# Study of Earthquake Dynamics in Major Tectonic Zones of Himalayas – A Nonlinear Forecasting Approach

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The mega tectonic units of Himalayas comprising, the Northeast Himalayas (NEH), Central Himalayas (CH) and Western Himalayas (WH) are considered to be one of the most seismically active regions of the world. The earthquake processes occurring in these regions are very complex and exhibit mixed responses having stochastic and chaotic/deterministic and random behavior. The characterization of the nature of dynamical behaviors in these regions is therefore quite important for the purpose of constraining the models and hence for predictions. In this study, the modern nonlinear forecasting schemes are applied to characterize distinctive patterns from earthquake frequency time series. The temporal evolution of seismicity (magnitude $\geq$ 4) of the CH, WH and NEH for the period of 1960-2003 are analyzed which reveal that the earthquake processes in all three regions evolved on a high dimensional chaotic plane, however, with a contrasting prognostic pattern. In particular, the predictive correlation analysis suggests 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 place significant constraints for developing criteria for testing the models of Himalayan earthquakes on a more rigorous and quantitative basis.

Keywords: Nonlinear forecasting analysis, NEI, Western & central Himalayan seismicity, Non-linear characteristics.