Short-Term Prediction of Medium- and Large-Size Earthquakes Based on Markov and Extended Self–Similarity Analysis of Seismic Data

M. R. RahimiTabar(1,2), **F. Ghasemi** (3), M. Sahimi(4), J. Pienke(5)

(1)Department of Physics, Sharif University of Technology,P.O. Box 11365-9161, Tehran, Iran, (2) CNRS UMR 6202,Observatoire de laCôte d'Azur, BP 4229, 06304 Nice Cedex 4, France, (3)The Max Planck Institute for the Physics of Complex Systems,Nöthnitzer Strasse 38, 01187 Dresden, Germany, (4)Department of Chemical Engineering and Material Science, University of Southern California Los Angeles, CA 90089, USA, (5)Carl von Ossietzky University,Institute of Physics, D-26111 Oldendurg,Germany

We propose a novel method for analyzing precursory seismic data before an earthquake that treats them as a Markov process and distinguishes the background noise from real fluctuations due to an earthquake. A short time (on the order of several hours) before an earthquake the Markov time scale t_M increases sharply, hence providing an alarm for an impending earthquake. To distinguish a false alarm from a reliable one, we compute a second quantity, T_1, based on the concept of extended self-similarity of the data. T_1 also changes strongly before an earthquake occurs. An alarm is accepted if *both* t_M and T_1 indicate it *simultaneously*. Calibrating the method with the data for one region provides a tool for predicting an impending earthquake within that region.