Harmonized Probabilistic Seismic Hazard Assessment in Europe: Earthquake Geology Applied

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Probabilistic seismic hazard assessment (PSHA) aims to characterize the best available knowledge on seismic hazard of a study area, ideally taking into account all sources of uncertainty. Results from PSHAs form the baseline for informed decision-making and provide essential input to each risk assessment application.

SHARE is an EC-FP7 funded project to create a testable time-independent community-based hazard model for the Euro-Mediterranean region. SHARE scientists are creating a model framework and infrastructure for a harmonized PSHA. The results will serve as reference for the Eurocode 8 application and are envisioned to provide homogeneous input for state-of-the art seismic safety assessment for critical industry.

Harmonizing hazard is pursued on the input data level and the model building procedure across borders and tectonic features of the European-Mediterranean region. An updated earthquake catalog, a harmonized database of seismogenic sources together with adjusted ground motion prediction equations (GMPEs) form the bases for a borderless assessment. We require transparent and reproducible strategies to estimate parameter values and their uncertainties within the source model assessment and the contributions of the GMPEs.

The SHARE model accounts for uncertainties via a logic tree. Epistemic uncertainties within the seismic source-model are represented by four source model options including area sources, fault sources and kernel-smoothing approaches, aleatory uncertainties for activity rates and maximum magnitudes. Epistemic uncertainties for predicted ground motions are considered by multiple GMPEs as a function of tectonic settings and treated as being correlated. For practical implementation, epistemic uncertainties in the source model (i.e. dip and strike angles) are treated as aleatory, and a mean seismicity model is considered. The final results contain the full distribution of ground motion variability. This contribution will feature preliminary results and sensitivity analysis of the new Euro-Mediterranean hazard model with particular focus on the contribution of the fault sources.