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Sensitivity, testing and validation of multiple seismic hazard models of Italy

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The results of a probabilistic seismic hazard analysis of Italy, achieved according to scientifically accepted methodologies, updated information and well-documented data processing, are shown. The hazard assessment is carried out according to Cornell's method (1968), based on an earthquake catalogue with the foreshock and aftershock events filtered out, and on three different types of seismic sources: macro-areas, seismogenic zones and single points (seismic epicentres). Peak Ground Acceleration (PGA) and Spectral Acceleration (SA) values at two fixed frequencies (1 and 5 Hz) are computed using two sets of attenuation equations: the attenuation relationships proposed by Sabetta and Pugliese (1996) on the basis of strong motion recordings of Italian earthquakes and the attenuation relationships proposed by Ambraseys et al. (1996) based on strong motion recordings of European earthquakes. A Poisson model of earthquake occurrence is assumed as a default and three return periods are investigated, 100, 500 and 1000 years.
For validation purposes, seismic hazard estimates are then compared with those obtained by Albarello and D'Amico (2001) using a different seismic database and procedure. They were based on the seismic intensities felt in 2,579 municipalities, giving thus the opportunity to compare, for the same sites, the hazard obtained through two alternative methods, a direct one (felt intensities) versus a derived one (strong motion estimates).
Furthermore, a panel of seismic hazard experts has been solicited to provide their relative confidence in the alternative models used in this work as it regards seismic source models, seismicity rate models and attenuation models. A sensitivity analysis has been also performed, to determine those models that mostly influence the results. A hazard model, which is a synthesis of the previous ones, is finally proposed: it represents the best fit of the results of the sensitivity analyses and validation tests.