

Interactive comment on “Pre-earthquake magnetic pulses” by J. Scoville et al.

Anonymous Referee #2

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The work entitled “Pre-earthquake Magnetic Pulses” by J. Scoville, J. Heraud, and F. Freund is a very interesting paper that deserves our attention and publication in NHESS after some modification that will increase the impact of the work. In their work the authors present a semiconductor model of rocks to describe unipolar magnetic pulses, a phenomenon that has been observed prior to earthquakes. As in many other works of the group and in agreement with similar approach presented in Greece (see the works of Varotsos et al., and Vallianatos et al.,) they proposed that these pulses are generated deep in the Earth’s crust, in and around the Hypocentral volume, days or even weeks before Earthquakes. According to model originally presented by Freund, these unidirectional currents are expected to produce transient unipolar magnetic pulses similar in form, amplitude, and duration to those observed before earthquakes, and this suggests that the pulses could be the result of geophysical semiconductor processes. As a general comment I propose that all the discussion on the work of Dahlgren eta

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al., (BSSA, 2014) to be included in the present work since will give a broad view to the reader to compare the results and will help the scientific community to validate laboratory experiments and field observations. I strongly suggest that this will increase the impact of the work Some additional points that have to be addressed are: 1. Page 7369, line 23. Please give more details on the statement “The incidence of these pulses increased as the day of the earthquake approached”. 2. Please correct the order between Fig.1 and Fig.2 , as appeared in the text. 3. Page 7372, line 2. What 5m-7 means ? 4. Page 7372, line 10. Explain with some more detail the space time domain $\Omega \times (0, T)$. Some more information on the analysis is required 5. Page 7375, line 20. Please explain the surface equation 6. Page 7375, line 23. Give some evidence on the attenuation of the magnetic field, to convince that “not considering” it is reliable. 7. Give some comment on the fact that magnetic field is not observed in most of the cases of SES presents by Varotsos VAN method (The Physics of Seismic Electric Signal , TERRAPUB, Tokyo, 2005) 8) Give some comment on the fact that similar result is presents using the “dislocation model” as presented in a) F. Vallianatos, D. Triantis, A. Tzanis, C. Anastasiadis and I. Stavrakas, [Electric earthquake precursors: from laboratory results to field observations”, Physics & Chemistry of the Earth, 29, 339-351, 2004] b) Í. Tzanis and F. Vallianatos, [A physical model of electrical earthquake precursors due to crack propagation and the motion of charged edge dislocations, Seismo Electromagnetics (Lithosphere-Atmosphere-Ionosphere Coupling), TERRAPUB, 2002], c) F. Vallianatos and A. Tzanis, [A model for the generation of precursory electric and magnetic fields associated with the deformation rate of the earthquake focus, in M. Hayakawa (ed.), Seismic Atmospheric & Ionospheric electromagnetic Phenomena, Terra Scientific Publishing Co., Tokyo, Feb., 1999], and d) A Tzanis and F. Vallianatos, [A critical review of ULF electric earthquake precursors] Annali di Geofisica, 44/2, 429-460, 2001]

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