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Non-stationary stochastic modeling for Portugal Mainland: Estimates of the spectral parameters for calculating response spectra and synthesing strong ground motion acceleration records.

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Predictions of strong motion in Portugal make the use of well-founded physical models imperative. This work presents a non-stationary stochastic seismological model, based on random vibration theory, for calculating response spectra and synthesizing strong ground motion acceleration records for Portugal Mainland.

Because of the lack of reliable data and the uncertainties on the seismotectonic, very few studies for Portugal concerning source and path effects have been undertook. We based some of our model parameters from data from intraplate earthquakes in continental regions, like East North America, whose response spectra have often been considered to be representative of intraplate conditions around the world. Modifications are then made to fit the recorded ground motion in Portugal Mainland. The validation and comparison are entirely in terms of 5% damped pseudo absolute response spectra for acceleration.

This point source model can be implemented to simulate motions over a magnitude, distance and site category grid. The synthetic data are then used to regression analysis resulting in region-and-site-specific attenuation relations for use in either deterministic or probabilistic seismic hazard simulations.

The demonstrated agreement between model and data for low to moderate events in Portugal provides strong grounds for accepting the stochastic-process model predictions for this type of events and to used it as the basis for characterization of stronger

earthquakes considering a finite fault rupture modeled as a sum of a number of point sources distributed spatially and temporally, which will be done in future.