Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

SSS30-02 Room:106 Time:May 20 16:30-16:45

Numerical simulation to test and evaluate the forecast probabilities by BPT distribution model

Masami Okada[1*]

[1]Meteorological Research Institute, JMA

Numerical simulation was conducted to test and evaluate the performance of Brownian Passage Time (BPT) distribution model on the renewal process which is used by the Earthquake Research Committee of Japan (2001) to compute the probabilities for the forthcoming event in repeating earthquake sequence.

1000 sets consist of N random numbers corresponding to the interevent time following BPT distribution with parameters, the mean of 100 and coefficient of variation of 0.24 were compiled and 1000 random numbers larger than the elapsed time, Tp, since the last event to the forecast were collected from the same BPT population.

The probabilities for relevant event in the forecast period were computed by the BPT distribution model in which the two parameters are determined by the maximum likelihood method from each sequential N data, and they are compared with the hypothetical time interval between the last event and forthcoming one. Log-normal distribution model based on the small sample theory, LN-SST is also used to calculate the probabilities which are compared with those by the BPT distribution model.

In the case of N=4, Tp=75, and forecast period of 25, the probabilities distribute widely and ones larger than 0.99 appeared abnormally many times. Scores on the mean log-likelihood, MLL and Brier, BS are shown in following table which shows that LN-SST is superior to the BPT distribution model for small sample data.

N	Tp	period	PP	MLL	BS
4	50	25	0.135	-0.585(-0.443)	0.135(0.131)
4	75	25	0.475	-0.969(-0.789)	0.302(0.282)
4	100	40	0.862	-0.867(-0.530)	0.156(0.171)
7	50	25	0.135	-0.476(-0.434)	0.130(0.128)
7	75	25	0.475	-0.755(-0.734)	0.272(0.266)
7	100	40	0.862	-0.611(-0.498)	0.151(0.155)

The N: number of interval data, Tp: elapsed time from the last event to forecast, period: forecast length, and PP: probability calculated from BPT population.

MLL and BS are calculated by the BPT distribution model and those by LN-SST are listed in the parentheses.

Keywords: repeating earthquake, earthquake forecast, BPT distribution, numerical simulation, Bayesian approach, log-normal distribution