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Short-period seismic noise conditions at the BURAR seismic array

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In this study, short-period noise characteristics at BURAR station were investigated by applying both power spectral density estimation (PSD) and frequency-wavenumber (f-k) array technique. Regular recording of noise spectra for 60 seconds time window sampled at every six hours has been performed over one-year period. F-k analysis estimates were calculated for 9 frequency bandwidths between 0.1 and 16 Hz.

The average noise PSD shows relatively low noise conditions at BURAR site comparing with the Peterson's Noise Model (NLNM and NLNM). Seismic noise conditions imply frequency dependence. For frequencies above 2 Hz, seasonal and diurnal fluctuations were observed. Noise level is higher in the summer, with a considerable increasing for large frequencies (> 6 Hz), and thus affecting the BURAR detection capability for this period of the year. Furthermore, noise is amplified in the middle of the day-time (measured at 13.00 local time), mainly because of the man-made activities in the area.

Shallow geology influence within the BURAR site is emphasized as well, i.e. identifying the highest PSD values for BUR07 instrument, where geological conditions are different than the rest of elements.

Noise wave-field characteristics were studied using automatic f-k processing for one-year data, in order to identify the distribution of the noise sources. The range of the measured apparent velocities was upper limited to 3.2 km/s, including Rayleigh wave velocities. At BURAR, azimuthally dependence of the noise characteristics is observed for frequencies below 2 Hz, with a consistent number of Rg detections observed in the 330o to 30o back-azimuth domain. For a 1-3 Hz frequency band, noise increasing is outlined in the 165oN direction. For higher frequencies, velocity values show an azimuthal dispersive behavior.

The Rayleigh-wave dispersion in the BURAR site was described by plotting the average dispersion curve (average velocities values as a function of frequency). The peak value observed at 2 Hz is followed by a rapid fall-off in the 3-5 Hz range.

Our study is useful for the BURAR site description, contributing to the site effects assessment and estimation of a local velocity model.