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THE 2013 EUROPEAN SEISMIC HAZARD MODEL [ESHM13]: DISSAGREGATION

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The European Commission funded the project "Seismic Hazard Harmonization in Europe" (SHARE, 2009-2013) to develop an improved understanding of seismic hazard within the European region and Turkey and with the goal to provide a reference model for the application of the European seismic regulations for buildings design (Eurocode 8). The 2013 European Seismic Hazard Model (ESHM13) delivered by the SHARE program delivers a complete set of harmonized seismic hazard results and associated uncertainties. It serves as reference for the update of seismic norms at national and regional scale in Europe, thus for future safety assessment and improvement of built environment, general buildings, critical infrastructures as well as reference model for insurance sector.

The ESHM13 core is represented by two main elements: a seismic source representation and a ground-shaking model. At the seismic source modeling level three different earthquake source models were aggregated, describing the expected rate of future earthquake activity in terms of their spatial, depth and frequency-magnitude distribution as well as the style of faulting in different regions. The three earthquake source models include (i) an area source model, assuming a homogeneous distribution of earthquakes within each zone, (ii) a zoneless earthquake model distributing the catalogued earthquake activity based on kernel-smoothed earthquake and fault densities, and (iii) a fault source model inferring future seismic activity from estimated slip rates on active fault, distributing smaller events in background sources. The ground-shaking model consists of fourteen-ground motion prediction equations (GMPEs) carefully selected to represent the earthquake process, wave propagation characteristics of the different tectonic regionalization.

Of great interest for engineering community is the seismic hazard disaggregation, because it provides an efficient way of identifying the predominant source, which can be used to generate scenario earthquakes and select corresponding time histories for seismic design. Generally, the scenario earthquakes are characterized by bins of magnitude, M, source-to-site distance, R, and number of standard deviations, ε, that the ground-motion parameters can deviate from its median value for a Magnitude-Distance pair as estimated by a ground motion prediction equation.
We present disaggregation results for the ESHM13 and discuss its complexity, in particular:

- Challenges of disaggregating a complex seismic hazard model consisting of nine hundred independent branches representing the belief of the modellers and the different parameterizations and assumptions.
- Site-specific disaggregation results focusing on the individual seismic source model contribution.
- Maps of the individual magnitude, distance and epsilon of peak ground acceleration corresponding to mean return periods of 475 and 2475 years.

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