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Mantle Discontinuities under Iranian Plateau and Turan Shield from the Modeling of Seismic Triplications

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Recent studies of seismic tomography show velocity anomalies in the mantle transition zone (TZ) under Zagros and Iranian Plateau, which are created by active collision between Africa and Eurasia. Remnants of Neo-Tethys slab that subducted before the collision might had experienced a break-off and likely be rested in the deep mantle. In this study, we utilize triplicate arrivals of high-resolution P waveforms to investigate the velocity structure of mantle beneath this continental collision zone and the surroundings. By combining several broadband arrays in eastern Turkey and Caucasus, we construct a fan of profiles, each about 800 km long, which consist of triplicate waveforms generated from the 410- and 660-km discontinuities. The method is particularly sensitive to the size of the velocity contrast for the sampled regions, including the central Iranian Plateau, Turan shield and part of South Caspian basin. Our results show that the lower TZ under the stable Turan shield is fast. The corresponding 660-km contrast is about 4.5% only, smaller than the value in global average model IASP91, but fairly close to that under the northern Indian shield in Precambrian age. For profiles sampling Iran, we observe azimuthal changes in the waveforms which require further data division or grouping. The preliminary analysis suggests that the velocity near the bottom of the TZ is comparable to model appropriate for Turan and probably has a slightly shallower 660-km discontinuity. We hope the comparisons between velocity structures under different terranes can improve our understandings to the lithosphere-mantle dynamics under the process of continental collision.