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Two-station Rayleigh and Love surface wave phase velocities between stations in Europe

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We study the Rayleigh and Love surface wave fundamental mode propagation beneath the continental Europe and examine inter-station phase velocities employing a two-station method for which the source code developed by Herrmann (1987) is utilized. In the two-station method, the near-station waveform is deconvolved from the far-station waveform removing the propagation effects between the source and the near-station. This method requires that the near and far stations are aligned with the epicentre on a common great circle path for which we impose the condition that the azimuthal difference of the earthquake to the two stations and the azimuthal difference between the earthquake to the near-station and the near-station to the far-station are smaller than 5^o. From the IRIS and ORFEUS databases, we visually select 3002 teleseismic, moderate-to-large magnitude (i.e.$M_w \geq 5.7$) events recorded by 255 broadband European stations with high signal-to-noise ratio within the years 1990-2011. Corrected for the instrument response, suitable seismogram pairs are analyzed with the two-station method yielding a collection of phase velocity curves in various periods ranges (mainly in the range 25-185 s). Diffraction from lateral heterogeneities, multipathing, interference of Rayleigh and Love waves can alter the dispersion measurements. In order to secure the quality of measurements we select only smooth portions of the phase velocity curves, remove outliers and average over many measurements. We finally discard these average phase velocity curves suspected of suffering from phase wrapping errors by comparing them with a reference Earth model (i.e. IASP91 by Kennett and Engdahl 1991). The outlined analysis procedure yields 5109 Rayleigh and 4146 Love individual phase velocity curves. 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 work is supported by Turkish Scientific and Technical Research Council (TUBITAK) (project number 109Y345).