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Moho topography beneath the southern Lhasa terrane by receiver functions

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The collision of the Indian and Asian plates since about 55Ma has created the most gigantic plateau with the thickest crust of the world. There is, however, no general agreement on the modes of the crustal thickening. Even the crustal thickness of the Tibetan plateau still remains poorly determined. While it is generally accepted that the Tibetan crust is roughly double normal thick, and that it thins somewhat toward the north, individual observations of Moho depth differ spatially, and between different techniques at the same place, by greater than 20 km. In this work we compare P and S receiver functions at station LSA, located in the southern Lhasa terrane, to determine the crustal thickness beneath the station. Two significant interfaces can be clearly seen in the P receiver functions at depths of $\sim$60 and $\sim$80 km (Moho), whereas the latter is absent in the S receiver function data, although the S receiver functions sample a similar region of the Moho as the P receiver functions do. Possible mis-interpretation of primary conversions of P receiver functions by crustal multiples can be excluded by distinct differences in moveout curves of phases. We can model the observed P and S receiver functions by a strong topography of the Moho dipping to NEE direction at an angle of 32°. This result may indicate that the Moho beneath Tibet is very complicated and has strong lateral variations, and is consistent with earlier wide-angle reflection and receiver function data showing an imbrication Moho architecture resulted from separated tectonic crustal thickening. The Moho dip direction is locally perpendicular to the Indian plate motion, suggesting that the lower crust flow is decoupled from the underlying Indian mantle lithosphere. The observation may also explain the different

results of Moho depths previously made and suggest that a detailed map of Moho depth is only possible with 2-D dense-spacing seismic experiments.