

ACTIVE CRUSTAL DEFORMATION IN IMPHAL INTERMONTANE VALLEY, NE INDIA: INSIGHTS FROM INTEGRATED REMOTE SENSING, GIS AND FIELD INVESTIGATIONS

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Abstract:

The Imphal intermontane valley in northeastern India is a part of the seismotectonically active Indo-Myanmar Ranges, which are frequently struck by earthquakes. Comprehensive data on active crustal deformations and tectonic activities in the region are thus required not only from the academic viewpoint but also from the societal viewpoint.

In the present study, data from satellite images, topographic maps and field have been integrated in a Geographical Information System (GIS) to determine active crustal deformation in and around Imphal valley. Active tectonic deformation in the area is manifested by such geomorphic feature as paired and unpaired river terraces, triangular fault facets, escarpments, trains of landslide, entrenched rivers and anomalies along the river courses. In order to quantitatively determine the spatial pattern of this deformation, Basin Asymmetry Factor (AF) and Transverse Topography Symmetry Factor (T) of the 76 drainage basin of fourth-order streams of the valley-facing slopes of the surrounding mountains have been calculated. Statistical analysis of these geomorphic indices reveals that the mountain segments bounding the valley in the east and west are differentially tilted in different segments. AF values of 54% the total 48 drainage basins of the mountain segment in the east of the valley reveal its up-tilting in the north (in NW–NE directions). In the west of the valley, AF values of 58% of the total 12 drainage basins of the northern part of the mountain segment indicate its up-tilting in the north (in N–NE directions), whereas AF values of 44% of the total 16 drainage basins of the southern part of the mountain segment indicate its up-tilting in the south (in S–SW directions). The azimuths of T do not always conform to the AF indicated (mountain) block-tilting, but the azimuths of T with >0.50 magnitude are generally conforming to the AF indicated (mountain) block-tilting directions. The (mountain) block-tilting directions indicate differential activities along the segment-bounding thrust/faults as well other faults and folds of the area.

Keywords: Active tectonics, Crustal deformation, Geomorphic Indices, Imphal valley.