

Precision versus uncertainty in regional seismic hazard mapping

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Regional and national seismic hazard mapping efforts have increasingly pursued more detailed and precise models and outputs, particularly in terms of source characterisation and modelling. With increasing precision comes increasing uncertainty. In recent years much attention has been paid to modelling uncertainty in ground-motion models and including this in seismic hazard modelling. However, much less effort has been made to quantify and model uncertainty in seismic source characterisation. This raises two questions: 1) is increasing precision appropriate when uncertainty remains poorly quantified? 2) what is the optimal balance between precision and uncertainty? Ultimately the answer to this depends on the end-uses of the models and the implications of increasing uncertainty with increasing precision. Here we explore some of the main sources of uncertainty in seismic source characterisation such as incomplete and limited records of earthquake occurrence in paleoseismic data and earthquake catalogues, non-stationarity of seismicity and the poisson assumption, fault source characterisation and so-called moment balancing. We pay particular focus to uncertainties in estimating hazard in less seismically active regions and the implications for building design guidance.

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