Probabilistic seismic hazard model for Cairo, Egypt: estimates and uncertainties

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Abstract:

A new seismic hazard model for Cairo, the capital city of Egypt is developed herein based on comprehensive consideration of uncertainties in various components of the probabilistic seismic hazard analysis. The proposed seismic hazard model is developed from an updated catalogue of historical and instrumental seismicity, geodetic strain rates derived from GPS-based velocity-field of the crust, and the geologic slip rates of active faults. The seismic source model consists of area sources and active faults characterised to forecast the seismic productivity in the region. Ground motion prediction models are selected to describe the expected ground motion at the sites of interest. The model accounts for inherent epistemic uncertainties of statistical earthquake recurrence; maximum magnitude; ground motion prediction models, and their propagation toward the obtained results. The proposed model is applied to a site-specific hazard analysis for Kottamiya, Rehab City and Zahraa-Madinat-Nasr (hereinafter referred to as Zahraa) to the East of Cairo (Egypt). The site-specific analysis accounts for the site response, through the parameterization of the sites in terms of average 30-m shear-wave velocity (Vs30). The present seismic hazard model can be considered as a reference model for earthquake risk mitigation and proper resilience planning.

Keywords:

Probabilistic seismic hazard analysis GMPEs Uncertainty analysis Logic-tree

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