



Electrostatic emissions observed by CLUSTER/WHISPER experiment in the outer plasmasphere near the equator: Study of two case events.

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Several kinds of natural electrostatic emissions are observed in the outer plasmasphere (Christiansen et al 1978, Olsen et al 1987), in particular emissions near half harmonics of the electron gyro-frequency which have been recorded for the first time by OGO5 (Kennel et al 1976), but also Bernstein waves structured in series of spots placed inside harmonics bands of the electron gyro-frequency.

The Wave of High frequency and Sounder for Probing of Electron density by Relaxation (WHISPER) instrument records the natural waves in the 2-83 kHz bandwidth and makes a diagnostic of the electron density using the sounding technique on each of the four satellites of the CLUSTER mission. The various working modes and the Fourier transforms calculated on board provide a good time and frequency resolution and allow us to detect the fine structure of these emissions as well as their spectral characteristics in relation to the local plasma regime (gyro-frequency f_{ce} and plasma

frequency f_{pe}).

In a previous statistical analysis, we have shown that the $(n+1/2)$ fce emissions are seen in the plasmasphere close to the magnetic equator, preferentially in the morning sector. The number of observed harmonics has a large variability.

In this presentation, two specific events, both taken in the dayside, are studied in detail.

In the first event, on 2004, July 2nd, the Cluster constellation crosses an extended but irregular plasmasphere. Two harmonic series of intense emissions are observed below the local plasma frequency, one at the minimum of the magnetic field and the other inside a density depletion placed closeby. The two series have different characteristics (number of harmonics, frequency positions, etc.). In the second event, on 2003, September 23th, the plasmasphere has been compressed and the constellation travels in the outer plasmasphere boundary layer. Electrostatic emissions appear below and above f_{pe} on all spacecraft close to the geomagnetic equator. Furthermore, intense waves appear at higher latitudes in the vicinity of f_{pe} .

We study in detail the features of these waves, signature in frequency-time for each spacecraft, frequency bandwidth, frequency location, time duration and spectral energy density. Relation to small scales irregularities in density and magnetic field map are investigated. We try to identify the process of generation of these waves, taking into account the measured electron distribution function.