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

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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 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.