

## **NUMERICAL TOOLS FOR THE ISOLATION OF EARTHQUAKE PRECURSORS IN ELECTRICAL / ELECTROMAGNETIC TIME SERIES**

B. R. ARORA, Gautam Rawat

Wadia Institute of Himalayan Geology, Dehradun, INDIA, arorabr@wihg.res.in

The search for earthquake precursors, which can be used towards successful prediction of catastrophic earthquakes, has been a challenging issue. The intensive monitoring in several seismic zones of the world have indicated number of seismic and other geophysical precursors including electrical resistivity and magnetization changes. There are some success stories of definite precursory changes prior to several moderate to large earthquakes but their prognostic values are still skeptical due to lack of sound theory which can explain the presence of precursors in certain cases and their absence in many other cases. The laboratory based dilatancy-diffusion model tends to provide the physical mechanism for such precursory changes. Given the optimism provided by dilatancy-diffusion model, phases of earthquake cycle is expected to produce precursory changes in number of geophysical parameters at well-defined simultaneous measurements of multi-interdisciplinary data like seismic, geophysical, electrical, magnetic and electromagnetic parameter has now been well recognized. Given this rationales, WIHG has established the first Indian Multi-Parametric Geophysical Observatory (MPGO) in central Himalaya which has been shown to be critically stressed to produce great earthquakes. The observatory is equipped with superconductivity gravimeter, magnetotelluric, overhauser magnetometer, triaxial fluxgate, ULF bands search coil magnetometers, besides the radon data logger, water level recorder and network of broad band seismometers and GPS. Despite the high precision of most modern equipments, isolation of stress induced perturbations continues to be a challenging issue. Present paper shall highlight the importance of fractal, principal component analysis as well as data adopted techniques of wavelet transform to isolate inter-planetary / terrestrial induced changes from tectonic perturbations. The presentation shall demonstrate the efficacy of these methods in identifying local perturbations in magnetization / resistivity changes associated with moderate earthquakes.

earthquake precursor, earthquake cycle, MPGO

B.R.Arora, Wadia Institute of Himalayan Geology, 33 GMS Road Dehradun-248001, India,  
Telephone-91-135-2525103 fax: 91-135-2525200/2625212