Seismicity models of moderate earthquakes in Kanto, Japan,utilizing b-value, its temporal change and the EEPAS rate

Masajiro Imoto[1]; David Rhoades[2]

[1] NIED; [2] GNS Science

We construct a single hazard function from multiple predictive parameters independently developed for moderate earthquakes in Kanto, Japan, during a learning period from 1990 - 1999, and applied to a testing period from 2000 - 2005. Here, we consider as predictive parameters the a- and b-values of the Gutenberg-Richter relation, change in b-value, and the Every Earthquake a Precursor According to Scale (EEPAS) model rate. Here we assume the EEPAS rate as a surrogate precursor. To study the correlations among the parameters, we prepare two groups of space-time coordinate sets for assessment, namely the background and conditional groups selected from the learning period. The conditional group contains some ten sets of space-time coordinates corresponding to the epicenters of the target earthquakes (M equal to and greater than 5.0) just before their times of occurrence. The background group contains ten thousand sets of random coordinates. Each parameter for the background group is transformed so that its distribution conforms to the standard Normal function. The mean and variance of the conditional distribution is then estimated after applying the same transformation to the conditional group. Using the means and variances of b-values, changes in b-value and EEPAS rates and the correlation matrices in the background and conditional distributions, we construct a combined hazard function following the procedure developed for normally distributed parameters. The information gain per event (IGpe) of the new hazard function is larger than that of the EEPAS rate for the learning and testing period, respectively.