Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)
©2012. Japan Geoscience Union. All Rights Reserved.

SSS01-04 Room:104 Time:May 25 09:45-10:00

Inter-event Time Maps to Predict Earthquakes

TALBI, Abdelhak[1*], NANJO, Kazuyoshi[1], SATAKE, Kenji[1], ZHUANG, Jiancang[3], Mohamed Hamdache[2]

[1]Earthquake Research Institute, University of Tokyo, [2]Centre de Recherche en Astronomie Astrophysique et Geophysique (CRAAG), [3]Institute of Statistical Mathematics (ISM)

Abstract. This study discusses the use of inter-event time spatial mapping as a tool to provide forecast for large earthquakes. The ratio of the mean inter-event time over the variance, called moments ratio (MR), is used as a precursory alarm function. The statistic MR has been proved to be an approximation of the percentage of background events present in the whole catalog. As a result, MR is supposed to depict long term changes in the background seismicity with a potential to detect precursory signals before the occurrence of large events. In order to test the forecasting performance of MR, a composite catalog covering all Japan within the period 679-2011, was compiled using the Japan Meteorological Agency (JMA) catalog for the period 1923-2011 and the Utsu historical seismicity records for the period 679-1922. Our study selects the time period by taking into account the completeness of the magnitude. For example, for target earthquakes with magnitude $M >= 7$, we test the forecasting within the longest time period for which all target events are completely reported. In a retrospective test of $M >= 7$ target earthquakes, MR is spatially mapped for different learning time periods before the occurrence of target earthquakes. The start of the learning period is defined for each target earthquake depending on the magnitude of learning events and the catalog completeness, whereas it ends a short time before the occurrence of the target event. The forecasting ability of MR is discussed using the relative operating characteristic (ROC) error diagrams which plot successful hits against false alarms. In addition, Molchan error and area skill score diagrams are used to evaluate the quality of forecasting in space and time. The preliminary results show good performance when the relative intensity (RI) forecasting method is used as a reference model.

Keywords: Earthquake prediction, Inter-event times, Alarm function, Molchan error diagrams