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Climate-Tectonics interactions in the light of symptomatic critical wedge theory: Insights from Darjiling-Sikkim-Tibet Himalayan wedge

M. Mukul

Dept of Earth Sciences, Indian Institute of Technology-Bombay, Mumbai, India (malaymukul@gmail.com)

The symptomatic critical wedge theory postulates that continental collision boundaries typically have a wedge-shaped geometry characterized by a basal decollement and several thrust faults that merge with the decollement. Dominant critical-wedge building structures drive the deformation in the wedge from hinterland to foreland an in-sequence manner. The in-sequence deformation is punctuated by out-of-sequence deformation triggered by loss of taper in the wedge typically as a result of either focused or secular erosion. The Darjiling-Sikkim-Tibet (DaSiT) wedge has been driven by two dominant structures namely the Kangmar Dome and the Lesser Himalayan Duplex that are separated by Main Central Thrust (MCT) sheet rocks that have been attributed to Channel Flow in the Himalaya. Out-of-sequence deformation in the Himalaya has also been attributed exclusively to Channel Flow. The MCT sheet rocks have also been transported to within a kilometer of the Himalayan mountain front in the DaSiT wedge. The MCT rocks in the frontal Darjiling-Sikkim Himalaya has also been eroded into a mushroom-shaped half-window by the Tista-Rangeet-Rangli river system within which Ramgarh and MBT sheet rocks have been exposed. Active tectonics in the DaSiT wedge appears to be largely concentrated within the Tista half-window suggesting that it might be driven by focused erosion and loss of wedge-taper in the frontal part of the DaSiT wedge. Taper in the frontal wedge is probably being built by re-activation of LHD or structures south of the LHD in the Lesser-Outer Himalaya transition and the contemporary DaSiT wedge is sub-critical. This indicates that out-of-sequence deformation is not confined to the Channel flow driven Lesser-Higher Himalayan transition and is driven by taper in the deforming wedge.