



HF signature of powerful lightning recorded by DEMETER

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The paper is related to HF emissions observed at the time of powerful lightning by the low altitude satellite DEMETER. At its altitude (~ 700 km), the phenomena observed on the E-field spectrograms recorded during night time by the satellite are mainly dominated by sferics and whistlers. During thirty months, 130 events with HF emissions at frequency ~ 2 MHz have been observed at the time of intense sferics. A map of these events indicates that they do not occur above regions of intense thunderstorm activity as the upper part of South America or the middle Africa. It is shown that this lack of occurrence above these two regions is due to the high value of the critical frequency of the F layer which prevents the propagation of the lightning pulses up to the altitude of the satellite. The characteristics of the lightning discharges related to some HF events have been determined above the North American region with the National Lightning Detection Network (NLDN). It gives time, location, intensity and sense of the lightning discharges. As most of the events are recorded when full resolution of the data is not available, the neural network onboard DEMETER have been used. This neural network gives the times of the sferics and the whistlers recorded by the satellite with a time accuracy of ~ 0.2 second. It is shown that the HF events correspond to intense lightning discharges occurring in close vicinity below the satellite.