



New Geophysical and Geotechnical Data on Quaternary Layers in the Metropolitan Area of Bucharest

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Bucharest, the capital of Romania, with approximately 2.5 million inhabitants, is considered after Istanbul the second-most earthquake-endangered metropolis in Europe. It is identified as a natural disaster hotspot by a global study of the World Bank and the Columbia University (Dilley et al., 2005). Four major earthquakes with moment-magnitudes between 6.9 and 7.7 hit Bucharest in the last 70 years. The most recent destructive earthquake of 4th March 1977, with a moment magnitude of 7.4, caused about 1.500 casualties in the capital alone. All disastrous earthquakes are generated within a small epicentral area – the Vrancea region - about 150 km northeast of Bucharest. Thick unconsolidated sedimentary layers in the area of Bucharest amplify the arriving seismic shear-waves causing severe destruction. Thus, disaster prevention and mitigation of earthquake effects is an issue of highest priority for Bucharest and its population.

An international research project was initiated and recently finished - NATO SfP Project 981882: Site-effect analyses for the earthquake-endangered metropolis Bucharest, Romania. This project had the target to fill gaps in knowledge concerning seismic and geotechnical parameters in the shallow ($h < 50$ m) Quaternary layers in Bucharest. The project was conducted by the National Institute for Earth Physics, Bucharest, Romania and the Universität Karlsruhe (TH), Germany. The main objective was earthquake risk mitigation and better seismic safety of Bucharest City.

Ten 50 m deep boreholes were successfully drilled and studied in detail. The values of the mean weighted seismic velocities computed in the present study are within a narrow range as others obtained by seismic in situ measurements. v_{s30} values below 360 m/s indicate intermediate soil as near-surface material which tends to amplify earthquake waves. This means that the near-surface layer and its elastic properties are crucial for understanding the seismic hazard imposed to Bucharest City.

The elastic and dynamic parameters from geotechnical measurements at samples from the first 6 Quaternary layers were added to the already organised database. This database is a valuable collection of elastic and dynamic parameters of the Quaternary sedimentary layers obtained by direct measurements. It will be used for further studies on the seismic microzonation of Bucharest City using the equivalent linear approach, like that employed by Bala et al. (2007).

The spectral acceleration diagrams computed for the new 10 sites in Bucharest will contribute directly to an improvement of the seismic microzonation of the city and to a better understanding of the links between the geological characteristics of each layer, the geotechnical parameters and the actual future ground motion scenarios. Sponsored by NATO's Science for Peace Programme.