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Evaluation of seismic hazard in Marmara region based on the new datasets developed in the EU-MARSITE Project

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Several studies with various degrees of sophistication have been conducted for the probabilistic assessment of seismic hazard in the Marmara Region (e.g. Atakan et al., 2002; Erdik et al., 2004; Kalkan et al., 2008; Gülerce and Ocak, 2013),. The common point of these studies was that they have all addressed the hazard in the region in terms of both time-independent probabilistic (simple Poissonian) and time-dependent probabilistic (renewal) models. This tendency was governed by the following considerations: 1) the region has experienced a considerable number of large magnitude events in the history, which have also shown some periodicity; 2) the existing seismic gap and the post-1999 earthquake stress transfer at the western portion of the 1000km-long NAFZ indicates a high probability of having a M>7 event in the near future close to the city of Istanbul; 3)the seismic history of the region was well documented and studied and there have been, especially in the aftermath of the 1999 Kocaeli and Düzce events, several geological investigations both on-shore and off-shore aiming to obtain a regional fault model as complete as possible, which were reflected in the fault segmentation models of the PSHA studies.
Task 5.5. of the MARSITE Project aimed at a reassessment of the probabilistic seismic hazard of the Marmara region in the light of the new datasets compiled in the project. The improvement of the knowledge on the seismotectonic regime of the Marmara region paved the path for the development of alternative source models for the improvement of the existing probabilistic seismic hazard maps. In this connection, the most recent findings and outputs of different work packages of the project, in terms of seismicity, fault segmentation and slip rate data are utilized. A revised fault segementation model and associated Poisson and renewal recurrence models as well as recently emerged global and regional ground motion prediction equations are used to assessed the seismic hazard in the region. The PSHA approach is based on the characteristic earthquake modelling for the fault segments and the background earthquake model with the spatially smoothed seismicity. We have also considered the impact of fault parameter uncertainties (maximum magnitude, and slip rates) on the ground motion hazard for Poisson and renewal forecasting models. Finally the time-independent and dependent seismic hazard results in terms of ground shaking are compared with the previous studies.