

Velocity structure of the mantle transition zone beneath the southeastern Tibetan Plateau

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P-wave triplications related to the 410 km discontinuity (the 410) were clearly observed from the seismograms of three intermediate-depth earthquakes that occurred in the Indo-Burma Subduction Zone (IBSZ) and were recorded by the Chinese Digital Seismic Network (CDSN). By comparing the observed triplications with synthetic waveforms, we obtained the best-fit models for four azimuthal profiles to constrain the P-wave velocity structure near the 410 beneath the southeastern Tibetan Plateau (TP). We find that there is a ubiquitous low-velocity layer (LVL) atop the mantle transition zone (MTZ). The LVL is characterized by a thickness of 35-45 km, and the P-wave velocity decreased by up to 4.1-4.7%. We attribute the LVL to the partial melting induced by water or other volatiles released from the subducted Indian Plate and the stagnant Pacific Plate. A high-velocity anomaly of up to 1% is detected at a depth of 500 km, providing additional evidence for the remains of the subducted Pacific plate within the MTZ. There is a clear transition in the velocity decrement and the depth of the 410. We therefore infer that the mantle structure beneath the southeastern TP is primarily controlled by the southeast extrusion of the Plateau to the north, combined with the eastward subduction of the Indian Plate to the south.

Keywords: seismic triplication, low-velocity layer, mantle transition zone, southeastern Tibetan Plateau