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Retrieval of Green's Functions from Ambient Noise Measurements in the Adana and Bursa Basins of Turkey

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Records of ambient seismic noise (ASN) field are widely used to obtain seismic velocity structures at both engineering and global scales. Two well-known methods commonly employed to obtain shear-wave velocity profiles, in engineering seismology, are the frequency-wavenumber (FK) transform and spatial auto-correlation (SPAC) methods that are based on the analysis of ASN field recorded by 2D sensor arrays. At global scale on the other hand, seismic velocity structure is determined by the Green's function retrieved from cross-correlation of the ASN recorded between two seismic stations. In the last decade, this approach has become complementary or almost alternative to the conventional methods of surface wave tomography used to investigate the velocity structure of the crust and upper mantle. Similarly, in recent years, the Green's functions estimated from ASN have also been used to investigate the shear-wave velocity structure of basins and their site amplification properties.

This work presents the Rayleigh wave Green's functions retrieved from the vertical-component ASN data recorded in the Bursa and Adana basins of Turkey. This constitutes the first stage of our research whose objective is to investigate whether velocity structures of these basins can reliably be obtained from tomographic inversion. The continuous data used in our study were recorded between 2010 and 2013 by the national seismic networks operated by Kandilli Observatory and Earthquake Research Institute (KOERI) of Bosphorus University and Earthquake Research Department (ERD) of Disaster and Emergency Management Presidency of Turkey. For both basins, distances between station pairs are in the range of 30-200 km. In this distance range, the Green's functions reveal Rayleigh waves with the periods of 6 to 30 s. Group velocity dispersion analysis carried out by the multiple filtering technique show that the group velocities are estimated to be in the range of 2.5-4.0 km/s. Observed variation of group velocities across different paths covering the basins suggest that the variation of velocity structure is reflected upon the group velocity dispersion data. Estimation of average 1D shear-wave velocity models characterizing the variation in sediment thickness from the inversion of Rayleigh wave group velocities is under progress. This research is supported by The Scientific and Technological Research Council of Turkey under Grant No. 1929B011200045 (TÜBİTAK-2218).