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Seismic Noise Characteristics at the Romanian Broadband seismic stations

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The National Institute for Earth Physics (NIEP) carries out the seismic survey of Romania and operates the national seismic network. Modernization of the Romanian Broadband Seismic Network (RBSN) started in fall of 2001, when a new seismic monitoring system was installed at Muntele Rosu (MLR) in the framework of the Japan International Cooperation Agency (JICA) project "Technical Cooperation for Seismic Monitoring System in Romania". Since then, the number of the digital broadband seismic stations has significantly increased, so that NIEP is currently operating a total number of 75 seismic stations equipped with both velocity and accelerometer sensors. Among these, 34 stations are equipped with broadband velocity sensors (CMG3ESP, CMG40T, KS2000, KS54000, STS2) while the rest of the stations are equipped with short period sensors (SH-1, S13, MP). The data are continuously recorded and transmitted in real time to the Romanian National Data Center in Bucharest (RONDC) using GPRS lines and also through TCP/IP protocol. At RONDC Antelope 4.11 is running for data acquisition and processing.
In the present study the characteristics of the seismic noise recorded at the Romanian broadband seismic stations have been analysed using power spectral density (PSD) estimates and their corresponding probability density functions (PDFs) (McNamara and Buland, 2004). This approach allowed us, on one hand, to monitor the network performance by identifying the stations with anomalously high noise levels and, on the other hand, to investigate the variations of the seismic noise related to time of day, season, location or type of installation. At high frequencies (> 1 Hz), the noise sources have cultural origin. Significant variations are observed between noise levels at different stations based on proximity to populated areas. At microseismic frequencies (0.05 – 1 Hz), the noise level is more uniform among stations, although sites close to populated areas show a slightly increased level. For periods longer than 20 s, the horizontal components are much noisier than vertical components, sometimes exceeding even the new high-noise model. The main temporal variations observed are the diurnal differences in the noise level, particularly significant for high frequencies, and the noise level variations correlated to the season. The latter is clearly seen at Buzias (BZS) station for which the highest noise level is observed for winter time and the lowest for summer period. The distribution of the median noise levels across the RBSN shows a relatively good correlation with major geological features, such as Focsani sedimentary basin and the Carpathian Orogen.