NATURAL TIME ANALYSIS AS A TOOL FOR SHORT-TERM EARTHQUAKE PREDICTION

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Seismicity as a critical phenomenon has been actively discussed by many authors (e.g., Bak and Tang, 1989; Turcotte, 1997; Sornette, 2000; Rundle et al., 2003; Keilis-Borok and Soloviev, 2003). It has been shown that seismic electric signals (SES) and EQs reveal dynamic evolution characteristic to critical stage when their time series is analyzed in the framework of natural time introduced by the Varotsos' group (e. g., Varotsos, 2005;). Seismicity and geoelectric potential changes, possibly associated with the seismic swarm activity in 2000 in the Izu Island region, Japan, were analyzed in the framework of the natural time χ, which is an index of the k th event $\chi = k/N$, where N is the total number of events (Uyeda et al., 2009). The Izu 2000 swarm activity lasted for about 2 months with some 7000 shocks with magnitude M≤3 and five M≤6 shocks, and was preceded by a pronounced electrical activity with innumerable signals that started 2 months prior to the swarm onset. It is shown, first, that the seismicity subsequent to the electrical activity approaches a critical stage a few days before the occurrence of the first M≤6 shock and, second, that the electrical signals also have the properties characteristic to the critical stage. Despite the big differences in time scale and numbers of electric signals and earthquakes, these features are similar to those in Greece.
Furthermore, we investigate whether the above properties of seismicity were found also before 1995 Kobe earthquake, by using only seismic catalog without using SES data. When computations were started several months before the main shock, several true coincidences appeared approximately one month before the earthquake.

Seismic Electric Signals, Natural time, Earthquake Prediction

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