

Title: Spacecraft observations of waves in low-latitude magnetospheric plasma

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Abstract: The present doctoral thesis is based on the analysis of the electromagnetic equatorial noise (EN) emissions. These waves propagate in the vicinity of the geomagnetic equator at frequencies between the local proton cyclotron frequency and the lower hybrid frequency. We used data obtained by the 4 Cluster spacecraft during the period from January 2001 to December 2010. The analysis is based on the data from the STAFF-SA instrument. We have developed 3 selection criteria for the visual identification and we have compiled a database of more than 2000 events. We demonstrate that EN occurs in almost entire analyzed range of the McIlwain's parameter from about $L \sim 1$ to $L \sim 10$. EN mostly occurs between $L = 3$ and $L = 5.5$. Analysis of occurrence rates as a function of magnetic local time shows strong variations outside of the plasmasphere (with an increase in the afternoon sector), while the occurrence rate inside the plasmasphere is almost independent. We have also analyzed the inner structure of EN. We use data from the WBD instrument which provides us with high-resolution data. We have found 342 events and we have visually checked them for visibility of the spectral lines. For further investigation we use only those containing at least 4 spectral lines. We have estimated the locations of the source regions from the frequency differences of the spectral lines. For most cases it was found around $L \sim 4.4$.

Keywords: equatorial noise, radiation belt, Cluster spacecraft, Earth magnetosphere