

The Structural Analysis of Out-of-Sequence Thrust: Insights from Chaura Thrust of Higher Himalaya in Himachal Pradesh, India

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Abstract : This paper focuses on the structural analysis of Chaura Thrust in Himachal Pradesh, India. It investigates mylonitised zones under microscopic observation, characterizes the box fold and its signature in the regional geology of Himachal Himalaya, and documents the Higher Himalayan Out-of-Sequence Thrust (OOST) in the region. The study aims to provide field evidence and documentation for Chaura Thrust (CT), which was previously considered a blind thrust. The research methodology involves geological field observation, microscopic studies, and strain analysis of oriented samples collected along the Jhakri-Chaura transect. The study presents findings such as the activation ages of MCT and STDS, the identification of mylonitised zones and various types of crenulated schistosity, and the manifestation of box folds and OOST. The presence of meso- and micro-scale box folds around Chaura suggests structural upliftment, while kink folds and shear sense indicators were identified. The research highlights the importance of microscopic studies and contributes to the understanding of the structural analysis of CT and its implications in the regional geology of the Himachal Himalaya. Mylonitised zones with S-C fabric were observed under the microscope, along with dynamic and bulging recrystallization and sub-grain formation. Various types of crenulated schistosity were documented, including a rare case of crenulation cleavage and sigmoid Muscovite occurring together. The conclusions emphasize the non-blind nature of Chaura Thrust, the characterization of box folds, the activation timing of different thrusts, and the significance of microscopic observations. Jhakri/Chaura/Sarahan thrusts are the zone of tectonic imbrication that transport Higher Himalayan gneissic rock on Rampur Quartzite. The evidence of frequent earthquakes and landslides in the Jhakri region confirm the study of morphometric conclusion that there is considerable neo-tectonic activity along an active fault in the Sutlej river basin. The study also documents the presence of OOST in Himachal Pradesh and its potential impact on strain accumulation.

Keywords : Main Central Thrust, Jhakri Thrust, Chaura Thrust, Higher Himalaya, Out-of-Sequence Thrust, Sarahan Thrust

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