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AN: **T22D-07**
TI: Shear Velocity Structure and Anisotropy in the Crust and Upper Mantle Beneath SE Tibet From Ambient Noise and Teleseismic Surface Wave Array Tomography

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AB: Southeastern Tibet plays a very important role in the dynamic evolution of the Tibetan Plateau. Models of middle or lower crustal channel flow have been proposed to explain the deformation and tectonics in Tibet. High resolution array tomography can help to determine the existence and geometry of low velocity layers (LVLs) in the crust where channel flow may occur. In this study we adopt recent tomographic method from ambient noise and teleseismic surface wave array analysis to study the shear velocity structure and azimuthal anisotropy in the crust and upper mantle beneath SE Tibet using data from temporary array stations deployed by MIT and Lehigh University in 2003-2004. We measure Rayleigh wave phase velocity dispersion curves in the period band 10-50 s from inter-station empirical Green's functions recovered by 10 months continuous recordings. We also measure phase velocity dispersion curve in the period band 20-200 s from teleseismic surface wave two-station analysis. In the period of overlap (20-50 s), ambient noise and two-station analysis yield very similar dispersion. Finally we average dispersion data from ambient noise and two-station analysis to obtain inter-station dispersion curves in the period band 10-200 s, and then produce 2-D phase velocity maps at each period. The path coverage is very dense, yielding a horizontal resolution 50-100 km in the crust and 100-200 km in the upper mantle. Neighborhood algorithm is used to invert the point-wise dispersion curve at each grid point from 2-D phase velocity maps for the 1-D shear velocity structure. Finally we combine all the point-wise 1-D models to construct 3-D shear velocity structure from the crust to 410 km depth beneath SE Tibet. Our results demonstrate that LVLs dominate at mid-crustal depth beneath SE Tibet, which is consistent with previous MT studies which mainly show low resitivity layers at similar depth range in this area. We also observe some LVLs existing in the lower crust, e.g., Yunnan province. The horizontal transition of LVLs to normal or high velocity layers in SW China seems to correlate with some major fault zones. In the upper mantle, we observe a pronounced high velocity layer (HVL) at 150-220 km depth range beneath almost the whole study region. How this HVL will be related to the Indian lithosphere subduction is an important issue to study. Beneath this HVL to 400 km, shear velocity is apparently slower than the global ak135 value, suggesting a thick and pronounced asthenosphere beneath SE Tibet. The magnitude of horizontal heterogeneity beneath the study region is very large from upper crust to 250 km depth and generally small from 250 km to 400 km depth. Beneath Tengchong Volcanic area, we observe clear low velocity anomaly in the upper mantle. Shear velocity appears fast at 150-220 depth range beneath eastern Lhasa block, but changes to be slow below 220 km depth. The region around Eastern Himalayan Syntaxis shows high velocity feature at almost all depth range. With the dense path coverage in the array area, we are going to invert for the surface wave azimuthal anisotropy in the crust and upper mantle and investigate how the surface wave anisotropy correlates with the surface deformation from GPS studies and mantle anisotropy from shear wave splitting studies. With both high-resolution structure and anisotropy results, we are expecting to understand more about the tectonics and dynamics beneath the Tibetan Plateau.

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DE: 7270 Tomography (6982, 8180)
DE: 7294 Seismic instruments and networks (0935, 3025)
SC: Tectonophysics [T]
MN: 2007 Fall Meeting
