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Characterization of the complex 3D structure and deformation pattern in the eastern third of the Himalaya

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The eastern third of the Himalayan arc is distinctly different from the western two-thirds: smaller curvature radius, different cross-orogen elevation profiles and significant strike-slip deformation have already been documented. We here investigate the structural and deformational complexity of this zone, comprising the Sikkim and Bhutan Himalaya as well as the Shillong Plateau. Our recently collected data clearly delineate the western boundary of this area by a change in gravity anomalies (Hetényi et al. 2016, doi:10.1038/srep33866) and by a narrow, mid-crustal, dextral fault zone connecting NW Sikkim with the NW corner of the Shillong Plateau (Diehl et al. 2017, doi:10.1016/j.epsl.2017.04.038). Within Bhutan, lateral variations of present-day deformation as well as of crustal thickness and upper crustal velocity structure are also revealed (Marechal et al. 2016, doi:10.1002/2016GL071163; Singer et al. 2017a, doi:10.1002/2016JB013337; Singer et al. 2017b, doi:10.1002/2016GC006742). This leads us to evaluate the strain partitioning between the Himalaya and the Shillong Plateau at various time scales (geodetic to geological), and in terms of structure of the Indian lithosphere entering and underthrusting the orogen. Finally, we elaborate on the stress connectivity between Bhutan and the Shillong Plateau by computing Coulomb stress transfer following typical M7+ events (1714, 1897, 1930), and demonstrate that the linkage is markedly weaker than commonly believed.