

## Structural Geology along the Jhakri-Wangtu Road (Jutogh Section) Himachal Pradesh, NW Higher Himalaya, India

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**Abstract :** The paper presents a comprehensive study of the structural analysis of the Chaura Thrust in Himachal Pradesh, India. The research focuses on several key aspects, including the activation timing of the Main Central Thrust (MCT) and the South Tibetan Detachment System (STDS), the identification and characterization of mylonitised zones through microscopic examination, and the understanding of box fold characteristics and their implications in the regional geology of the Himachal Himalaya. The primary objective of the study is to provide field documentation of the Chaura Thrust, which was previously considered a blind thrust with limited field evidence. Additionally, the research aims to characterize box folds and their signatures within the broader geological context of the Himachal Himalaya, document the temperature range associated with grain boundary migration (GBM), and explore the overprinting structures related to multiple sets of Higher Himalayan Out-of-Sequence Thrusts (OOSTs). The research methodology employed geological field observations and microscopic studies. Samples were collected along the Jhakri-Chaura transect at regular intervals of approximately 1 km to conduct strain analysis. Microstructural studies at the grain scale along the Jhakri-Wangtu transect were used to document the GBM-associated temperature range. The study reveals that the MCT activated in two parts, as did the STDS, and provides insights into the activation ages of the Main Boundary Thrust (MBT) and the Main Frontal Thrust (MFT). Under microscopic examination, the study identifies two mylonitised zones characterized by S-C fabric, and it documents dynamic and bulging recrystallization, as well as sub-grain formation. Various types of crenulated schistosity are observed in photomicrographs, including a rare occurrence where crenulation cleavage and sigmoid Muscovite are found juxtaposed. The study also notes the presence of S/SE-verging meso- and micro-scale box folds around Chaura, which may indicate structural upliftment. Kink folds near Chaura are visible, while asymmetric shear sense indicators in augen mylonite are predominantly observed under microscopic examination. Moreover, the research highlights the documentation of the Higher Himalayan Out-of-Sequence Thrust (OOST) in Himachal Pradesh, which activated the MCT and occurred within a zone south of the Main Central Thrust Upper (MCTU). The presence of multiple sets of OOSTs suggests a zigzag pattern of strain accumulation in the area. The study emphasizes the significance of understanding the overprinting structures associated with OOSTs. Overall, this study contributes to the understanding of the structural analysis of the Chaura Thrust and its implications in the regional geology of the Himachal Himalaya. The research underscores the importance of microscopic studies in identifying mylonitised zones and various types of crenulated schistosity. Additionally, the study documents the GBM-associated temperature range and provides insights into the activation of the Higher Himalayan Out-of-Sequence Thrust (OOST) in Himachal Pradesh. The findings of the study were obtained through geological field observations, microscopic studies, and strain analysis, offering valuable insights into the activation timing, mylonitization characteristics, and overprinting structures related to the Chaura Thrust and the broader tectonic framework of the region.

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

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