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Crustal Structure across Northeastern Tibet from Seismic Wide Angle Reflection/Refraction Profile

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The 2010 Yushu earthquake, located at 33.2°N, 96.6°E at a focal depth of 14 km, was one of the largest earthquakes experienced in the west China since the 2008 Ms8.0 Wenchuan earthquake. This earthquake was one of a series of large recent earthquakes resulting from the northward-moving Indian plate as it uplifts the Tibetan block and causes the eastward extrusion of the Bayan Har active sub-block (Zhang, et al, 2003). A 550 km-long wide-angle reflection/refraction profile which is the densest active source profile in Tibet Plateau up to now executed during July and August 2010. This experiment have provided the best opportunities to obtain better knowledge of seismic structure and properties of crust and uppermost mantle beneath the North Tibet Plateau. This seismic profile extends from the Qang Tang block in Central Tibet, through the Bayan Har block, and into the west Qinling fold. We observed clear Pn phase, refraction Phase from mantle in Tibet Plateau. We present a hybrid tomographic and layered velocity model of the crust and uppermost mantle along the profile. The final velocity model reveals large variations both in structure and velocity, and is demonstrated that a particular model has minimum structure. We find the deepest Moho is deeper than 70 km in Yushu basin and Qang Tang block, and the shallowest Moho is around 60 km in north part of Bayan Har block. This unusual crust thickness with respect to the continental average value of 41 km (Christensen and Mooney, 1995) indicates that the Bayan Har crust may have thickened either homogeneously or by tectonic superposition. Our crustal model also shows that the Bayan Har Moho segment appears indeed as the southward geometrical continuation and this may indicates the Bayan Har Moho would hence extend further south than the location of the Jinsha suture at the surface. We also observe the presence of one low velocity layer or anomalous body in the middle crust along the profile, which may suggest the general presence of partial melting in the crust (Makovsky et al., 1996a, 1996b; Teng et al., 1999). Our model is in favor of models of control of the evolution by lower crustal flow in this northeastern region of the Tibetan Plateau.
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