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THE SHEAR WAVE VELOCITY STRUCTURE OF THE CENTRAL ALBORZ REGION USING COMBINATED METHOD OF AMBIENT NOISE CROSS-CORRELATIONS

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In traditional studies of the velocity structures of the earth, a seismic source has to be used such as earthquakes or explosions. In new studies, using ambient seismic noise makes it possible to study the deep structures. In the classical ambient noise method is required to using the simultaneous records at the pair's station. To remove this condition and increase the number of Green's functions between pairs of stations, we use the new method. The area locates at longitude 48° to 55.5° E and latitude 35° to 37° N which covers the central Alborz that includes the Damavand volcano and the great city of Tehran. To improve the earth response functions derived from the classical method, was used the Phase Weighted Stacking. The velocity map of the Rayleigh wave was plotted at 10, 20, 30 and 40 seconds. In order to better understand the region, four profiles were drawn in perpendicular and parallel to the directions with the main structures of Alborz. In this study, the depth of the Moho is estimated to be approximately 38 km. The possibility of existence of root due to topographic changes and the approximate stability depth of Moho for this mountain range is not available. From the profiles it is understood that the central and eastern parts of the central Alborz have similar structures but differ from the western part. There are only a few studies using the ambient noise for the central Alborz area. Shomali and Shirzad (2015) studied central Alborz using ambient seismic noise and earthquake data only down to depth of 5 km. Mottaghi et al. (2013) estimated the depth of Moho below at parts of central Iran about 45 km and not well defined at parts. The cross correlation of ambient noise method (classical method) has been used for the regions in different scales and depths to calculate Green's functions between pair of stations in the last few decades (Shapiro & Campillo, 2004; Bensen et al., 2007; Saygin & Kennett, 2012; Saygin et al., 2016). This method is based on seismic interferometry theory and fluctuation-dissipation theorem (e.g. Campillo and Paul, 2003; Wapenaar et al., 2011).

In fact, whenever the energy flux can excite all environmental modes with the same energy and of course different phases, the cross correlation between the wave field received at two stations can give Green's function between the two stations. In this method, despite of advantages, there are limitations. Firstly, it is necessary to record the pair of stations simultaneously to be calculated earth response between them. In the next, it depends entirely on the homogeneous distribution of ambient seismic noise sources (seas and oceans). In other words, the azimuths with low energy flux are estimated the poorly Green's function (Stehly at al., 2008). In this study, we use the seismic wave scattering property that plays an important role in the reconstruction of Green's functions in areas without seismic sources. Various studies have been done using this method throughout the world. For the first time, we study specially the velocity structure of the central Alborz using ambient seismic noise. To increase the number of rays that used in tomography, is used the correlation of coda correlation (C^3) method that described in Spica et al. (2016). In this method, the stations are used as virtual sources to construct the Green's function between station pairs. Before using this method, the PWS method was also used to increase the SNR of the C^1 functions that were not well extracted (Figure 1).

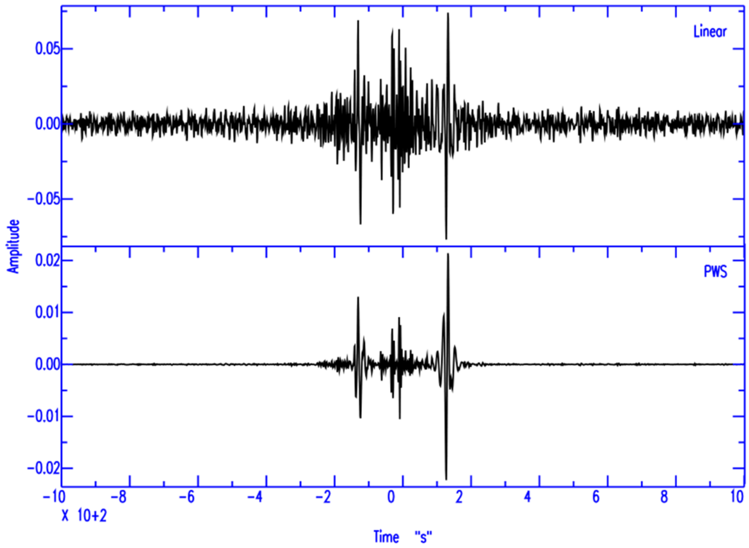

Figure 1. The retrieved Green's function between TAHR and QABG with linear and phase weighted stacking methods.

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