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Earthquake vulnerability and risk modeling for the area of Greater Cairo, Egypt

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Egypt is a country of low-to-moderate earthquake hazard. However, the earthquake risk potential (in terms of both probable economic and human losses) is rather high. Population of Egypt (according to the Central Agency for Public Mobilisation and Statistics – CAPMAS) is about 80 million. At the same time the distribution of the population in the country is far from uniform. In particular, the area of Greater Cairo attracts migrants from the whole country and the metropolitan area faces the problem of unplanned urbanization. Due to the high density of population and vulnerability of the existing building stock the potential for earthquake damage and loss in the area is a problem of great concern.

The area under study covers 43 administrative districts of Greater Cairo (including the City of Cairo, El-Giza and Shubra El-Kheima), where field investigations were conducted aiming at identifying representative building types and assessing their seismic vulnerability. On the base of collected information, combining the findings of the field investigations in different districts with available statistical data about the distribution of buildings in the districts, we constructed vulnerability composition models (in terms of the vulnerability classes of the European Macroseismic Scale, EMS-98) for all the considered districts of Greater Cairo. The vulnerability models are applicable for analysis of potential damage and losses in case of occurring damaging earthquakes in the region, including zonation of the seismic risk in the area, generation of probable earthquake scenarios and rapid damage and loss assessment for the purposes of emergency management.