

Application of pattern recognition algorithm in the seismic belts of Indian convergent plate margins – M8 algorithm

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Abstract. The seismicity associated with the convergence of the Indian and Eurasian plates, from 1964 to August 1990 was scanned using the M8 algorithm with a view to identify the times of increased probabilities (TIPs) of the earthquakes of magnitudes greater or equal to 6.4 that occurred during the period from 1970 to August 1990. 23 out of 28 earthquakes ($M \geq 6.4$) have been predicted. These were preceded by specific activation of the earthquake flow which was picked up by the M8 algorithm. The earthquake of August 1988 in the Himalaya could not be predicted, the other four unpredictable earthquakes occurred in the early dates of the catalogue (1970–1971) and hence their TIPs could not be diagnosed. Two current alarms are diagnosed, one in the Indo-Burmese arc and the other in the Hindukush-Pamir region.

The algorithm provides the correlation between the earthquakes and their area of activation (both in time as well as in space) which, when compared with the local geology, may help to comment on the present day status of the seismic features on the surface.

Keywords. Intermediate term prediction; M8 algorithm; pattern recognition; times of increased probability.

1. Introduction

The Himalayan mountain chain runs unbroken for a distance of about 2400 kms and joins the Indo-Burmese mountains in the east and Hindukush-Pamir in the northwest. This chain is inhabited by many earthquakes due to the process of underthrusting of the Indian plate beneath the Eurasian plate (figure 1). There are atleast four major earthquakes ($M \geq 8$) which occurred during the past 100 years. To mitigate the seismic risk due to future earthquakes of this seismic belt, there is a need to develop a prediction method from the available data.

After the successful application of algorithm M8 in different seismic regions of the world (Keilis-Borok and Kosobokov 1990 and Gabriellov *et al* 1986), an attempt has been made to apply the algorithm in the seismic belts of the Indian convergent plate margin with the hope of diagnosing precursors which may help to predict the next pending earthquake ($M \geq 6.4$, magnitude here referred is common maximum) in the region. For this purpose, the NEIC catalogue from 1964 to August 1990 is used to find out the TIPs before the earthquakes ($M \geq 6.4$) which occurred after 1970 (table 1). The aftershocks were removed using the time and space windows given by