



Model-free smoothed seismicity maps

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Smoothed seismicity maps show earthquake rates or probabilities interpolated from the observed distribution of epicentres. A model has to be chosen as smoothing kernel, such as Gaussian, power-law or inverse-biquadratic, including at least a bandwidth parameter, which can be fixed or adaptive. A too large bandwidth leads to over-smoothing (the map is excessively blurred), while a too small one produces under-smoothing (the map is excessively fine-grained). This gives the modeller a virtually infinite variety of options, so choosing, testing and optimizing the model become cumbersome.

This presentation offers a model-free alternative, in which the smoothing is based on the empirical distribution of distances between epicentres. Tests for worldwide and regional seismicity, and for simulated datasets, show that indeed the expected fraction of epicentres originate within each given probability threshold of the map. Furthermore, when the maps are updated as new earthquakes occur, they become increasingly detailed, optimizing themselves automatically.