

S velocity reversal in the mantle transition zone

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Mantle transition zone in a depth range of 400 -700 km is remarkable by high P and S velocity gradients that are caused by a series of phase transitions. However, we demonstrate seismic evidence for the S velocity reversal starting at a depth around 500 km, found by applying S receiver function techniques in several regions. S velocity reduction is in a range of 0.15 - 0.2 km/s. The lower boundary of the anomalous layer is not detected, perhaps owing to a reduced sensitivity of the method at larger depths. As documented by seismic tomography, S velocity in the transition zone close to the regions with the detected S velocity reversal is anomalously low compared to the world average, and some regions correspond to prominent hotspots. We argue that the low velocity is, most likely, caused by transformational plasticity corresponding to the phase transition from β to γ spinel at a depth around 520 km.