Upper mantle structure beneath central Tibet by teleseismic S wave tomography along INDEPTH-III profile

Zhen Liu[1,2],Xiao-bo Tian[1], Xiao-feng Liang[1], Ji-wen Teng[1]

[1] Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing, 100029, China, liuzhen@mail.iggcas.ac.cn
[2] University of Chinese Academy of Sciences, Beijing, 100049, China

Tibetan Plateau is produced by the continental- continental collision between the India and Eurasian plates as well as the subsequent convergence. It has become a consensus that the crustal thickness beneath the plateau is twice of the normal continental crust, while the deformation of its mantle lithosphere, as an important part of the developing plateau, is in disputes. This ambiguity about the upper mantle structure is resulted from uneven distributed seismologic observations in Tibet, when upper mantle structure is possibly heterogeneous along the east-west direction, and the seismic wave speed contrast between the continental mantle lithosphere and asthenosphere might not be significant to detect by current seismic methods. Because the geodynamic of mantle lithosphere is closely related to the process of plateau uplift and the presence of volcanic rocks, revealing the geometric configuration of Indian and Eurasian mantle lithosphere is conducive to study the dynamic processes of mantle lithosphere as well as the evolution of the plateau. In this paper, we obtain the travel times of teleseismic S wave from the INDEPTH-III broad-band waveforms, and calculate the perturbation of S wave speed beneath the profile. Our results show that a north-dipping S wave high-velocity anomaly presents in depth range of 100 to 300 km beneath Bangong-Nujiang suture, with a dipping angle about 65°. We suggest that it is the roll-backed Indian lithosphere or/and remnant of Indian mantle lithosphere from convective removal.

Cite as: Liu, Z., Tian, X., Liang, X. and Teng, J., 2014, Upper mantle structure beneath central Tibet by teleseismic S wave tomography along INDEPTH-III profile, in Montomoli C., et al., eds., proceedings for the 29th Himalaya-Karakoram-Tibet Workshop, Lucca, Italy.