

Earthquale Dynamics in Major Tectonic Zones of Himalayas using the Non-Linear Forecasting Approach

R. K. Tiwari* and S. Sri Lakshmi

National Geophysical Research Institute Hyderabad (INDIA) - 500 007 *E-mail: rk_tiwari3@rediffmail.com

Northeast, Western and Central Himalayas distinctly differ in their tectonic activities. The characterization of dynamical pattern is central for understanding the appropriate models for seismic hazard analysis in such critical tectonic regions. We examine here the temporal evolution of seismicity $(M \ge 4)$ of the Central Himalaya (CH), Western Himalaya (WH) and Northeast Himalayas (NEH) for the period of 1960-2003 using the modern nonlinear forecasting scheme to decipher the comparative determinism of underlying dynamical patterns, which may yield insight into earthquake processes. The non-linear analyses of monthly resolution earthquake frequency time series suggest that earthquake processes in all three regions evolved on a high dimensional stochastic/chaotic plane, however, with a contrasting predictive pattern. The predictive correlation analysis suggests that the available earthquake data of the NEH and WH can be predicted by more than 40%-50% where as the CH data only by 0%-30% implying that the earthquake dynamics in the NEH and WH are better "organized" than in the central region. The significant distinction in the earthquake dynamical patterns seems to be associated with the underlying seismo-tectonics of these three regions. These results may place significant constraints for developing criteria for testing the models of Himalayan earthquakes on a more rigorous and quantitative basis.

Keywords: Chaos, K_2 Entropy, Northeast, Western & Central Himalayan seismicity, Non-linear forecasting, Seasonality bias.