Geophysical Research Abstracts
Vol. 18, EGU2016-7838, 2016
EGU General Assembly 2016

Impact of fault models on probabilistic seismic hazard assessment: the example of the West Corinth rift.

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Including faults in probabilistic seismic hazard assessment tends to increase the degree of uncertainty in the results due to the intrinsically uncertain nature of the fault data. This is especially the case in the low to moderate seismicity regions of Europe, where slow slipping faults are difficult to characterize. In order to better understand the key parameters that control the uncertainty in the fault-related hazard computations, we propose to build an analytic tool that provides a clear link between the different components of the fault-related hazard computations and their impact on the results. This will allow identifying the important parameters that need to be better constrained in order to reduce the resulting uncertainty in hazard and also provide a more hazard-oriented strategy for collecting relevant fault parameters in the field.

The tool will be illustrated through the example of the West Corinth rifts fault-models. Recent work performed in the gulf has shown the complexity of the normal faulting system that is accommodating the extensional deformation of the rift. A logic-tree approach is proposed to account for this complexity and the multiplicity of scientifically defendable interpretations.

At the nodes of the logic tree, different options that could be considered at each step of the fault-related seismic hazard will be considered. The first nodes represent the uncertainty in the geometries of the faults and their slip rates, which can derive from different data and methodologies. The subsequent node explores, for a given geometry/slip rate of faults, different earthquake rupture scenarios that may occur in the complex network of faults. The idea is to allow the possibility of several faults segments to break together in a single rupture scenario. To build these multiple-fault-segment scenarios, two approaches are considered: one based on simple rules (i.e. minimum distance between faults) and a second one that relies on physically-based simulations. The following nodes represents for each rupture scenario different rupture forecast models (i.e; characteristic or Gutenberg-Richter) and for a given rupture forecast, two probability models commonly used in seismic hazard assessment: poissonian or time-dependent. The final node represents an exhaustive set of ground motion prediction equations chosen in order to be compatible with the region. Finally, the expected probability of exceeding a given ground motion level is computed at each sites. Results will be discussed for a few specific localities of the West Corinth Gulf.