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Large-scale geodetic deformation measurements of the Indo-Burma Subduction Zone from multi-sensor InSAR and GNSS: implications for strain partitioning and earthquake hazard

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The Indo-Burma subduction zone (IBSZ) is an entirely subaerial plate boundary, where the Indian plate obliquely converges with the Burma microplate. Because the incoming plate includes the 16-20 km thick sediment of the Ganges-Brahmaputra Delta, the accretionary prism is over 250 km wide with numerous active splay thrust faults and strike slip faults. Accurately assessing the long- and short-term dynamics of this complex region is critical for determining its earthquake hazard.

However, due in part to insufficient geodetic observations in the region to constrain the 3D shape of the megathrust and upper plate deformation, the kinematics of this plate boundary zone remain controversial. Ongoing debates focus on how strain is partitioned between the megathrust and strike-slip and oblique faults, whether the subduction zone is locked, and whether the multiple anticlines of the accretionary prism foldbelt are locked or actively deforming aseismically.

In this study, we present the first large-scale Interferometric Synthetic Aperture Radar (InSAR) velocity field over the IBSZ. Considering the operational nature and radar characteristics of different satellites, we processed datasets of multiple satellites spanning from late 2014 to 2023, including Sentinel-1, ALOS-2, and the newly launched L-Band differential InSAR satellite of China, LuTan-1. This approach allows us to more accurately constrain deformation across such a heavily vegetated and topographically-varied region. We incorporated updated horizontal and vertical GNSS velocities from 60 sites obtained from 2003 to 2023 to derive a three-dimensional decomposed velocity field, and then we investigated faults activities by estimating interseismic strain rates across the IBSZ. Our preliminary results reveal how strain is distributed in the region, shedding light on seismic hazard across this densely populated area.