[EE] Evening Poster | S (Solid Earth Sciences) | S-SS Seismology

[S-SS05]Effective usage of PSHA

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Seismic hazard models, including national seismic hazard models (NSHM) of most seismically active countries around the world are used by society for a wide range of applications, such as: optimising insurance rates, foundation of building design standards, large engineering projects and portfolio loss assessments. As such, these models need to be able to meet a wide range of end-user requirements. A crucial part of meeting those needs is to include a realistic assessment in the uncertainty in seismic hazard knowledge, and to translate that in a useful way to end-users and decision makers.

In this session we welcome presentations that address fundamental work in the development of seismic hazard models, particularly those that consider key uncertainties in the modeling and how these uncertainties can be modeled in a useful way for end-users. We have identified the following six dominant themes, but welcome topics from across the hazard and risk spectrum: 1) subduction-zone hazard is poorly understood but is significant source of uncertainty in many regions; 2) a focus on quantifying and including epistemic uncertainty is necessary, including uncertainty in fault and earthquake catalogue source models (and uncertainty due to data quality issues), as well as those in ground-motion prediction; 3) ground-motion simulations are becoming increasingly relevant for the NSHMs and require NSHM specific focus; 4) understanding how to include earthquake clustering and triggering will improve hazard forecasts; and 5) a focus on testing of hazard and model components will lead to improved NSHMs; 6) new approaches to seismic hazard and risk that will improve our understanding and the usefulness of hazard and risk models

[SSS05-P02]Heterogeneity of direct aftershock productivity of the main shock rupture

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Keywords:direct aftershock, finite-source ETAS model, background probability

The epidemic type aftershock sequence (ETAS) model is widely used to describe and analyze the clustering behavior of seismicity. Instead of regarding large earthquakes as point sources, the finite-source ETAS model treats them as ruptures that extend in space. Each earthquake rupture consists of many patches, and each patch triggers its own aftershocks isotropically. We design an iterative algorithm to invert the unobserved fault geometry based on the stochastic reconstruction method. This model is applied to analyze the Japan Meteorological Agency (JMA) catalog during 1964–2014. We take six great earthquakes with magnitudes >7.5 after 1980 as finite sources and reconstruct the aftershock productivity patterns on each rupture surface. Comparing results from the point-source ETAS model, we find the following: (1) the finite-source model improves the data fitting; (2) direct aftershock productivity is heterogeneous on the rupture plane; (3) the triggering abilities of M5.4+ events are enhanced; (4) the

background rate is higher in the off-fault region and lower in the on-fault region for the Tohoku earthquake,
while high probabilities of direct aftershocks distribute all over the source region in the modified model;
(5) the triggering abilities of five main shocks become 2–6 times higher after taking the rupture geometries
into consideration; and (6) the trends of the cumulative background rate are similar in both models,
indicating the same levels of detection ability for seismicity anomalies. Moreover, correlations between aftershock productivity and slip distributions imply that aftershocks within rupture faults are adjustments
to coseismic stress changes due to slip heterogeneity.