MODEL OF PRE-SEISMIC ELECTROMAGNETIC EMISSIONS IN TERMS OF FRACTAL-ELECTRODYNAMICS

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We introduce a new model of the generation of pre-seismic electromagnetic emissions (EME). Accumulated evidence indicates that the earthquake (EQ) can be viewed as a critical phenomenon culminating in a large event that corresponds to a kind of critical point. The principle feature of criticality is the fractal organisation both in space and time. EQs display a complex spatio-temporal behaviour: in addition to the regularity in the rate of occurrence (Gutenberg-Richter law, Omori law), the spatial distribution of epicentres is fractal and EQs occur on a fractal structure of faults. Thus, the hypothesis that the fault develops as a fractal is reasonable. A mounting body of laboratory evidence suggests that micro-fracturing of rocks are associated with the appearance of spontaneous charge production and transient EME. The emitting, diffusing and recombination charge accompanying the micro fracturing, can act as current generation during crack opening. In this view, an active crack, a rupture, can be simulated in terms of a "radiating element". The idea is that a fractal geo-antenna (FGA) can be formed as an array of line elements having a fractal distribution on ground surface. We test this idea in terms of the Fractal Electrodynamics: we argue that the precursory VLF-VHF EM signals associated with recent EQs in Greece are governed by characteristics (e.g. scaling laws, temporal evolution of the spectrum content, broad band spectrum region, accelerating emission rate) predicted by Fractal Electrodynamics.