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Toward developing a 3D seismic velocity model beneath the SE Tibetan and surrounding regions

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We investigated crustal and lithospheric mantle seismic structure beneath the southeast of the Tibetan plateau and the surrounding regions to understand what roles the lower crust and lithospheric mantle have played in shaping area. Firstly, we analyzed receiver function data that were recorded by four provincial seismic networks of the China Earthquake Administration, comprising of 88 broadband stations in the study area, from earthquakes occurring from July 2007 to July 2010. We have employed a new analysis technique for estimating crustal anisotropy and found significant seismic anisotropy with the splitting time of 0.3-0.8s beneath the SE margin of the Tibetan plateau. Both the splitting time and the fast direction were comparable to the result from the SKS/SKKS data, suggesting that crustal anisotropy is the main cause of shear wave splitting of the SKS/SKKS wave. On the other hand, stations located within the surrounding regions, Sichuan, Guizhou and Yunnan showed very little or no crustal anisotropy. However, SKS splitting data showed a sharp change of fast direction from NS in the north to EW in the south between 27°N and 25°N near the YuiGui plateau. This sharp transition was not observed from our crustal anisotropic result, suggesting that the crust and lithospheric mantle have different deformation pattern in this area. Secondly, we applied the finite frequency tomography method to map the upper mantle tomography beneath SE Tibetan plateau, the image show some fast S wave velocity anomalies beneath the SE margin of Tibet with the depth varying from ∼90km to 350km, which also identified the decoupled structure between lower crust and lithospheric mantle beneath the SE Tibet margin. Once the crustal anisotropic fast polarization direction was identified, we applied the *H-k* analysis to determine the crustal thickness and two Vp/Vs ratios corresponding to the fast and slow propagating directions. We found significant difference between the plateau and the surrounding regions in both Moho depth and Vp/Vs ratio. The Tibetan plateau and the western Sichuan basin showed a higher Vp/Vs (∼1.78) ratio than its southern neighbor, the Yungui plateau (∼1.68), indicating that mafic lower crustal materials composes a significant part of the crust beneath the SE margin and some felsic or rocks that have high SiO_2 content composition in the Yun-Gui plateau. The uplifting of the Tibetan plateau may not only be caused by the lower crustal flow, but might also be caused by the partial lithosphere detachment. Suggesting that there are two or more than two geodynamic models worked on the SE Tibetan plateau.