

Statistical study on variations of the ionospheric ion density observed by DEMETER and related to seismic activities

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In this paper, we present the result of a statistical study performed on the ionospheric ion density variations above areas of seismic activity. The ion density was observed by the low altitude satellite DEMETER between 2004 and 2010. In the statistical analysis a superposed epoch method is used where the observed ionospheric ion density close to the epicenters both in space and in time is compared to background values recorded at the same location and in the same conditions. Data associated with aftershocks have been carefully removed from the database to prevent spurious effects on the statistics. It is shown that, during night time, anomalous ionospheric perturbations related to earthquakes with magnitudes larger than 5 are evidenced. These perturbations are small, just larger than one σ , but real. They occur up to 200 km from the epicenters, and mainly 5 days before the earthquakes. As expected, a ion density perturbation occurring just after the earthquakes and close to the epicenters is also evidenced.

Keywords: seismic, a superposed epoch method, ionospheric perturbations