2006 Fall Meeting
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AN: **T53F-08 INVITED**

Crust and Upper Mantle Structure Beneath Tibet and SW China From Seismic Tomography and Array Analysis

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AB: Detailed knowledge of the isotropic and anisotropic structure of the crust and mantle beneath Tibet and SW China would put important constraints on our understanding of the geotectonic evolution of the Tibetan plateau and, for instance, the relative importance of continental collision versus the far field stresses related to more distant subduction processes. In 2003 and 2004 MIT and CIGMR (Chengdu Institute of Geology and Mineral Resources) operated a 25 station array (3-component, broad band seismometers) in Sichuan and Yunnan provinces, SW China. Along with data from other recent array deployments in central and eastern Tibet, most notably the 75 station array operated by Lehigh University (in collaboration with CIGMR) in east Tibet, data from our array allow delineation of mantle structure in unprecedented detail. I will present an overview of preliminary results

from four lines of seismological study. (1) We used travel time tomography to map 3-D variations in P-wavespeed in the lithosphere and upper mantle beneath East Asia. The hand-picked phase arrivals from recordings at regional arrays are combined with data from ~1,000 stations in China and with the global data base due to Engdahl et al. (BSSA, 1998). The resulting high-resolution tomographic images reveal the structural complexity of the upper mantle and help us understand how this shallow structure is related to structures and processes in the deeper mantle. (2) With a newly developed approach to surface wave array tomography (Yao et al., GJI, 2006) we can now determine the 3-D structure of the crust and lithospheric mantle at length scales as small as 100 km. This analysis demonstrates the presence of anomalously low wavespeeds in the middle and lower crust beneath eastern Tibet, consistent with models of mid/lower crustal flow. (3) Receiver function analysis puts constraints on the lateral variations of crust thickness and on the internal structure of the crust. These results reveal a gradual decrease in Moho depth from the plateau proper to the off-plateau regions in Yunnan province and a distinct low velocity mid-lower crust beneath the eastern Tibetan plateau. (4) Along with estimates of crust motion from GPS campaigns, seismic anisotropy inferred from shear wave splitting has begun to give unique insight into the styles of deformation in the lower crust and lithospheric mantle beneath the region under study. This analysis reveals a transition in deformation regime from the plateau proper to the plateau flanks and the low-lands of Yunnan province.

DE: 7205 Continental crust (1219)
DE: 7218 Lithosphere (1236)
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DE: 8110 Continental tectonics: general (0905)
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SC: Tectonophysics [T]
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