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SENSITIVITY OF HAZARD RESULTS TO DIFFERENT METHODOLOGICAL APPROACHES AND COMPUTER CODES

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The choice of different inputs for probabilistic seismic hazard assessment, such as seismic zones, ground motion attenuation models and seismic catalogues, is of critical importance because it affects the final results strongly. Accordingly, sensitivity analyses of input parameters as well as uncertainties quantification are an extended, recommended practice on seismic hazard evaluation studies. However, the influence of the methodology in itself, (including the mathematical approach to solve the hazard equations) on the final results is often overlooked. Consequently, computer programs for seismic hazard calculation are used as black boxes, assuming that they yield correct results within the uncertainties introduced by the input parameters.

To test the sensitivity of hazard results to different methodological approaches, we carried out a set of numerical experiments using geometries for which the probability density functions, contained in the hazard equation, have analytical solutions.

We also developed sensitivity analyses of the relative variability of the results using the most popular computer codes (e.g. EZ-Frisk, CRISIS, FRISK88M) and polygonal area sources. The effect of changing with each code the options of calculation and the results of de-aggregation analysis were also tested.

The analysis of the results demonstrates that, even considering the same inputs for the study, different values of calculation parameters and different computer codes may lead to significantly dissimilar solutions.

The ultimate goal of the study is to understand and control the characteristics of the calculation methods used in seismic hazard assessment which will allow us obtaining stable results and hence to optimize the seismic hazard analysis.