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Estimation of LAB depth in Zagros, Central Iran and Alborz zones using S receiver function method

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The continental–continental collision of Arabian and Eurasian plates has controlled the current state of Iranian plateau. According to accepting of the plate tectonics theory, it is clear that the study of the lithospheric thickness plays a key role to reveal predominant tectonic setting process of a region. Telesismic body waveforms have significant information on earthquake source, the propagation path and the earth structures. S Receiver Function method as an accepted technique by removing the effects of source and mantle path detects the Lithosphere–Asthenosphere Boundary (LAB). We computed S receiver functions for 9 permanent broad band seismic stations of the International Institute of Earthquake Engineering and Seismology (IIEES), which have been installed in the limited region between 32.10˚-35.63˚N and 48.801˚-51.97˚E. All stations are equipped with Güralp CMG30 seismometers. The teleseismic events in epicentral distances between 60˚-85˚ with magnitude larger than 5.7 (mb) and clear S onset with high signal to noise ratio, which recorded in a time period between 2006 and 2010, were selected. We obtained about 76 S receiver functions for the study region. SRFs for all stations were calculated and the distribution of the S to P piercing points at 100 Km was plotted, which is the depth of expected LAB. SRFs located in the same geological zone were assumed as a group. The study region was divided into 6 groups. The individual SRFs for each group were sorted by the latitude of their conversion points and then stacked. The depth of the Moho and LAB were calculated by converting the time difference between Sp and S waves into the depth domain using a reference velocity model (IASP91). Our results show the lithospheric thickness about 90 km beneath Central Alborz, which is significantly thin to support the high Alborz elevations. Presence of the least LAB depth about 70 km beneath the Central Iranian plateau suggests a dominant stable tectonic which has been affected less than SSZ and ZFTB zones by the collision of the Arabian and Eurasia plates. The increasing lithospheric thickeness beneath UDMA and SSZ zones shows an increasing trend along the lower latitudes. The most LAB depths are observed beneath SSZ and ZFTB zones around 150 and 130 km, respectively, which can be associated with the shortening process related to the underthrusting of the Zagros crust under the crust of the Central Iran.