

2004 Fall Meeting
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Crustal Deformation and Mantle Flow: The Eastern Syntaxis Seismic Experiment

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The Himalaya and high Tibetan Plateau are one of the most remarkable topographic features on Earth, and 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. Steep lateral velocity gradients mark the eastern margin of the Indian plate, and incoming Indian lithosphere is partitioned as deeper Indian lithosphere continues north beneath Tibet, and shallower lithosphere decelerates

and, together with overthrust Asian lithosphere, enters the clockwise deformation regime of the eastern syntaxis. As part of a larger multidisciplinary study we deployed a temporary seismic array of 50 broadband and 20 short period stations across the transition from the Tibetan plateau to the eastern indenter corner to examine how changes in lithospheric rheology are linked to changes in topography and lithospheric mechanics. We are particularly interested in how deformation in the mantle is coupled to deformation at the surface. The 50 station broadband array extends east from Lhasa, through the eastern Himalayan syntaxis, to the eastern edge of the Tibetan plateau. Station spacing averages 50 km. A denser array of 20 short period stations was deployed in the core of the syntaxis around the Gyala Peri - Namche Barwa Massiff. This massiff is the site of high relief, high topography, and rapid exhumation exposing mid to lower crustal rocks at the surface. Our array was in place from July 2003 through October 2004 recording local, regional, and teleseismic events. Here we present preliminary results from local and regional earthquake location and focal-mechanism solutions. These data are compared with recent GPS results from a co-located array and with shear-wave splitting analysis of SKS phases. The objective is to locate active faults and to understand their contributions in the general deformation of the plateau and to compare deformation at depth with surface observations.

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