High-resolution uppermost mantle velocity structure beneath central Tibet and its implications for geodynamics

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The Tibetan Plateau was produced by north-south extrusion, the interior also developed structures which indicate east-west extension. Whether these extensional structures are limited to the crust or extend to the deep lithosphere remains controversial. The uppermost mantle serves as a link between the crust and the deep lithosphere, its velocity structure provides an important constraint on the relation between shallow extensional structures and deep geodynamics. Based on the Pn traveltime data of the SANDWICH network deployed in central Tibet, we used the interstation traveltime difference method and by adopting a fine crustal structure model to constrain the travel time in the crust, the uppermost mantle velocity in central Tibet was finally obtained. The results show that the Pn velocity in the study area is characterized by high values in the north and low values in the south. The high velocity near the the BNS (Bangong-Nujiang Suture) indicates that there may be no large-scale delamination. The low velocity zone beneath the YGR (Yadong-Gulu Rift) and its northeast rift indicates that the rifts cuts through the entire crust. The uppermost mantle velocity beneath the NTR (Nyima-Tingri Rift) and the XDR (Xainza-Dingjye Rift) and between the two rifts shows a low velocity signal which suggests that the Indian lithospheric plate may define a high angle subduction In this area. In combination with other geological and geophysical evidence, we infer that the subduction of the Indian lithosphere plate gradually changes from a low angle in the east to a steep angle in the middle.