Geophysical Research Abstracts
Vol. 21, EGU2019-9586-5, 2019
EGU General Assembly 2019

Receiver Function Imaging of the Mantle Transition Zone beneath Central Myanmar

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Myanmar is located at the eastern margin of the on-going Indo-Eurasian collision system which created the Tibetan plateau and Himalayas. While regional seismic tomography indicated that the Indian plate is obliquely subducting eastward beneath the Burma microplate, these studies did not provide sufficient resolution on whether the slab has descended deeply into the mantle transition zone (MTZ), largely due to the lack of local seismological observations in Myanmar.

Here, we apply P receiver functions (RFs) to detect the MTZ discontinuities with the seismic data collected from the China-Myanmar Geophysical Survey in the Myanmar Orogen (CMGSMO) project. The topographies of the 410- and 660-km discontinuities could provide important constraints on the depth extent of the slab for they are sensitive to the temperature variation near the MTZ. 164 earthquakes with magnitudes greater than 5.8 and at epicentral range of 30° – 90° were selected for the calculation of RFs. A depth section along ∼22°N was constructed by a common conversion point (CCP) stack approach. From 95° to 97°E in this section, the 410- and 660-km discontinuities are ∼18 km and ∼13 km shallower than the global averages, respectively. Furthermore, we slant-stacked receiver functions at each stacking bin along the section as a function of time and slowness. This technique helps clean up the multiples from shallower depths atop of the 410-km discontinuity and reveal a negative signal at ∼370 km, suggesting a shear-wave velocity drop at this depth.

The uplift of the 410-km discontinuity and thicken of the MTZ appeared on our CCP stacked image might, to some extent, attribute to the eastward subducting Indian plate. This preliminary result is coherent well with a new body-wave tomography model derived from the same network. Further investigations would reveal detailed topographies of the MTZ discontinuities and therefore better constrain the dynamic process of the subducting Indian plate. This study is supported by the National Natural Science Foundation of China (grants 41490612, 41474040).