



Automatic detection and recognition of plasma waves and statistical analysis of ionospheric effects of seismic activity

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The search for ionospheric disturbances and plasma wave emissions associated with seismic activity has been the subject of a number of studies during the last decade. While atmospheric waves generated by the main shock and propagating to high altitude offer a likely physical mechanism for some of the post-seismic effects in the ionosphere, the possible occurrence of disturbances during the preparatory phase of earthquakes and their interpretation are still the subjects of considerable debate.

Using measurements of the electric components of plasma waves in the ELF/VLF ranges provided by the ICE instrument onboard DEMETER, a detailed data analysis is performed to characterize the main features of the natural emissions observed in the vicinity of seismic regions. This analysis allows to sort out several classes of plasma waves that differ by the physical mechanism at their origin and/or the propagation characteristics. Although electromagnetic interferences are maintained to a very low level, a particular attention is paid to detect them and suppress their effects. The parameters from the signal analysis of the classified plasma waves are used to perform a statistical study and to search for possible correlations with seismic activity. One of our first objectives is to search for possible pre-seismic effects since they are the less understood phenomena. To this aim, from the earthquake database, the cases with the main shock preceded by a quiet period more than 5 days long are sorted out and categorized as opposed to the more usual cases with preceding earthquakes of smaller magnitude. This study has been conducted for seismic events with magnitudes larger than 5.5 leaving a relatively reduced database for the first category of events. First results will be presented to exemplify the base line situation in absence of seismic activity and the differences that are observed in the two categories of seismic events.