



## **Computing seismic damage estimates for buildings within a big city. Bucharest case study.**

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The seismic risk analysis of big cities is a very demanding yet necessary task; the modeling of such complex systems requires first of all insightful input data at good resolution, referring to local effects, buildings and socio-economic aspects. Also, seismic risk estimation methods with good confidence levels are needed. Until recently, these requirements were not fulfilled for Bucharest, one of the most endangered capital city in Europe due to earthquakes. Based on 2011 and 2002 census data, standardized according to the framework of the Near-real time System for Estimating the Seismic Damage in Romania (SeisDaRo) through a unique approach and on relevant hazard scenarios, we estimate for the first time the building damage within the city, divided in more than 120 areas. The methodology applied relies on 48 vulnerability curves for buildings, on the Improved Displacement Coefficient Analytical Method included in the SELINA software for computing damage probabilities and on multiple seismic hazard scenarios, including the maximum possible. In order to compare results with real losses we use a scenario based on the 4 March 1977 Vrancea earthquake (7.4 moment-magnitude) that lead to 1424 deaths in Bucharest. By using overlay analysis with satellite imagery and a new methodology integrated in GIS we show how results can be enhanced, reflecting even more local characteristics. Best practices for seismic risk mapping are also expressed. Results are promising and contribute to the mitigation efforts in Bucharest.