



DEMETER observations of electromagnetic perturbations connected with seismic activity

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We present a statistical study of intensity of VLF electromagnetic waves observed in the vicinity of earthquakes. A unique set of data obtained by the French micro-satellite DEMETER and a robust two-step data processing is used. In the first step, we use all the measured data to construct a map of electromagnetic emissions, which contains a statistical description of wave intensity at a given point of the satellite orbit under given conditions. In the second step, we analyze the wave intensity measured close to earthquakes using the expected values of intensity obtained in the first step. We investigate changes of wave intensity caused by seismic activity and evaluate their statistical significance.

We have processed more than 2.5 years of satellite data and earthquakes with magnitude larger than 4.8 that occurred all over the world during the analyzed period are included in the study. It is shown that there is a statistically significant correlation between the wave intensity measured onboard the satellite and seismic activity. We study the observed intensity variations in detail, looking for the most favorable natural conditions (Kp index, magnetic local time) and earthquake properties (magnitude, depth) to observe the phenomenon. Frequency spectrum, dimensions and shape of the affected area are thoroughly discussed.