



Are there credible earthquake electromagnetic precursors?

Konstantinos Eftaxias (1), Georgios Balasis (2), Yiannis Contoyiannis (1), Maria Kalimeri (1), Constantinos Papadimitriou (1), Labrini Athanasopoulou (1), John Kopanas (1), and George Antonopoulos (1)

(1) University of Athens, Faculty of Physics, Department of Solid State Physics, Athens, Greece (ceftax@phys.uoa.gr, +30 210 727 6733), (2) National Observatory of Athens, Institute for Space Applications and Remote Sensing, Athens, Greece

Ultra low frequency-ULF (1 Hz or lower), kHz and MHz electromagnetic (EM) anomalies were recorded prior to the L'Aquila catastrophic earthquake (EQ) that occurred on April 6, 2009. The detected anomalies followed this temporal scheme. (i) The MHz EM anomalies were detected on March 26, 2009 and April 2, 2009. The kHz EM anomalies were emerged on April 4, 2009. The ULF EM anomaly was continuously recorded from March 29, 2009 up to April 2, 2009. Are EQs predictable is a question hotly debated in the science community. Its answer begs for another question: Are there credible EQ precursors? Despite fairly abundant circumstantial evidence pre-seismic EM signals have not been adequately accepted as real physical quantities. Therefore, the question effortlessly arises as to whether the observed anomalies before the L'Aquila EQ were seismogenic or not. The main goal of this work is to provide some insight into this issue. More precisely, the main aims of this contribution are threefold: (i) How can we recognize an EM observation as pre-seismic one? We wonder whether necessary and sufficient criteria have been established that permit the characterization of an EM observation as a precursor. (ii) How can we link an individual EM precursor with a distinctive stage of the EQ preparation process? (iii) How can we identify precursory symptoms in an individual EM precursor that indicate that the occurrence of the EQ is unavoidable? We emphasize that we attempt to specify not only whether or not a single EM anomaly is pre-seismic in itself, but mainly whether a combination of emergent ULF, MHz and kHz EM anomalies could be characterized as pre-earthquake.