



Imaging the mantle transition zone beneath eastern and central China with CEArray receiver functions

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We analyzed a total of 37427 receiver-function data recorded by regional broadband seismic networks operated by the China Earthquake Administration to study the mantle transition zone beneath eastern and central China. Significant topography on both the 410-km and 660-km discontinuities was clearly imaged in the 3D volume of CCP (common-conversion-point) stacked images that cover an area of 102.5°-122.5°E and 22.0°-42.°N. 3D crustal and mantle velocity models were used in computing the Ps time moveouts to better image the absolute depths of the two discontinuities. We found that the 660-km discontinuity is depressed up to 25 km along the east coast of China, indicating the presence of the subducted Pacific slab in the region. More interestingly, a double 660-km was observed beneath the Yellow Sea, which was not seen from the 410-km discontinuity. We found a strong and localized anomaly beneath the Quaternary Datong volcano located at the northeastern edge of the Ordos plateau in north China. The 410-km is depressed by as much as 15 km beneath the volcano. If the amount of the depression is caused by unmodeled low velocity anomaly in the upper mantle, it requires either a strong (4-8%) localized low velocity anomaly near the lithosphere-asthenosphere boundary or ~1.5% low velocity column across the entire upper mantle above the 410-km. The latter could suggest a deep origin of the Datong volcano, although it was usually attributed to edge driven convection by most of the literatures.