

## Uncertainty analysis for seismic hazard in Northern and Central Italy

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### Abstract

In this study we examine uncertainty and parametric sensitivity of Peak Ground Acceleration (PGA) and 1-Hz Spectral Acceleration (1-Hz SA) in probabilistic seismic hazard maps (10% probability of exceedance in 50 years) of Northern and Central Italy. The uncertainty in hazard is estimated using a Monte Carlo approach to randomly sample a logic tree that has three input-variables branch points representing alternative values for b-value, maximum magnitude (Mmax) and attenuation relationships. Uncertainty is expressed in terms of 95% confidence band and Coefficient Of Variation (COV). The overall variability of ground motions and their sensitivity to each parameter of the logic tree are investigated. The largest values of the overall 95% confidence band are around 0.15 g for PGA in the Friuli and Northern Apennines regions and around 0.35 g for 1-Hz SA in the Central Apennines. The sensitivity analysis shows that the largest contributor to seismic hazard variability is uncertainty in the choice of ground-motion attenuation relationships, especially in the Friuli Region (?0.10 g) for PGA and in the Friuli and Central Apennines regions (?0.15 g) for 1-Hz SA. This is followed by the variability of the b-value: its main contribution is evident in the Friuli and Central Apennines regions for both 1-Hz SA (?0.15 g) and PGA (?0.10 g). We observe that the contribution of Mmax to seismic hazard variability is negligible, at least for 10% exceedance in 50-years hazard. The overall COV map for PGA shows that the uncertainty in the hazard is larger in the Friuli and Northern Apennine regions, around 20-30%, than the Central Apennines and Northwestern Italy, around 10-20%. The overall uncertainty is larger for the 1-Hz SA map and reaches 50-60% in the Central Apennines and Western Alps.

### Keywords

seismic hazard;uncertainty analysis;Italy

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
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