Assessing the Nature of Stochastic Uncertainties for Ground Motion Predictions: The Apennines, Italy

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In this study we aim to assessing the nature of stochastic uncertainties in ground-motion predictions, by including the variability of region-specific crustal attenuation in time and space in the Central/Northern Apennines (Italy), using the events occurred during 2016-2017 earthquake sequence. Spectral characteristics of excitation, attenuation and duration of ground motion are derived through a regression analysis of the peak ground velocities in the frequency range of 0.25–22 Hz. Regressions are carried out over thousands time windows before and after the Amatrice (M6.0), Visso (M5.9) and Norcia (M6.3) earthquakes, in order to evaluate the fluctuations in seismic wave attenuation induced by the largest mainshocks of the seismic sequence. Propagation terms are modeled using random vibration theory, through a grid search over the attenuation parameters. Here we show that crustal attenuation is strongly affected by transients triggered by the main events, and quantify the impact of the seismic wave attenuation variability on the ground-motion hazard in the Central/Northern Apennines. We also determine the effect of spatial variability of crustal attenuation and its contribution to stochastic uncertainties in ground motion predictions.