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Crustal structure and composition beneath northeastern Tibetan Plateau from teleseismic receiver function analysis

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More detailed studies of crustal structure in northeastern Tibetan Plateau can be of great benefit to the understanding of crustal deformation and plateau growth mechanisms. We investigate crustal structure beneath 53 seismic stations in northeastern Tibetan Plateau by using the P receiver function method to estimate the crustal thickness, Poisson's ratio and Vp/Vs ratio by analyzing the collected three-component teleseismic data. The Moho depths identified by this study reveal that the crustal thickness decreases laterally from the Qilian Orogen (~63 km) to east Kunlun fault (EKLF) area (~44 km). The Moho depth becomes obviously deeper beneath the Qilian Orogen. A remarkable contrast is observed in the measured Poisson's ratio between the Qilian Orogen and EKLF area. The Qilian Orogen is characterized by lower Poisson's ratio. In general, the higher Poisson's ratios in the EKLF area can be considered as the evidence for dominantly mafic rocks in the crust. The measured low Poisson's ratio and the negative correlations between V_P/V_S and the crustal thickness beneath the Qilian Orogen suggest dominantly felsic crust beneath the Qilian Orogen, which is in contrast with the mid-to-lower low-velocity crustal model beneath the NE margin of the Tibetan plateau indicating that the low velocity zone terminates beneath the east Kunlun area. The seismic evidence suggests that the thickened crust is probably resulted from superposition of the successive intracrustal thrusts. Our results reveal the lateral inhomogeneity of crustal structure in this area and are inconsistent with the scenario of an inflated crust due to extrusion of lower crust material from the central Tibetan plateau, and provide some constraints on understanding the mechanism of uplift and crustal thickening of the Tibet.

References:

[1] Ligorria J P and Ammon C J (1999) Bulletin of the Seismological Society of America 89: 13995-1400

[2] Li X F et al. (2015) Physics of the Earth and Planetary Interiors 249: 51-58

[3] Zhu L P and Kanamori H (2000) Journal of Geophysical Research 105: 2969-2980