Session 29

The a, b, c of seismology: Estimating seismicity parameters for time-dependent seismic hazard and risk assessment

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For many decades, seismologists have characterized observed seismicity with an ever-growing set of parameters: the a- and b-values of the Gutenberg-Richer relation describing the activity rate and size distribution of earthquakes; c, p, and K describing the productivity and temporal decay rate of aftershock seismicity using the Omori-Utsu-law and numerous additional parameters that describe epidemic-type behavior of seismicity, its fractal dimension or spatial decay etc. Many of these parameters are critical input for seismogenic source models of contemporary probabilistic seismic hazard and risk models. However, even today it remains often challenging to robustly estimate these seismicity parameters from highly heterogeneous earthquake catalogs, and it is particularly challenging to identify biases and map these parameters as a function of space, time and magnitude at the appropriate resolution and scale, or to dynamically update such estimates in near-realtime as new data arrives. An additional alphabet soup is added by the need to test earthquake forecast models against observations, using a range of statistical tests (N, L, S, T, W tests) as developed by the Collaboratory for the Study of Earthquake Predictability (CSEP).

This session invites contributions that present and apply methods for robustly estimating and updating seismicity parameters and their spatio-temporal variability from observed seismicity. We also seek contributions that interpret observed spatial patterns or temporal gradients in a seismo-tectonic context or explore their relevance for earthquake forecasting as well as long-, medium- and short-term seismic hazard and risk assessment. Innovative approaches for parameter estimation and forecasting, for example using machine learning for data-driven discoveries are especially welcome, as are CSEP-related contributions that focus on testing and validation of earthquake forecast models. Contributions describing the effects of seismicity parameters on seismic hazard and risk are highly welcome.