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Surface wave phase velocities from 2-D surface wave tomography studies in the Anatolian plate

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We study the Rayleigh and Love surface wave fundamental mode propagation beneath the Anatolian plate. To examine the inter-station phase velocities a two-station method is used along with the Multiple Filter Technique (MFT) in the Computer Programs in Seismology (Herrmann and Ammon, 2004). The near-station waveform is deconvolved from the far-station waveform removing the propagation effects between the source and the station. This method requires that the near and far stations are aligned with the epicentre on a great circle path. The azimuthal difference of the earthquake to the two-stations and the azimuthal difference between the earthquake and the station are restricted to be smaller than 5o. We selected 3378 teleseismic events (Mw >= 5.7) recorded by 394 broadband local stations with high signal-to-noise ratio within the years 1999-2013. Corrected for the instrument response suitable seismogram pairs are analyzed with the two-station method yielding a collection of phase velocity curves in various period ranges (mainly in the range 25-185 sec). Diffraction from lateral heterogeneities, multipathing, interference of Rayleigh and Love waves can alter the dispersion measurements. In order to obtain quality measurements, we select only smooth portions of the phase velocity curves, remove outliers and average over many measurements. We discard these average phase velocity curves suspected of suffering from phase wrapping errors by comparing them with a reference Earth model (IASP91 by Kennett and Engdahl, 1991). The outlined analysis procedure yields 3035 Rayleigh and 1637 Love individual phase velocity curves. To obtain Rayleigh and Love wave travel times for a given region we performed 2-D tomographic inversion for which the Fast Marching Surface Tomography (FMST) code developed by N. Rawlinson at the Australian National University was utilized. This software package is based on the multistage fast marching method by Rawlinson and Sambridge (2004a, 2004b). The azimuthal coverage of the respective two-station paths is proper to analyze the observed dispersion curves in terms of both azimuthal and radial anisotropy beneath the study region. This research is supported by Joint Research Project of the Scientific and Research Council of Turkey (TUBİTAK- Grant number 111Y190) and the Russian Federation for Basic Research (RFBR).