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Seismic hazard assessment in the Catania and Siracusa urban areas (Italy) through different approaches

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The seismic hazard assessment (SHA) can be performed using either Deterministic or Probabilistic approaches. In present study a probabilistic analysis was carried out for the Catania and Siracusa towns using two different procedures: the "site" (Albarello and Mucciarelli, 2002) and the "seismotectonic" (Cornell 1968; Esteva, 1967) methodologies. The SASHA code (D'Amico and Albarello, 2007) was used to calculate seismic hazard through the "site" approach, whereas the CRISIS2007 code (Ordaz et al., 2007) was adopted in the Esteva-Cornell procedure. According to current international conventions for PSHA (SSHAC, 1997), a logic tree approach was followed to consider and reduce the epistemic uncertainties, for both seismotectonic and site methods. The code SASHA handles the intensity data taking into account the macroseismic information of past earthquakes. CRISIS2007 code needs, as input elements, a seismic catalogue tested for completeness, a seismogenetic zonation and ground motion predicting equations. Data concerning the characterization of regional seismic sources and ground motion attenuation properties were taken from the literature. Special care was devoted to define source zone models, taking into account the most recent studies on regional seismotectonic features and, in particular, the possibility of considering the Malta escarpment as a potential source. The combined use of the above mentioned approaches allowed us to obtain useful elements to define the site seismic hazard in Catania and Siracusa. The results point out that the choice of the probabilistic model plays a fundamental role. It is indeed observed that when the site intensity data are used, the town of Catania shows hazard values higher than the ones found for Siracusa, for each considered return period. On the contrary, when the Esteva-Cornell method is used, Siracusa urban area shows higher hazard than Catania, for return periods greater than one hundred years. The higher hazard observed, through the site approach, for Catania area can be interpreted in terms of greater damage historically observed at this town and its smaller distance from the seismogenic structures. On the other hand, the higher level of hazard found for Siracusa, throughout the Esteva-Cornell approach, could be a consequence of the features of such method which spreads out the intensities over a wide area. However, in SHA the use of a combined approach is recommended for a mutual validation of obtained results and any choice between the two approaches is strictly linked to the knowledge of the local seismotectonic features.

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