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An automated analysis of DEMETER ionospheric plasma waves observations and its application to the search for anomalous emissions over the Great Sichuan EQ region

Tatsuo ONISHI and Jean-Jacques BERTHELIER
LATMOS/IPSL, St-Maur-des-Fosses, France (tatsuo.onishi@latmos.ipsl.fr)

Electric field observations in the VLF range from the ICE experiment onboard the CNES DEMETER micro-satellite have been analyzed to search for anomalies possibly related to the Great Sichuan Earthquake of May 12, 2008. This work was undertaken using results from a dedicated data processing that has been recently developed at LATMOS to perform an automated recognition and characterization of the various wave emissions that are regularly detected along the orbit of DEMETER. The data processing method and the associated algorithms will be first presented and a few typical results will be shown in order to provide a detailed understanding of the algorithm capabilities. As a first full-scale application of this method, a statistical study was conducted to analyze the plasma waves observed in day-time half orbits over a region of $\sim$1000 kilometres extent centred on the Sichuan EQ epicentre and during a period of 20 days encompassing the day of the EQ. 5 years of observations have been used to derive the statistical distribution of various types of ionospheric plasma waves that can be compared to the signals detected during the seismic active period. The first outcome of our study was the detection of a localized variation in the characteristics of the electrostatic turbulence 6 days before the EQ that appears to be unique in the whole 5 year reference observations data base. We will discuss this result and its possible interpretations.