2006 Fall Meeting
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AN: **T32B-01**
TI: Links Between Lithospheric Structure and Topography SE Tibet
AU: *** Meltzer, A**
EM: *ameltzer@lehigh.edu*
AF: *Lehigh University, 31 Williams Dr, Bethlehem, PA 18015*
AU: **Sol, S**
EM: *stsd@lehigh.edu*
AF: *Lehigh University, 31 Williams Dr, Bethlehem, PA 18015*
AU: **Zurek, B**
EM: *bdz2@lehigh.edu*
AF: *Lehigh University, 31 Williams Dr, Bethlehem, PA 18015*
AU: **Ault, A**
EM: *ala2@lehigh.edu*
AF: *Lehigh University, 31 Williams Dr, Bethlehem, PA 18015*
AU: **Zeitler, P**
EM: *peter.zeitler@lehigh.edu*
AF: *Lehigh University, 31 Williams Dr, Bethlehem, PA 18015*
AU: **Liu, Y**
EM: *cdlyuping@cgs.gov.cn*
AF: *Chengdu Institute of Geology and Mineral Resources, 82 Yihuanlu, Chengdu, 610082 China*
AU: **Zhang, J**
EM: *cdjzhang@cgs.gov.cn*
AF: *Chengdu Institute of Geology and Mineral Resources, 82 Yihuanlu, Chengdu, 610082 China*
AB: The Himalaya and high Tibetan Plateau, one of the most remarkable topographic features on Earth, are widely taken to be the classic example of continent-continent collision. Across the northeastern margin of the Indian plate in southeastern Tibet, the Himalayan orogen terminates abruptly. Collisional processes responsible for the elevation of Tibet and the tectonics of the main Himalayan range are replaced by the strike-slip tectonics of the eastern Himalayan syntaxis as lithospheric material, enters the clockwise deformation regime of the eastern syntaxis. As part of a larger multidisciplinary study we deployed a broadband temporary seismic array extending east from Lhasa, through the eastern Himalayan syntaxis, to the eastern margin of the Tibetan plateau to examine how changes in lithospheric structure and rheology are linked to changes in topography and lithospheric mechanics. A denser short period array was deployed in the core of the

syntaxis around the Gyala Peri – Namche Barwa Massif, the site of high relief, high topography, and rapid exhumation exposing mid to lower crustal rocks of the Indian plate at the surface. In southeastern Tibet, the fast directions of seismic anisotropy in the lithospheric mantle correlate with surficial geology including major sutures and shear zones, and with the surface strain derived from the GPS velocity field. These observations are consistent with a clockwise rotation of material around the eastern Himalayan syntaxis and suggest coherent and distributed lithospheric deformation beneath much of southeastern Tibet. Receiver function analysis reveals considerable topography on the Moho (coincident with the Gyala Peri and Namche Barwa massifs), and lateral changes in Moho and crustal reflectivity and Poisson's ratio. To first order, structure at depth correlates with significant changes in topography and a number of geomorphic metrics associated with the transition from the high elevation low relief plateau in central Tibet to deeply incised linear valleys in southeastern Tibet. Our observations document a fundamental change in the relationship between upper-crustal and mantle deformation between southeastern Tibet and its adjacent eastern plateau margins. The data suggest that lateral heterogeneities play an important role in the geodynamic evolution of the region. Fully 3-D geodynamic models incorporating lateral heterogeneity in boundary conditions and lithospheric properties are required to more accurately describe the development of collisional orogens.

DE: 7218 Lithosphere (1236)
DE: 7230 Seismicity and tectonics (1207, 1217, 1240, 1242)
DE: 8011 Kinematics of crustal and mantle deformation
DE: 8031 Rheology: crust and lithosphere (8159)
DE: 8175 Tectonics and landscape evolution
SC: Tectonophysics [T]
MN: 2006 Fall Meeting

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