



Equatorial noise emissions with a quasi-periodic modulation observed by DEMETER at harmonics of the O⁺ ion gyrofrequency

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The analysis of ionospheric equatorial noise (EN) with a quasi-periodic (QP) modulation observed by the DEMETER spacecraft is presented. These EN emissions also called whistler mode or fast magnetosonic waves play an important role in acceleration of radiation belt electrons. A statistical analysis with 103 events shows that they occur just after intense magnetic storms. Usually, they are generated by unstable proton ring distribution close to the magnetic equator at harmonics of the proton gyrofrequency in the inner magnetosphere ($2 < L < 8$). But at lower L values down in the ionosphere three events have been analyzed and it appears that the EN waves are at harmonics of - or very close to - a O⁺ ion gyrofrequency which can be found close or slightly above the satellite. The wave propagation analysis indicates that these emissions are coming from an area above the satellite. Concerning one event, the EN emissions are observed on several consecutive orbits and there is a temporal coincidence with observations performed by the CLUSTER satellites at higher altitudes in the magnetosphere. EN emissions at lower frequencies have been also observed by the CLUSTER satellites in the same longitudinal sector as DEMETER but at ~ 5 RE. The analysis of the STAFF data onboard C1 reveals that the magnetic field spectrogram has peaks close to harmonics of the local proton gyrofrequency as usually reported. It is shown that the DEMETER and CLUSTER EN waves have a similar QP modulation but with slightly different period and frequency.