



Possibility of coupling the magnetosphere–ionosphere during the time of earthquakes

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In this work we attempt to quantify and investigate the causes of earthquakes using the magnetic signal and hence to predict. We proceed several trails to quantify forces using Sq-variation currents in the Earth's lithosphere and the electromagnetic induction prevailed in the ionosphere at the time of earthquakes. The deep sources of magnetic field prevailed in the Lithosphere has been investigated using the magnetic jerks. Also, the relationship between the applied stress and the corresponding variation in the remanent magnetization has been investigated for rock samples collected along active tectonic zones, while the electromagnetic variations prevailed in the ionosphere were studied using Kp index with respect to the earthquake occurrences.

The results show that correlation between the variations in the magnetic field and the tectonic activities has been approved along the diurnal and long term variations. The cross-correlation coefficients (PCC) factors between the correlated data sets are ranging between 0.813 and 0.94 indicating strong linear relationship. We concluded that we can trace a noticeable magnetic signal during the 24 before earthquake events. We determine the occurrence times of geomagnetic impulses (jerks) at the time of earthquakes. We show a direct relation between the stress and the remanent magnetization confirming the additional magnetic values (ΔH) that is added to the main magnetic field. Also analysis of the Kp and the variations of geomagnetic background (perturbations) shows the possibility of the coupling interaction process between the magnetosphere-ionosphere during the time of earthquake. In fact, by analyzing the modulation of solar activity taking as reference the change in density of the solar wind, was verified that M6+ global seismic activity is influenced by the variations of the density of the solar wind.

Key words: Sq variations, earthquakes, magnetic jerks, Seismic Geomagnetic Precursor (SGP), Interplanetary Seismic Precursor (ISP).