Geophysical Research Abstracts
Vol. 18, EGU2016-9650, 2016
EGU General Assembly 2016

The Crustal Structure Of The Marmara Region Using Receiver Function Analysis

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The Marmara region is a rapidly deforming area with high seismic activity in the northwestern Turkey. In order to further understand the crustal structure in the region, we present results from receiver function analysis using the permanent stations in the region by applying H-κ stacking algorithm which gives crustal thickness and Vp/Vs ratio beneath a station. 40 land stations between January of 2008 and April of 2012, and 5 cabled Sea Bottom Observatories which were deployed at the end of 2010 by KOERI located between 40.2°- 41.2° N and 26.5°-30.5° E were included in the analysis. Approximately 250 teleseismic events from a wide range of epicentral distances with magnitudes greater than Mw 5.5 are used to obtain receiver functions. Furthermore, in order to calculate the receiver functions in time domain using iterative deconvolution technique suggested by Ligorria and Ammon (1999). Consequently, the crustal structure of the region has been reasonably defined and compared with the other studies. As a consequence of the receiver function analysis, the Moho depth variation map and Vp/Vs ratio map were plotted. The Moho depth on average is 31 km. There are no sharp changes in the crustal thickness of the Marmara Region except North Marmara Trough because basin structure of the Marmara Sea where crustal thickness reaches up to 26 km in the same region was not observed. Furthermore, we found overall average Vp/Vs ratio of 1.74, for the region but we obtained low Vp/Vs ratios in the stations located near Çınarcık Basin which varies between 1.64 - 1.74 indicating the effect of basin structure in the area and North Marmara where Vp/Vs ratios vary between 1.60 and 1.70 which is related to the sediment structure of the area. We also acquired higher Vp/Vs ratios which are between 1.86 and 1.96 in the Western Marmara Region. This can be due to increasing mafic content in this area. Additionally, an attempt has been made to invert the radial receiver function of the station KCTX using iterative linear inversion method in order to compare the Moho depth values with two different techniques.