

Quantifying Late Cenozoic Out-of-Sequence Thrusting at Chaura, Sutlej Valley, Himachal Pradesh, India

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Abstract : Out-of-sequence thrusts (OOST) are reported at different geographic locations with various local names along Siwalik Himalaya (SH), Lesser Himalaya (LH), Higher Himalaya (HH) from Bhutan, India, Nepal, and Pakistan Himalayan range. Most of OOSTs have been identified within the upper LH, and the lower HH based on geochronological age jump across. These thrusts activated from Late Miocene to recent. The Chaura Thrust (CT) was deciphered from age jump of Apatite Fission Track (AFT) and considered as blind thrust base on variable exhumation rates in Chaura region, Satluj river valley, Himachal Pradesh. CT is located north of Jhakri Thrust (JhT) and is also differently identified as Sarahan thrust (ST). Structural documentation from the rocks near the OOST in Chaura was not so far done. Detail structural study of the Jeori Group of rocks was carried out in this study to understand the manifestation of the Chaura thrust and associated structures in meso- to micro-scale. Box fold, scar fold, kink fold, crenulation cleavages, and boudins are developed in the Chaura region. These structures usually do not indicate shear sense. When studied under an optical microscope, the Chaura samples reveal that the mica fish are usually lenticular with aspect ratio (R) varying from 6–11 and inclination angle (α) from 15–40°. According to 'R' and ' α ', elongated sigmoid shaped mica fish and parallelogram shaped mica fish were also documented. Asymmetric mica fish demonstrate top-to-S/SW ductile shear, which is similar as that of Chaura thrust. Grain boundary migration (GBM) structures in quartzo-feldspathic grains from Jeori Group of rocks indicate deformation temperature ranging from 400 to 650°C. This can indicate that the OOST at Chaura, i.e., the Chaura Thrust, underwent thrusting in the ductile regime.

Keywords : out-of-sequence thrust, chaura thrust, sarahan thrust, jakhri thrust, higher himalaya, s/c- fabric

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