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The lithospheric architecture of the eastern Himalayan syntaxis from 3-D teleseismic receiver function imaging

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AB The eastern Himalayan syntaxis marks a dramatic change in tectonic style that punctuates the Tibetan plateau as it goes from an extensional, high standing, low relief landscape to a highly incised region dominated by strike-slip faults. To better understand the relationship between topography and structure at depth we deployed a dense temporary seismic array of 48 broadband stations distributed regionally in southeastern Tibet and 19 short period stations located the core of the syntaxis around the Gyala Peri and Namche Barwa massifs. In this study we present teleseismic receiver function images of crustal structure. In order to create the models from which the images are derived the receiver functions from all stations are stacked on a 3-D grid at the point of the P_ds conversion. Two sets of models were

generated for this study: a regional model (800x1200x120 km in size with grid points every 25x25x1-km) that focuses on the transition from the central plateau to southeast Tibet and a higher resolution model (400x300x120 km in size and has grid points every 10x10x1-km) that focuses on the core of the syntaxis around the actively deforming Gyala Peri and the Namche Barwa metamorphic massifs. At the end of the syntaxis, located to the north and east of Gyala Peri and Namche Barwa massifs lies the Jiali fault, the first in series of large strike-slip faults that characterize southeast Tibet. These results show that to first order this change in tectonic style as observed at the surface can be spatially correlated to changes in reflectivity across the crust-mantle interface. We infer that this change in reflectivity marks the transition from traditional collisional Himalayan tectonics to the strike-slip tectonics of east Tibet. In central Tibet the Moho is characterized by a doublet in the P_ds arrival. Within the eastern syntaxis the Moho changes to a distinct single P_ds arrival and shallows thinning the crust by ~15-20 km coincident with the Gyala Peri and Namche Barwa massifs where ~15-20 km of exhumation is estimated. Across the Jiali fault a strikingly clear discontinuous offset is observed in the Moho. However, the resolution of the data does not allow us to determine whether this abrupt offset represents a discrete fault across the Moho or a continuous but relatively sharp change in depth.

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