EGU26-4678, updated on 10 Nov 2026
https://doi.org/10.5194/egusphere-egu26-4678
EGU General Assembly 2026
© Author(s) 2026. This work is distributed under
the Creative Commons Attribution 4.0 License.

Evidence of strong plate coupling in the Uttarakhand Himalayas: Constraints from GNSS and ALOS-2 InSAR observations

Dibyashakti Panda, Mridul Yadav, Eric O. Lindsey, and G Srinivasa Rao
Central University of Tamil Nadu, Central University of Tamil Nadu, Department of Geology, India (dibyashakti@cutn.ac.in)

Long-term convergence across the Himalayan megathrust continues to pose a significant seismic threat to the adjoining Indo-Gangetic plains, one of the world's most densely populated regions. Parts of the megathrust have not ruptured in the last 200 years and have been identified as seismic gaps. The Uttarakhand Himalayas are considered part of the central Himalayan seismic gap, and differing opinions exist on the strength of interseismic plate coupling along the Main Himalayan Thrust (MHT). This has led to varying assessments of the associated seismic hazards. The present study focuses on the kinematic status of the MHT in the Uttarakhand Himalaya using Global Navigation Satellite System (GNSS) data, along with Interferometric Synthetic Aperture Radar (InSAR) satellite imagery, to estimate the elastic strain accumulation. GNSS-derived horizontal displacements indicate a slip deficit of ~18 mm/year, with an MHT that is locked up to a width of ~115 km. ALOS-2 InSAR imagery shows interseismic vertical deformation with a peak uplift of 4–6 mm/year. Consideration of an Elastic Subducting Plate Model (ESPM) predicts well both horizontal and vertical displacement without introducing any artifacts. Both the GNSS and InSAR measurements indicate that the megathrust across the Uttarakhand Himalaya is highly coupled, and the accumulated strain energy is equivalent to one Mw 8.1 megathrust earthquake every 100 years.