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HDS024-01 Room: Exibition hall 7 subroom 1 Time: May 26 15:30-15:45

A Bayesian predictor of recurrent earthquakes based on BPT model with slip data

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Figure 1: Relation between mean recurrence interval from slip data and each recurrence interval

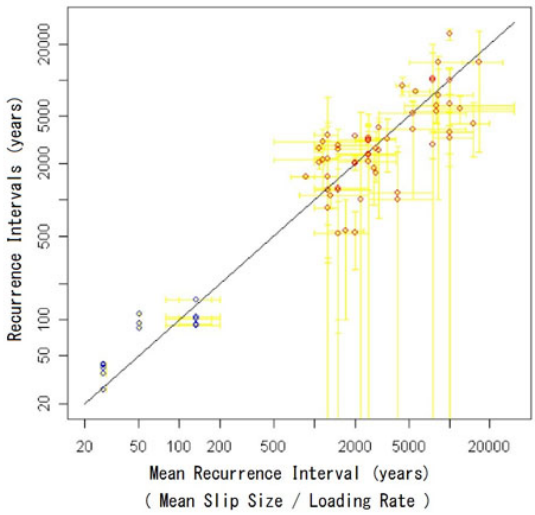


Figure 2: Distribution map of active faults in Japan

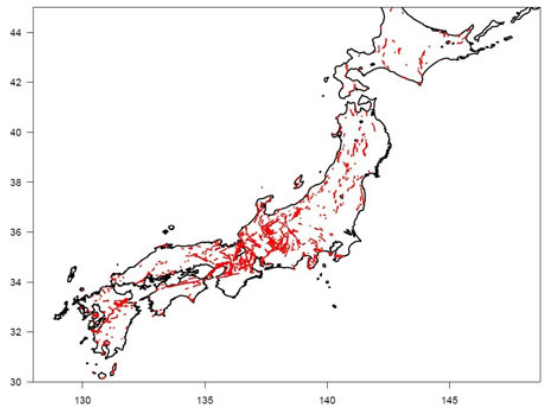
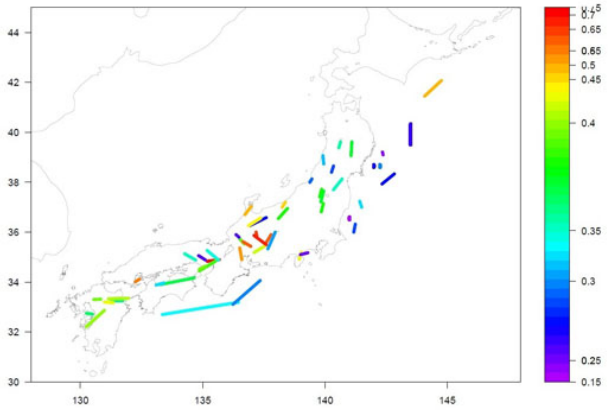


Figure 3: Distribution map of the estimate of variation coefficient of each fault



This paper is concerned with the probability forecast by the Brownian Passage Time (BPT) model especially in case where only one or a few records of recurrent earthquakes from an active fault are available. We adopt the Bayesian predictive distribution that takes the relevant prior information into account. This provides a stable and better predictive performance than the plug-in predictors by the maximum likelihood estimates (MLE) that include the predictor currently adopted by the Earthquake Research Committee (ERC) of Japan. We model the BPT distribution by scaling a recurrence time interval which takes various orders. We then make use of the best fitted prior distribution for the BPT variation coefficient (the shape parameter) relative to the mean recurrence time, while the ERC uses the same common value 0.24 for this coefficient that was confirmed by means of the Akaike information criterion (AIC).
In this paper, the prior distribution is objectively selected by the Akaike Bayesian information criterion (ABIC) using all available datasets of the recurrence times from all fault segments listed

in the tables including the ERC datasets. Here, some such datasets also include the mean recurrence times obtained from the pairs of slip-size and deformation (loading) rate from the fault segments. We conduct the numerical experiments to compare the performance of the Bayesian predictors with the conventional MLE plug-in predictors. Also, we compare the predicted probabilities with those given by the ERC and make diagnostic discussions for a couple of particular cases where the difference of the forecasts is large.

Keywords: long-term evaluation of earthquake, BPT distribution, Bayesian predictor,
slip data of active fault, variation coefficient