



A prospective earthquake forecast experiment for Japan

Sayoko Yokoi (1), Kazuyoshi Nanjo (2), Hiroshi Tsuruoka (1), and Naoshi Hirata (1)

(1) Earthquake Research Institute, The University of Tokyo, (2) NKSJ Risk Management

One major focus of the current Japanese earthquake prediction research program (2009-2013) is to move toward creating testable earthquake forecast models. For this purpose we started an experiment of forecasting earthquake activity in Japan under the framework of the Collaboratory for the Study of Earthquake Predictability (CSEP) through an international collaboration. We established the CSEP Testing Centre, an infrastructure to encourage researchers to develop testable models for Japan, and to conduct verifiable prospective tests of their model performance.

On 1 November in 2009, we started the 1st earthquake forecast testing experiment for the Japan area. We use the unified JMA catalogue compiled by the Japan Meteorological Agency as authorized catalogue. The experiment consists of 12 categories, with 4 testing classes with different time spans (1 day, 3 months, 1 year, and 3 years) and 3 testing regions called All Japan, Mainland, and Kanto. A total of 91 models were submitted to CSEP-Japan, and are evaluated with the CSEP official suite of tests about forecast performance. In this presentation, we show the results of the experiment of the 3-month testing class for 5 rounds. HIST-ETAS7pa, MARFS and RI10K models corresponding to the All Japan, Mainland and Kanto regions showed the best score based on the total log-likelihood. It is also clarified that time dependency of model parameters is no effective factor to pass the CSEP consistency tests for the 3-month testing class in all regions. Especially, spatial distribution in the All Japan region was too difficult to pass consistency test due to multiple events at a bin. Number of target events for a round in the Mainland region tended to be smaller than model's expectation during all rounds, which resulted in rejections of consistency test because of overestimation. In the Kanto region, pass ratios of consistency tests in each model showed more than 80%, which was associated with good balanced forecasting of event number and spatial distribution. Due to the multiple rounds of the experiment, we are now understanding the stability of models, robustness of model selection and earthquake predictability in each region beyond stochastic fluctuations of seismicity.

We plan to use the results for design of 3 dimensional earthquake forecasting model in Kanto region, which is supported by the special project for reducing vulnerability for urban mega earthquake disasters from Ministry of Education, Culture, Sports and Technology of Japan.