SECOND EUROPEAN CONFERENCE ON EARTHQUAKE ENGINEERING
AND SEISMOLOGY, ISTANBUL AUG. 25-29, 2014

FORECASTING TURKEY SEISMICITY BY USING THE MEAN RATIO METHOD

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Abstract. The recently introduced alarm-based forecasting model for earthquakes, called moment ratio (MR) model is tested on Turkey seismicity. This model uses the ratio of the mean inter-event time over the variance as a precursory alarm function to forecast future earthquakes in a given region. In a former study, this model was successfully tested in forecasting large earthquakes with magnitude $M \geq 7$, occurred in Japan. In this study, the MR model is tested on target earthquakes with different magnitude thresholds $M \geq 5$, $M \geq 6$ and $M \geq 7$. For this purpose, a composite earthquake data file is compiled using the National Earthquake Monitoring Centre (NEMC) of Kandilli Observatory for the period 1900-2013 and the SHARE European Earthquake Catalogue (SHEEC) for the historical period 1000-1900. Different time periods used in training and testing are selected by taking into consideration the completeness of the magnitude. Molchan error diagrams are used to evaluate the forecasting performance of the MR method in a series of retrospective tests applied at short, intermediate and long-term. MR forecasting maps minimizing miss and alarm rates are constructed to evaluate the forecasting performance of the MR method in practice. Preliminary results show that MR model forecasts show good performance comparing to the relative intensity (RI) method, especially when different free parameters which control fluctuations in inter-event time statistics are tuned. In particular, the minimal inter-event time sample size used to calculate the moment ratio and the size of inter-event time sampling should be carefully selected to cut high fluctuations in inter-event time data. Finally, the impact of the MR forecasts on seismic hazard in the study region is discussed.

Keywords Earthquake forecasting · Inter-event times · Alarm function · Molchan diagram

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