2004 Fall Meeting
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TI Insight into the lithospheric structure and deformation in Eastern Tibet from splitting and traveltime variations of core phases.

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AB The evaluation of the degree of crust/mantle mechanical coupling is essential to better understand the mechanisms accountable for the formation and uplift of the Tibetan plateau. To that end, a dense IRIS PASSCAL seismic array composed of 48 broadband (BB) and 19 short-period stations was deployed in southeastern Tibet from July 2003 to October 2004. The Eastern Syntaxis Seismic Experiment was designed to explore the structural and physical properties of the southeastern Tibetan plateau in order to enhance our understanding of the deformation processes associated with the Indian-Eurasian continental collision. We present preliminary results inferred from the analyses of both shear-wave splitting and multichannel cross-correlation relative arrival time. Both techniques have been performed using teleseismic SKS phases recorded exclusively by broadband stations. Initial SKS analysis reveals the presence of a complicated anisotropic pattern within the Lhasa terrane and the eastern edge of the Qiangtang block. The delay times integrated along the core-receiver path range from null to a maximum of 1.3s near the edge of the Bangong suture.The measured fast polarization directions show spatial variability with a tendency to

align close to the direction of the surficial structures. Although the crust is thick beneath the high plateau (60-80 km), the range of delay times implies that the splitting has a significant mantle component. The Fresnel zone approach indicates that the major part of the anisotropy is confined within the lithosphere as opposed to the sublithospheric mantle. One of the more remarkable features observed in our measurements is the south-eastward clockwise rotation of the fast axis of polarization that occurs along and east of the Bangong suture, where the Lhasa and Qiangtang terranes rotate around the eastern Himalayan syntaxis. This rotational anisotropic pattern is remarkably coherent with nearby preliminary GPS observations. The tendency of the fast polarization to align along surficial deformation, suggests coupling between the crust and the mantle in contradiction with the suggested presence of flow in the lower crust. Relative SKS arrival times inferred at all the BB stations using two Pacific events from the Tonga and Samoa Isl. show consistency. The Lhasa terrane appears to be divided into two distinct regions with negative delays (fast) up to 1s in the south and positive delays (slow) up to 1s in the north. These observations are consistent in the west part of the array with Moho thickening to the north, as revealed by a preliminary receiver function analysis (see poster of Zurek et al.). This coherence is not discerned in the eastern part. Although changes in crustal thickness contribute to the arrival times, the amount of delay time variations suggests a stronger dependence to mantle structure with the observed transition perhaps representing the northern edge of the underthrusting Indian lithosphere.

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