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# Analysis of sesimicity changes by a spatiotemporal point process model

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Regional occurrence rate of earthquakes is modeled as a function of previous activity, specific form of which is based on empirical aftershock laws in time and space such as the modified Omori formula and the Utsu-Seki scaling law of aftershock area against magnitude. Its parameters, including the p-value of the aftershock decay rate, vary from place to place. Those parameter functions of the location are estimated by maximizing the penalized log-likelihood function where the optimal weights of the penalty against the roughness of the parameter functions are determined by an objective Bayesian procedure. The estimated space-time model is used to visualize features of the regional seismic activities. Furthermore, this space-time model enables us to enhance the regions where the actual occurrence rates deviate systematically from the modeled one. That is to say, the activation and quiescence relative to the model's prediction could sensitively reveal the regional changes of stresses. These relative activation and lowering of the seismicity are of our concern to explore the regions matching the pattern of Coulomb stress changes due to a rupture or silent slip elsewhere. For example, such anomalies seen in the seismicity in the central Japan during 1995-1999 and during 2001 are respectively likely the consequence of the stress changes due to the 1995 Kobe rupture and the interplate aseismic slip during 2001 beneath the western Tokai region.