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GSA Connects 2023 Meeting in Pittsburgh, Pennsylvania

Paper No. 68-10

Presentation Time: 4:20 PM

CENOZOIC CRUSTAL THICKENING ACROSS THE INDUS-YARLUNG SUTURE ZONE IN THE EASTERNMOST HIMALAYAN OROGEN (Invited Presentation)

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Crustal thickening along the Indus-Yarlung suture zone during the India-Asia collision was primarily accommodated by slip along the north-dipping Gangdese thrust (ca. 27–18 Ma) and south-dipping Great Counter thrust (ca. 25–10 Ma). However, the along-strike continuities, geometries, and timings of these thrusts remain unclear, resulting in an inadequate understanding of Himalayan-Tibetan orogenesis. In this study, we performed geologic mapping, strain analyses, geo/thermochronology, and thermobarometry across the easternmost Himalayan orogen (i.e., the northern Indo-Burma thrust belt), specifically: (1) the Tidding thrust and easternmost Indus-Yarlung suture zone (i.e., Tidding mélange complex) in its hanging wall; and (2) the Lohit thrust and Jurassic–Cretaceous Gangdese batholith and Mesoproterozoic basement (i.e., Lohit Plutonic Complex) in its hanging wall. The Tidding thrust is a north-dipping, top-south mylonitic shear zone that was active by ca. 36–30 Ma, during which hanging-wall mélange rocks were exhumed from ~33–38 km depth. The geometry, kinematics, and initiation age of the Tidding thrust contrast those of the top-north Great Counter thrust at the same structural position to the west. North of the Tidding thrust, the Lohit thrust is a ~5-km-wide, subvertical, north-side-up mylonitic shear zone that contains a basal, discrete “Lohit thrust fault”. Results of electron backscatter diffraction analyses across the Lohit thrust shear zone show that deformation fabric intensity and finite strain magnitudes decrease southwards toward the discrete thrust fault. This spatial relationship may be the result of transient peak strain during the lifespan of the shear zone. The Lohit thrust was active by ca. 25–23 Ma, during which hanging-wall basement and batholithic root rocks were exhumed to mid-crustal depths. The Lohit thrust and Gangdese thrust to the west are located at the same structural position and have comparable geometries, kinematics, and timings. Based on these similarities and previous findings, we interpret that the Lohit and Gangdese thrusts are correlative segments of a single, orogen-wide thrust system that accommodated crustal thickening along the Indus-Yarlung suture zone during the Oligocene–Miocene.

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