



Upper mantle mineral composition anomaly beneath the Datong Volcano- from the seismological evidence

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P wave receiver function is a time series consisted of P-to-S converted phases, which are produced when teleseismic P waves transport upward cross velocity discontinuities. The traveltimes of different converted phases on a P-wave receiver function are the traveltimes differences between converted S waves and direct P wave. The traveltimes of converted phases on the 410- and 660-km discontinuities, which bound the mantle transition zone, intensively rely on the V_p/V_s ratios in the upper mantle. Based on the receiver functions received from 120 broadband seismic stations delayed in North China region, and taking advantage of which raypath crossings like tomography, we map receiver functions along the raypaths to different model grids to invert a high-resolution V_p/V_s ratios image in the upper mantle.

The results show that there are higher velocity ratios in the upper mantle beneath the Taihang Mountain in the middle of North China, and the highest anomaly could reach 10%. The higher velocity ratio anomaly extends toward to south with increasing depth, and presents a top-down and continuous higher velocity ratio channel. We suppose that the deep material with high velocity ratio upwell along this channel and result in the partial melting of the lithospheric bottom. Since Cenozoic, a series of right-lateral shear fracture occurred in Shanxi graben because of the extrusion from the northward motion of the Tibet Plateau and subduction of the western Pacific Ocean, and partial melting basaltic magma from upper mantle erupted and formed the Datong volcano.