

Uppermost mantle Pn tomography with Moho depth correction from eastern Europe to western China

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We proposed a modified Pn velocity and anisotropy tomography method by considering the Moho depth variations using the Crust 1.0 model and obtained high-resolution images of the uppermost mantle Pn velocity and anisotropy structure from eastern Europe to western China. The tomography results indicate that the average Pn velocities are approximately 8.0 and 8.1 km/s under the western and eastern parts of the study area, respectively, with maximum velocity perturbations of 3%–4%. We observed high Pn velocities under the Adriatic Sea, Black Sea, Caspian Sea, Arabian Plate, Indian Plate, and in the Tarim and Sichuan basins but low Pn velocities under the Apennine Peninsula, Dead Sea fault zone, Anatolia, Caucasus, Iranian Plateau, Hindu Kush, and in the Yunnan and Myanmar regions. Generally, regions with stable structures and low lithospheric temperatures exhibit high Pn velocities. Low Pn velocities provide evidence for the upwelling of hot material, which is associated with plate subduction and continental collision processes. The Pn anisotropy structure reflects the stress state of the uppermost mantle and indicates the location of the plate collision boundary at the depth of the Moho. Our Pn velocity and anisotropy imaging results indicate that the Adriatic microplate dives to the east and west, the hot material upwelling caused by subduction beneath the Tibetan Plateau is not as significant as that in the Caucasus and Myanmar regions, the lithosphere exhibits coupled rotational movement around the Eastern Himalayan Syntaxes, and the areas to the north and south of 26°N in the Yunnan region are affected by different geodynamic processes. Our newly captured images of the uppermost mantle velocity and anisotropy structure provide further information about continental collision processes and associated dynamic mechanisms.

Keywords: uppermost mantle, Pn, velocity, anisotropy

