Geophysical Research Abstracts
Vol. 14, EGU2012-13297, 2012
EGU General Assembly 2012

Empirical testing of earthquake recurrence models at source and site

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Several probabilistic procedures are presently available for seismic hazard assessment (PSHA), based on time-dependent or time-independent models. The result is a number of different outcomes (hazard maps), and to take into account the inherent uncertainty (epistemic), the outcomes of alternative procedures are combined in the frame of logic-tree approaches by scoring each procedure as a function of the respective reliability. This is deduced by evaluating ex-ante (by expert judgements) each element concurring in the relevant PSH computational procedure. This approach appears unsatisfactory also because the value of each procedure depends both on the reliability of each concurring element and on that of their combination: thus, checking the correctness of single elements does not allow evaluating the correctness of the procedure as a whole. Alternative approaches should be based 1) on the ex-post empirical testing of the considered PSH computational models and 2) on the validation of the assumptions underlying concurrent models. The first goal can be achieved comparing the probabilistic forecasts provided by each model with empirical evidence relative to seismic occurrences (e.g., strong-motion data or macroseismic intensity evaluations) during some selected control periods of dimension comparable with the relevant exposure time. About assumptions validation, critical issues are the dimension of the minimum data set necessary to distinguish processes with or without memory, the reliability of mixed data on seismic sources (i.e. historical and palaeoseismological), the completeness of fault catalogues. Some results obtained by the application of these testing procedures in Italy will be shortly outlined.