

## The multi-site probabilistic seismic hazard analysis in REASSESS V2.0

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A stand-alone user-friendly software for the probabilistic assessment of seismic hazard is under development. It is named REgionAl, Site-SpEcific and Scenario-based Seismic hazard analysis, REASSESS and, as the name suggests, it is structured in three modules for: (i) site-specific, (ii) scenario-based and (iii) multi-site (regional) analyses. This contribution focuses on (iii), which is devoted to multi-site probabilistic seismic hazard analysis (PSHA).

The input data for the analyses are: the coordinates of the sites of interest and their soil classifications, the geometry of the seismic source(s) and the corresponding annual rate(s) of occurrence of earthquakes, the distribution(s) of magnitude given the occurrence of one earthquake on each source and the ground motion propagation model (GMPM). Embedded databases of known seismic sources and faults and GMPMs aid the user, in some cases, in input definition.

Output of the analyses is the probability that, in a given time interval, a vector of ground motion intensity measure (IM) thresholds is exceeded an arbitrary number of times at the sites the region. The software also provides the statistics (i.e. mean and variance) of the collective number of exceedances of the vector of IM thresholds in any time interval. Disaggregation of multi-site hazard is also computed. All the results, which may be useful for seismic risk assessment of building portfolios or spatially-distributed infrastructures, consider all the sources of spatial dependence of IMs at the sites and most recent research findings on the topic.

REASSESS algorithms have been coded in MATLAB<sup>®</sup>, in which multi-site PSHA is computed via Monte Carlo simulation of random fields of IM in one earthquake event. Nonetheless, the accuracy of results and the reduced computational demand have been primary goals in REASSESS development.