A review and upgrade of the lithospheric dynamics in context of the seismo-electromagnetic theory

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This publication highlights theoretical work that could explain five different empirical observations indicating a direct relationship between magnetic fields and earthquakes, which would allow the description of a causal mechanism prior to and during the occurrence of earthquakes. These theoretical calculations seek to elucidate the role of the magnetic field in different aspects of solid Earth dynamics, with an interest in the study and comprehension of the physics that could generate earthquakes accompanied by simultaneous magnetic signals within the lithosphere. The motion of charged edge dislocations (MCD) model and its correlation with the magnetic field have been used in order to include the generation of electric currents. The electric currents resulting from stress variation in the lithosphere help us to analyze the lithosphere as a critical system, before and after the occurrence of earthquakes, by using the concept of earthquake entropy. Where it is found that the nonexistence of seismic and magnetic precursors could be interpreted as a violation of the second law of thermodynamics. In addition, the seismic moment and the moment magnitude of some great earthquakes are quite accurately calculated using the coseismic magnetic field. The distance-dependent coseismic magnetic field has been theorized for some of the largest recorded earthquakes. The frequency of oscillation of the Earth's magnetic field that could be associated with earthquakes is calculated and is consistent with the ultra-low-frequency (ULF) signals that some authors propose in the so-called "LAIC effect" (lithosphere-atmosphere-ionosphere coupling). Finally, the location and dimensions of the microcracks that explain some anomalous magnetic measurements are shown.