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Exhumation and extrusion of the Great Himalaya Complex (GHC)

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The predominant stretching lineation in the Great Himalaya Complex (GHC) trends perpendicular orogen, which has been attributed to southward exhumation of these mid-crustal rocks between the South Tibet Detachment (STD) and Main Central Thrust (MCT) in wedge extrusion (e.g., Burchfiel and Royden, 1985; Grujic et al., 1996) and channel flow models (e.g., Beaumont et al., 2001; Hodges et al., 2001; Grujic et al., 2002), or to emplacement of the GHC between the MCT and STD in tectonic wedging models (Yin, 2006; Webb et al., 2007, 2011a, b).
Our new structural and geochronological data from southern Tibet demonstrate widespread lateral flow marked by orogen-parallel stretching lineation in the upper part of the GHC, which corresponds to decoupling between the high-grade GHC rocks and the overlying Tethyan Himalayan Sequence (THS). The kinematic framework reveals a top-to-the-east shear sense in the eastern GHC, both top-to-the-east and top-to-the-west shearing in the central GHC, and a top-to-the-west shear sense in the western GHC during the late Oligocene and Miocene.
Geological observations along the Butwal-Pokhara- Jomsom cross section of the Central Nepal-Himalaya indicate that the STD is characterized by small-scale ductile normal shearing at the top part of the GHC and large-scale listric folding structures at the lower part of the Tethys Himalaya unit (TH) composed by Paleozoic- Mesozoic sediments. But the very wide thrusting deformation domain with about 8 km thickness existed in the both sides of the MCT shows possible ductile thrust shearing occurred earlier than
We propose that exhumation and extrusion of the GHC probably experienced following complex processes: (1) Early Partial melting occurred at the deep part of the GHC at Eocene; (2) Orogen-parallel gravitational collapse in the late Oligocene and Miocene; (3) Exhumation of the GHC caused by thrusting and extrusion of the GHC between the MCT and STD at Miocene.