

REMOTE SENSING AND GIS BASED GEOMORPHIC INVESTIGATIONS LEND INSIGHTS INTO ACTIVE TILT-BLOCK TECTONICS OF THE CENTRAL FRONTAL HIMALAYA, INDIA

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Remote sensing and Geographic Information System (GIS) based geomorphic investigations have provided new insight into the active tilt-block tectonics of two adjacent mountain segments of the frontal central Himalaya. The morphology and denudation patterns of these mountain segments, referred to here as the 'eastern' and 'western' segments, have been analyzed in conjunction with characteristics of drainages and drainage basins developed on them. Separated from each other and adjoining mountain-segments by antecedent streams of fourth- and fifth-order, the morphology and denudation of these segments have been quantitatively expressed in terms of 'mountain-front sinuosity' (S_{mf}) and 'valley-floor width to height ratio' (V_f), whereas the drainage basins developed on them have been characterized in terms of such geomorphic indices as 'basin asymmetry factor' (AF), 'transverse topography asymmetry factor' (T), 'basin elongation ratio' (BR) and 'hypsometric integral' (HI).

In both the mountain-segments, the S_{mf} values are mostly between 1.0–1.6 and, likewise, the V_f of most of the streams, calculated at a fix distance of 800m from the mountain-front, is invariably <1.0 . A total of 56 drainage basins of 3rd order streams were delineated for computing the geomorphic indices. The AFs of 64% of a total of 22 drainage basins of the western-segment and 65% of a total of 34 drainage basins of the eastern-segment indicate down-to-the-west tilting. The azimuths of the Ts of the basins are not always in conformity with AF suggested down-tilting, but the azimuths of the larger magnitude Ts are by and large in conformity with the AF suggested down-tilting. However, the BR and HI values of all the drainage basins of a mountain-segment do not show any spatial variation. These results suggest that both the studied mountain-segments are actively uplifting, but with faster rate in their eastern part. Moreover, the drainage pattern and deflections reveal east to west lateral progression of both the mountain segments.

Keywords: Remote sensing, GIS, tilt-block tectonics, geomorphic indices, Himalaya