MODULATION OF NTC FREQUENCIES BY PC5 ULF PULSATIONS: EXPERIMENTAL TEST OF THE GENERATION MECHANISM AND MAGNETOSEISMOLOGY OF THE EMITTING SURFACE

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Non-thermal continuum (NTC) radiation is believed to be emitted by the conversion of an electrostatic wave into an electromagnetic one, which takes place at the Earth's magnetic equator. It is generally accepted that the frequency of the electrostatic wave at the source meets a local characteristic frequency placed in between two multiples of the electron cyclotron frequency, fce, which results in emission of a narrow band frequency element. In an event on August, 14, 2003, we compare oscillations of the central frequency of distinct NTC frequency elements observed from CLUSTER orbiting near perigee, with simultaneous Pc5 Ultra Low Frequency (ULF) pulsations in the magnetic field observed from the same platform. The latter magnetic perturbations are interpreted as magnetohydrodynamic poloidal waves, where fundamental and second harmonic modes coexist. The NTC oscillation and the fundamental wave have similar periods, but are phase-shifted by a quarter of phase. From the correlation between both signals, and the proximity of the NTC source (localized via triangulation) with CLUSTER, we infer that the poloidal perturbations are spatially uniform between the source and the satellites. From the phase shift between signals, we conclude that the electrostatic wave which converts into NTC is mainly governed by the plasma density, affected by movements of the magnetic field lines. Furthermore, we demonstrate that the observations can be used to perform a magnetoseismology of the emitting surface. The results show a steepening of the plasmapause density profile near the satellites, which can be responsible for the generation of NTC emission.

Plasmapause, Electromagnetic radiation, ULF waves

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