



Mantle transition zone of the central Tien Shan

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We investigate structure of the mantle transition zone (MTZ) under the central Tien Shan in central Asia by using recordings of seismograph stations in Kyrgyzstan, Kazakhstan and adjacent northern China. We apply P-wave receiver functions techniques and evaluate the differential time between the arrivals of seismic phases that are formed by P to SV mode conversion at the 410-km and 660-km seismic boundaries. The differential time is sensitive to the thickness of the MTZ and insensitive to volumetric velocity anomalies above the 410-km boundary. Under part of the southern central Tien Shan with the lowest S wave velocity in the uppermost mantle and the largest thickness of the crust, the thickness of the MTZ increases by 15-20 km relative to the ambient mantle and the reference model IASP91. This anomaly is indicative of delamination and sinking of the cold mantle lithosphere. Our data reveal a reduction of thickness of the MTZ of 10 - 15 km under the eastern margin of the Fergana basin, in the neighborhood of the region of small-scale basaltic volcanism at the time near the Cretaceous-Paleogene boundary. The reduced thickness of the MTZ is the effect of a depressed 410-km discontinuity, similar to that found in many hotspots. This depression suggests a positive temperature anomaly of about 100- 150 K, consistent with the presence of a thermal mantle plume. A similar depression on the 410-km discontinuity is found underneath the Tarim basin.