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## The impact of the COVID-19 lockdown measures on the seismic monitoring in the Bucharest (Romania) metropolitan area

**Bogdan Grecu**<sup>1</sup>, Alexandru Tiganeşcu<sup>1</sup>, Natalia Poiata<sup>1,2</sup>, Felix Borleanu<sup>1</sup>, Raluca Dinescu<sup>1</sup>, and Dragos Tataru<sup>1</sup>

<sup>1</sup>National Institute for Earth Physics, Romanian Seismic Network, Magurele, Romania (bgrecu@infp.ro)

<sup>2</sup>Institut de Physique du Globe de Paris, France

The lockdown measures taken to control and stop the spread of the novel coronavirus (COVID-19) in cities around the globe caused an unprecedented reduction of anthropic activities. The signature of this reduction, different from one place to another, has been captured by the seismic stations installed in the urban areas where lockdown restrictions have been implemented. Bucharest, the capital of Romania, was no exception from this phenomenon.

In this paper, we investigate the effect of the COVID-19 lockdown measures imposed by the Romanian authorities on the high-frequency ambient seismic noise (ASN) data recorded by the Bucharest Metropolitan Seismic Network (BMSN). BMSN consists of 26 stations of which 19 are equipped with strong motion sensors and 7 have both short-period velocity and accelerometer sensors. All the stations are continuously recording the ground motion and the data is sent in real-time to the data center of the National Institute for Earth Physics.

The reduction of ASN was first observed at stations installed in educational units (kindergartens, schools) starting with 11th of March 2020, when the Romanian government decided to close the schools in Romania. For these stations, the largest reduction of ASN, up to 82%, was noticed in the 25-40 Hz frequency band. On 16th of March the state of emergency was imposed in Romania and a few days later, on 25th of March, the stay-at-home order was issued. These new restrictions caused substantial reduction in urban traffic and people's mobility and reflected in significant reduction of ASN at almost all the other BMSN stations, located either free-field or in buildings. For these stations, we observed a decrease of the noise levels by as much as 66% in the 15-25 Hz frequency band. We also correlated the ambient seismic noise with other types of data that might be affected by human activity, such as the mobility data from Google and Apple, and we found good correlation between ASN in different frequency bands and various mobility data categories. Finally, we showed that the noise reduction due to lockdown measures improved the signal-to-noise ratio of the stations in the Bucharest area, allowing us to record smaller earthquakes which otherwise would not have been recorded.