

Geomorphology, pedology and sedimentology of the Deoha/Ganga-Ghaghara Interfluve, Upper Gangetic Plains (Himalayan foreland basin) extensional tectonic implications

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ABSTRACT

Regional mapping of soils helped to identify and map 24 soil-geomorphic units on the Deoha/Ganga–Ghaghara Interfluve in the Upper Gangetic Plains (Himalayan Foreland Basin). On the basis of luminescence ages soil-geomorphic units can be grouped into five members of a Morphostratigraphic Sequence with ages of ≤ 1.7 ka, 1.8–3.6 ka, 4.6–6.4 ka, 6.8–10 ka and > 10 ka. Except for two units with sandy parent material, all the members with loamy parent materials show systematic increase in the degree of soil development from Member QGMS-I to V. Major pedogenic processes are salinization, alkalinization, illuviation, calcrete development and gleying, and degradation of some micromorphological features is observed in the oldest soils.

Regional mapping and dating of soils show that the Interfluve between the Deoha/Ganga–Ghaghara rivers is bounded by longitudinal faults, along the bounding rivers. The major longitudinal faults trend N–S or NNE–SSW in the northern region; turn N–S in the central region and take easterly to SEE direction in the south, giving the Interfluve a curvilinear shape. Strike of a set of six transverse extensional normal faults changes from approximately E–W to NEE–SWW in the southernmost region of the Interfluve. Downthrown sides are to the south and to the east in northern region and western region, respectively.

Due to the activity of different segments of various transverse faults during a probably dry sub-humid to semi-arid climatic period of 10–5 ka, terminal fans were deposited on the downthrown blocks. Thus, role of extensional tectonics in an overall compressional regime is significant. Also, tilting of smaller blocks leading to the shifting away of large rivers seems to be an additional control on the distribution of soils and sedimentation on the Interfluve.