



Frontier of the underthrusting Indian lithosphere beneath the central Tibet from finite frequency tomography

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Combining the new collected teleseismic body waves recorded by TIBET-31N passive seismic array with waveforms from several previous temporary seismic arrays, we carried out finite-frequency tomographic inversions to image three-dimensional velocity structures beneath southern-central Tibet to examine the roles of the upper mantle in the formation of the Tibetan plateau. Strong low P- and S-wave velocity anomalies that extend from the lower crust to about 200 km depth beneath the Comei rift, Yadong-Gulu rift, Tangra Yum Co rift, suggesting that rifting in southern Tibet is probably a process that involves the entire lithosphere. At the same time there is only the low velocity close to Yadong-Gulu rift extending further north and connecting with the massive upper mantle low velocity beneath central Tibet, and moreover, the other two are limited in southern Tibet. This observation implies that the previous proposed fragmentation of underthrusting Indian lithosphere might not happen underneath all the north-south trending rifts. Instead, it only happens close to Yadong-Gulu rift, then hot temperature upwelling materials fill up this lithospheric crack and might stuff the other weak zones in shallow depths beneath southern Tibet. Continuous high velocities are observed beneath Himalayas and Lhasa Terrance with a moderate northward inclination angle. We interpret this anomaly as the subducting/underthrusting Indian continental lithosphere.