

Active faults in regional seismic hazard models: use and modelling insights

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Tectonics, active faults and seismicity provide critical information when developing a seismogenic model for use in probabilistic seismic hazard assessment (PSHA). However, the relationship between these elements is not straightforward; some of the shortcomings are due to short historical seismicity records, other arises from insufficient knowledge of buried active faults, other due to poor correlation between seismicity patterns and exposed faults. Compilation of regional datasets might help in understanding the seismogenic profile of the region and thus provide a prime for developing an earthquake source model.

The efforts undertaken within the SHARE project (www.share-eu.org) and its sibling EMME-Project (<http://www.emme-gem.org/>), resulted in a fully harmonized dataset of active faults spanning over the Euro-Mediterranean, Middle East and Caucasus Region. The first harmonized active fault data set, fully available, is the European Database of Seismogenic Faults (EDSF), used within the 2013 European Seismic Hazard Models, ESHM13. A standardized definition of the crustal faults, the Composite Seismogenic Source (CSS) model was adopted as the common standard for the Earthquake Model of the Middle East and Caucasus Region (EMME14), too.

Both regional models introduced the active faults as independent models when quantifying the epistemic uncertainties of earthquake recurrence rates. The recurrence rates of active faults were obtained from converting the long-term slip rates into seismicity via a seismic moment balance. Similarly, the regional seismicity, described by the b-value, represents the proxy of the fault specific magnitude frequency distribution. However, differences exist between the approaches of building the active fault model in the two regional models. That is, the ESHM13 combines the active faults with the background area sources, whereas the EMME14 associates the active faults with a smoothed seismicity model. Other differences arise from the treatment of the epistemic uncertainties of the input parameters, which are fault specific.

In this contribution an overview of the use of active faults in two regional projects, the ESHM13 and its sibling the EMME14 is presented. Moreover, the insights of the models and the details of each active fault model are also discussed.