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An earthquake forecast experiment in the northwest Pacific using RI model

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The Collaboratory for the Study of Earthquake Predictability (CSEP) has been conducting a prospective earthquake forecast experiment in the northwest Pacific from 2009. This test region includes 2011 Tohoku Earthquake, So, it is very important to evaluate testing results before and after this event. The northwest Pacific test region covers the longitude rand between 109.75 and 170.25 and then latitude range between -0.25 and 60.25. This region is gridded into cells of 0.5° by 0.5° and depth $H <= 70.0$ km is considered (Eberhard et al., GJI 2012). Forecast models define earthquake rates for each magnitude bin in magnitude range $6.0 <= M <= 9.0$ (0.1 magnitude unit steps) at each node for consecutive 1-year time windows. The first forecast time stars at 1st JAN 2009. The GCMT catalogue was used for both model building and evaluation. CSEP testing centers (also CSEP-Japan) now use various tests to determine which models fit the observed data and which models forecast the distribution of seismicity best. For this study, we used the consistency tests of N, L, CL, S-tests developed by CSEP. For model comparison, we used the L-test's log likelihood. For this study, relative intensity (RI) model was used to get earthquake forecasts. We evaluated the test results of smoothing radii of RI models of 50km, 75km, 100km, 150km, 200km, 300km, 400km, 500km and 1000km. We summarize the testing results as follows. (1) For 2009-2010 and 2010-2011 forecasts, All RI models passed all consistency tests. (2) For 2011-2012 forecasts, All RI models passed S and CL tests. (3) Uniform model didn't pass S-test for all 3 rounds. (4) Comparing log likelihood, the RI model with the smoothing radii of 150 km showed the best performance of forecast in all 3 rounds.

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