Delaunay triangulation for smoothing seismicity models

Inst. Statist. Math. & Earthq. Res. Inst. U. Tokyo; **Yosihiko Ogata**

Some parameters of the seismicity models are characterized by a two-dimensional piecewise linear function whose value at any location is linearly interpolated by the values (coefficients) at the nearest three earthquake locations that consists a Delaunay triangle. I obtain optimal solutions of the coefficients of the parameter functions by maximizing the penalized log-likelihood against roughness penalties of the parameter functions. This provides high resolution images in areas of clustered earthquake locations and also provides accurate space-time forecast in the active stage of seismicity.

In the hierarchical space-time epidemic-type aftershock sequence (HIST-ETAS) models, I am primary interested in the spatial intensity of the background seismicity. This intensity image can regionally vary in the range of several orders in a seismogenic zone, but the inversion solutions are confirmed to be independent of observed periods. Hence this is quite useful for the secular-term location prediction of large earthquakes, in conjunction with Gutenberg-Richter distribution of magnitude frequency where the coefficient, called b-value, is also location dependent.

In this talk, I will show validation of large earthquake forecast in Japan inland and vicinity, California, and the global seismicity.