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Seismic hazard assessment in Grecce: Revisited

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Greece is the most earthquake prone country in the eastern Mediterranean territory and one of the most active areas globally. Seismic Hazard Assessment (SHA) is a useful procedure to estimate the expected earthquake magnitude and strong ground-motion parameters which are necessary for earthquake resistant design. Several studies on the SHA of Greece are available, constituting the basis of the National Seismic Code. However, the recently available more complete, accurate and homogenous seismological data (the new earthquake catalogue of Makropoulos et al., 2012), the revised seismic zones determined within the framework of the SHARE project (2012), new empirical attenuation formulas extracted for several regions in Greece, as well as new algorithms of SHA, are innovations that motivated the present study.

Herewith, the expected earthquake magnitude for Greece is evaluated by applying the zone-free, upper bounded Gumbel's third asymptotic distribution of extreme values method. The peak ground acceleration (PGA), velocity (PGV) and displacement (PGD) are calculated at the seismic bedrock using two methods: (a) the Gumbel's first asymptotic distribution of extreme values, since it is valid for initial open-end distributions and (b) the Cornell-McGuire approach, using the CRISIS2007 (Ordaz et. al., 2007) software. The latter takes into account seismic source zones for which seismicity parameters are assigned following a Poisson recurrence model. Thus, each source is characterized by a series of seismic parameters, such as the magnitude recurrence and the recurrence rate for threshold magnitude, while different predictive equations can be assigned to different seismic source zones. Recent available attenuation parameters were considered. Moreover, new attenuation parameters for the very seismically active Corinth Gulf deduced during this study, from recordings of the RASMON accelerometric array, were used. The hazard parameters such as the most probable annual maximum earthquake magnitude (mode) and the maximum expected earthquake magnitude with 70% and 90% probability of not been exceeded in 50 and 100 years are determined and compiled into a GIS mapping scheme. The data quality allowed the estimation of strong ground motion parameters (PGA, PGV and PGD) within cells of small dimensions of 0.25° X 0.25°. The results are discussed and compared with the ones obtained by other studies.