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BACKGROUND NOISE CHARACTERISTICS IN THE ROMANIA-BULGARIA CROSS-BORDER REGION

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The cross-border region between Romania and Bulgaria is exposed to earthquakes occurring in both countries: on the Romanian side, there are the intermediate-depth events generated in the Vrancea seismic source with 3 shocks per century on average with magnitude greater than 7, whereas on the Bulgarian side, there is the crustal seismicity generated in the northern part of the country, in the Shabla, Dulovo and Gorna Orjahovitza seismogenic areas.

Before 2010, this region was characterized by a poor infrastructure for earthquake monitoring. This situation has changed starting with 2010, when a new project (Danube Cross-Border System for Earthquake Alert - DACEA) between five partners from Romania and Bulgaria was launched with the main aim of developing of a system for earthquake alert in order to prevent the disasters caused by earthquakes in the cross-border area between the two countries. Within this project, the monitoring system of the Romanian and Bulgarian seismic networks was improved through the installation of 30 new seismic stations on both sides of the Danube River: 13 seismic stations were installed in seven counties in the southern part of Romania and 17 seismic stations were installed in eight municipalities or counties in the northern part of Bulgaria (Figure 1). Fourteen stations out of twenty are equipped with both velocity broadband (KS2000) and accelerometer (Episenzor) sensors while the rest of the stations have only accelerometer sensor. The data from all stations are transmitted in real-time to both Romanian and Bulgarian data centres.

Figure 1. Map with the Romanian and Bulgarian counties and municipalities where seismic station have been installed within DACEA project (http://quakeinfo.eu/ro/sistemul-de-avertizare.html)

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The aim of this work is to study the characteristics of the background seismic noise recorded at the DACEA broadband seismic seismic stations in order to identify the variations in background seismic noise as a function of time of day, season, and particular conditions at the stations.

Power spectral densities (PSDs) and their corresponding probability density functions (PDFs) (McNamara and Buland, 2004) are used to characterize the background seismic noise. At frequencies higher than 1 Hz, seismic noise seems to have cultural origin, since notable variations between daytime and nighttime noise levels are observed at most of the stations. The seasonal variations are seen in the microseisms band. The noise levels increase during the winter and autumn months and decrease in summer and spring seasons, while the double-frequency peak shifts from lower periods in summer to longer periods in winter. We also investigate the influence of the noise variability on the detection capabilities of the DACEA stations and perform polarization analysis in order to identify the main sources of the secondary microseisms.

REFERENCES

McNamara DE, Buland RP (2004) "Ambient Noise Levels in the Continental United States", *Bulletin of Seismological Society of America*, 94(4), 1517-1527