ESC2016-370, 2016
35th General Assembly of the European Seismological Commission

35th General Assembly of the European Seismological Commission
4–10 September 2016 Trieste

Investigation on the seismic risk of Bucharest, Romania

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Bucharest, the capital city of Romania, is one of the cities in Europe with the highest seismic risks. The high seismic risk is due to a combination of a relatively high level of seismic hazard and an existing building stock which includes more than 80000 buildings (out of a total of around 130000 buildings) built before the large Vrancea earthquake of March 4, 1977 (Mw = 7.4). The March 1977 earthquake has caused the deaths of more than 1500 people in Romania (90% of the deaths occurred in Bucharest) and total damage which exceeded 2 bill. US $. The major contributor to the seismic hazard of Bucharest is represented by the Vrancea intermediate-depth seismic source which generates on average 3 to 4 earthquakes with Mw > 7.0 per century. In this study, which represents a key part of the COBPEE research project financed by the Romanian National Authority for Scientific Research and Innovation in the period 2015 – 2017, an evaluation of the seismic damage and losses in Bucharest from Vrancea intermediate-depth earthquakes is performed. Both deterministic and probabilistic earthquake scenarios are employed in the computations. In addition, a recently developed spatial correlation model (Pavel and Vacareanu, 2016) is also employed in the deterministic computations in order to take into account the ground motion variability throughout Bucharest. The probabilistic seismic hazard results are taken from a recent study of Pavel et al.(2015)which focuses on the evaluation of the seismic hazard for Romania. The deterministic scenarios are obtained using a Monte-Carlo earthquake catalogue based on the XXth century seismicity of the Vrancea intermediate-depth seismic source. Finally, an in-depth investigation on the results obtained for seismic damage and losses will be performed with regard to the building height, building age and structural type.

Acknowledgments
This work was supported by a grant of the Romanian National Authority for Scientific Research and Innovation, CNCS – UEFISCDI, project number PN-II-RU-TE-2014-4-0697.

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