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Lithospheric structure beneath the Northwest Iran using Ps and Sp converted waves

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We compute P and S receiver functions to investigate the crustal and lithospheric thickness as well as the Vp/Vs ratio beneath the Northwest of Iran and map out the lateral variations of these discontinuities under this region. We selected data from teleseismic events (Mb $\geq$ 5.5, epicentral distance between 30˚-95˚ for P receiver functions and Mb>5.7, epicentral distance between 60˚-85˚ for S receiver functions) recorded since 1995 to present at 8 three component short period stations from Tabriz Telemetry Network. First of all, we calculated PRFs for each station and then the Moho depth will be estimated only from the delay times of the Moho p-to-s conversion phases. Then, we used an H-Vp/Vs stacking algorithm of Zhu & Kanamori to estimate crustal thickness and Vp/Vs ratio under each station. The average Moho depth is estimated to be about $\tilde{4}8$ Km and varies from 38.5 to 53 km. Deeper and shallower Moho are found under the western and eastern stations, beneath SHB and SRB, respectively. The obtained average Vp/Vs ratio is 1.76, with higher ratio of 1.82 beneath the TBZ station and lower ratio of 1.73 beneath the AZR station. The crustal structure beneath these stations is also determined by the modeling of P receiver functions. We obtained a 3 layered model for the crust beneath this region for all stations. The thickness of layers are estimated to be 7-11, 18-35 and 38-53 km, respectively. The average of the crustal shear wave velocity is 3.39 km/s and it reaches 4.32 km/s below the Moho discontinuity. The crustal thicknesses derived from these data are in good agreement with the results obtained from our S receiver functions. In addition, Clear negative signals from the Lithosphere-Asthenosphere boundary (LAB) are also observed ($\tilde{8}$.7 s) in our S receiver functions. They map a clear LAB showing a thin continental lithospheric thickness of 84 Km and varies from 77 to 103 km. Deeper and shallower lithosphere–astenosphere boundary are found under the western and eastern parts of the study area.

The P to S converted phases from 410 and 660 km upper mantle discontinuities are delayed more than 2 and 1 s with respect to the IASP91 global reference model, indicating an slower upper mantle and show higher temperature than the standard earth model. Because the 410 and 660 km discontinuities do not show the same delay, the transition zone is also considered to be thinner than that predicted by the IASP91 reference model. This could mean that the upper mantle in the region is still influenced by several geodynamical processes involving rifting, uplifting and magmatism.