NEOTECTONIC CHARACTERIZATION OF THE JHELUM FAULT ZONE, NORTHWESTERN HIMALAYAS, AN INSIGHT FROM INTEGRATED GEOMORPHOMETRIC AND KINEMATIC ANALYSIS

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Abstract

The compression associated with India-Eurasia convergence along the Himalayan Arc is accommodated by a series of southward younging imbricate thrusts in its northwestern part between Main Mantle Thrust (MMT) at the north and Salt Range Thrust (SRT) to the south. To facilitate the differential compression the transpression is also active. The Jhelum Fault is one of these transpressional faults, forming the western boundary of the Hazara Kashmir Syntaxis (HKS) and separates it from the Potwar fold thrust belt. This study integrates the geomorphometric and structural datasets using Digital Elevation Model (DEM) data, surface geological maps and field data to assess the kinematic evolution and neotectonic activity along the Jhelum fault zone (JFZ). Eleven geomorphic indices: Basin Length, Basin Area, Basin Perimeter, Basin relative Relief and Relief Ratio, Hypsometric Integral, Asymmetry Factor, Elongation Ratio, Stream Length, Stream Number and Bifurcation Ratio Index, are calculated from DEM data to determine the relative tectonic activity along the JFZ. Total of 22 basins are selected for which these indices are calculated. The steep relief and elongated shapes of the basins and the deviation of a specific stream order from the normal orders shows that some kind of neotectonic activity is responsible for the development of the landscape. Furthermore the results of these indices shows that the drainage basins i.e. 1, 2, 3, 6, 10, 14, 15, 16, 20, and 21 have high degree of tilting and drainage basins i.e. 1, 2, 3, 4, 5, 6, 7, 8, 11, 12, 13, 14, and 19 are characterized by deep to moderate incision and erosion which indicates their development under high degree of tectonic activity and dominance of hillslope processes, rather than fluvial processes. Based on the results of all these indices, the basins along the JFZ are divided into three categories of tectonic activity i.e. highly active, moderately active and slightly active. The analysis of geomorphic indices and kinematic analysis reveals that the drainage basins evolution in the ambiance of the JFZ is controlled primarily by the Jhelum Fault, lithology, and the structures associated with JFZ.