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Imaging the Detailed Structure the Mantle Transition Zone beneath the Eastern China with Seismic Triplications

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Triplicated waveforms from the dense China Digital Seismograph Networkare applied to mapping the structure of the mantle transition zone beneath eastern China. Comparing the observed seismograms with the synthetic ones with the FK method and travel-time fitting using the ray-tracing method, the velocity structure of the mantle zone are shown as: (1) the 410-km discontinuity is a gradient zone with the thickness of 20 km; (2) a low-velocity layer atop the mantle transition zone is characterized by a thickness regionally varied from 40 km to 57 km and P velocity decreased by 2.7-4.5% and should be the result of partial melting of olivine; (3) the 660 km discontinuity is depressed by the subducted slabs; and (4) a high-velocity layer is regionally revealed above the 660 km discontinuity, with the thickness of ∼115-120 km and the P-wave velocity increase of 1.5%-2.0%, and the layer should be the stagnant slab of the Pacific Plate; and (5) a local low-velocity anomaly with the P-wave velocity decrease of 0.7%-1.0%, is also revealed beneath the 660 km discontinuity, and the local low-velocity anomaly possibly relates to the dehydration of the stagnant slab from its bottom to the top of lower mantle or the dehydration of the slab fragments that have collapsed into the deep lower mantle, or probably relates to the hot material upwelling induced by the slab deep subduction and the collapsing of slab fragments.