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Characteristics of the ambient seismic noise recorded in urban environment. Case study: Bucharest city, Romania

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The characteristics of the background seismic noise recorded at a temporary seismic network have been analyzed using power spectral density (PSD) estimates and their corresponding probability density functions (PDFs). The network was installed in Bucharest area for 10 months, between November 2003 and August 2004, and consisted of 32 seismic stations equipped with broadband velocity sensors. We investigated the variations of the seismic noise as a function of time of day, season and location of the sensors. At high frequencies (> 1 Hz), seismic noise shows important diurnal variations for most of the stations, while in the microseismic domain (0.05 – 0.5 Hz) the noise level is more uniform among the stations and an increase of it is observed during the colder months of the year. To identify the main sources of the background noise in the microseisms domain we performed array specific techniques (f-k analysis) as the aperture of the array is appropriate for this kind of analysis in this frequency band. We also introduced a new approach to compute the horizontal to vertical (H/V) ratios and identify the resonant frequencies. We used the statistics of the PDFs (i.e. median, mean) to determine the H/V ratios and showed that we obtained similar results, in terms of resonant frequencies, with those obtained when using noise data to compute the ‘classical’ H/V ratios. Two resonant peaks, one with larger amplitude and one with smaller amplitude, were identified for the area of Bucharest in the frequency bands 0.13 – 0.3 Hz and 0.5 – 0.9 Hz, respectively. The identified resonant peaks are in good agreement with the ones obtained in previous studies.