Geophysical Research Abstracts, Vol. 7, 04257, 2005
SRef-ID: 1607-7962/gra/EGU05-A-04257

What can we learn with wavelets about pre-seismic electromagnetic sequences?

N. Alexiou (1), A. Samiotakis (1), **G. Balasis** (1), P. Kapiris (1) and K. Eftaxias (1)
(1) Department of Physics, University of Athens, Panepistimiopolis, Zografos 157 84, Greece

We focus on the following fundamental questions (unanswered yet) that scientists in this field ought to address are as follows: (i) Is there a possible way of quantifying the distance from the global failure? (ii) Is the evolution towards global failure unavoidable after the appearance of distinguishing features in pre-seismic electromagnetic (EM) time series? Herein we attempt to put forward physically powerful arguments with regard to the aforementioned basic questions. For this purpose, we use a wavelet based fractal analysis to explore the existence, the nature and the origin of long-range correlations in preseismic electromagnetic signals. An interesting characteristic of the VLF-VHF precursors is the systematically observed EM quiescence at all frequency bands before the earthquake. The EM quiescence at all sensors and frequencies could give a hint of a considerable probability for a forthcoming earthquake. We concentrate on this phenomenon. We attempt to explain this effect based on a model for the micro-fracture of granular media which consists of rigid grains separated by interstices filled with a brittle elastic material; this model assumes a Gaussian distribution of variance of the elastic properties of the brittle elastic material. We also suggest that the reported EM quiescence can be explained in terms of a catastrophic decrease in the elastic modulus close to mechanical percolation threshold. The ‘‘electromagnetic Kaise" effect is described as the absence of detectable electromagnetic events until the load imposed on the material exceeds the previous applied level. This phenomenon could also explain the systematically reported EM quiescence.