

Active Tectonic Deformation processes in the NW Sub-Himalaya — Tejpal Singh, CSIR-CSIO Chandigarh - 160 030

The NW sub-Himalaya is outstanding because of its extraordinary width in the Kangra area and comparable dimensions in the Dehradun and Nahan sectors. There are strongest lateral variations not observed anywhere in the sub-Himalayan belt. Of late, the area has been under a lot of geological scrutiny, in order to understand the active tectonic deformation processes. The area is also interesting because it lies in the isoseismal zone of the 1905 Kangra earthquake which is now more than a century old. Going by the most conservative estimates it appears to be ripe for the next major earthquake that could threaten over a million people. Recent research into these areas have shown that the deformation processes operating in the region are quite diverse and need a re-look for a proper assessment of prevalent seismic hazard. The most common manifestation of active tectonic deformation lies along the Himalayan mountain front, more commonly known as the Himalayan Frontal Thrust (HFT). The HFT is modelled as a fault related fold, mostly assumed blind with very less surface expression of any

faulting. Wherever present, the fault zone spans over several meters with no deformation observed further, on either side. The most common evidence are in the form of raised fill terraces which sit atop strath surfaces cut into the bedrock abruptly truncating at the mountain front, incised fans and overridden Quaternary deposits.

Multiple proxies in the form of (i) along- and across-strike topographic profiles, (ii) stream long profiles, (iii) channel planform morphology, (iv) topographic reconstructions etc. demonstrate the active deformation processes of the sub-Himalaya and their kinematics. It is noteworthy that the active deformation is also seen northward beyond the HFT. An indication of out-of-sequence thrusting of the tectonic wedge. This is in line with other results from modelling of topographic data, raised Quaternary geomorphic surfaces and radon measurements. Further, evidence occurs in the form of drainage deflections, stream capture and beheaded streams which are in agreement with active uplift along internal thrusts.

(Gist of the lecture to be delivered at the monthly scientific meeting of the Geological Society of India on 25 January 2017)