Long-term predictability for the repeating earthquake with a few times recurrence using the BPT model

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Event numbers of sequential recurrent large/medium earthquakes listed in seismic catalog are not so many, because they occur at long intervals. So, the probability of the next earthquakes must be calculated with a small number of data. We are studying the predictability by the BPT model using the 126 sequence of small interplate repeating earthquakes along the Japan Trench, which were used for the experiment of prospective forecast in 2008. Calculation was carried out with a small number of events. Events data was taken out in order of proximity from the last earthquake, by three, four, five and five or more.
We use BPT model to calculate the probabilities and three other models for comparison,
(1) BPT-pin: BPT distribution model. The parameters: the mean recurrence intervals, the average value of each series; the coefficient of variation, the median (α=0.367) of the values calculated in five events for each series.
(2) LN-Bayes: Lognormal distribution model with Bayesian approach. Probability distribution of recurrence interval is given with inverse gamma prior distribution. The parameters of inverse gamma are shape, φ=0.25 and scale, ζ=0.44.
(3) LN-SST: Lognormal distribution model base on the small sample theory.
(4) EXP-pin: Exponential distribution model. The parameter plugged is the sample mean.
The "Mean log-likelihood" mentioned below are used to score the forecast results.
Mean log-likelihood (MLL): Average of Ev*ln (P) + (1-Ev)* ln (1-P)
Here P means forecast probability for event and Ev means presence (Ev=1) or absence (Ev=0) of the event. If the Mean log-likelihood is larger than those of the alternative, the model is considered to be superior to the alternative one.
In Figure 1 the forecasts by four models become worse surely as the number of preceding events is smaller. The BPT-pin model is inferior to the other three of the statistical model. When the three qualifying events, the score is poor in the Exp-pin model, and it is below the results of the probability of 0.5 (MLL=-0.693).

Keywords: Repeating earthquakes, forecast, BPT model, Mean log-likelihood