28*th* IUGG Conference on Mathematical Geophysics, June 7-11, 2010, Pisa, Italy
Session 8: Data assimilation and model validation

Empirical testing of probabilistic seismic hazard estimates

Dario Albarello[1], Vera D'Amico[2], Marco Mucciarelli[3]

[1] *Dip. di Scienze della Terra - Università di Siena, Siena, Italy*
[2] *Istituto Nazionale di Geofisica e Vulcanologia, Sezione di Milano, Pisa, Italy*
[3] *DiSGG - Università della Basilicata, Potenza, Italy*

Keywords: *seismic hazard; probability; empirical testing; likelihood; seismology*

Several probabilistic procedures are presently available for seismic hazard assessment (PSHA). These result in a number of different outcomes (hazard maps), each generally compatible with available observations and supported by plausible physical models. To take into account this inherent uncertainty ("epistemic"), outcomes of these 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. An alternative approach to scoring is here presented that is based on the ex-post empirical testing of the considered PSH computational models. This is performed by 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. In order to take into account the inherent probabilistic character of hazard estimates, formally coherent procedures have been developed that are based on Likelihood estimates and Counting protocols. Some results obtained by the application of these testing procedures in Italy will be shortly outlined.