which shows a sharp decline in abundance below 100 m bgl. Moreover, presence of only zircon as heavy mineral is noted within 100m bgl. In contrast, beyond 100m bgl, the sediments are represented by very low mica content, abundance of pyroxene, and heavy minerals like zircon, rutile, illmanite, and sphene possibly signifying contribution from cratonic areas. Significant quantities of recrystallized and highly altered quartz-feldspathic mass showing clear evidence of strain, are also observed. The disposition of sediments from multiple provenances confirms significant contribution of sediment load from southern tributaries of the Ganges river system which eventually diminishes with time due to temporal and spatial migration of the river.