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Occurrence rate of magnetosonic equatorial noise emissions as a function of the McIlwain's parameter

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We report results of a statistical analysis of equatorial noise (EN) emissions based on the data set collected by the four Cluster spacecraft between January 2001 and December 2010. We have investigated a large range of the McIlwain's parameter from L≈1 to L≈12 thanks to the change of orbital parameters of the Cluster mission. We have processed data from the STAFF-SA instruments which analyze measurements of electric and magnetic field fluctuations onboard and provide us with hermitian spectral matrices. We have used linear polarization of magnetic field fluctuations as a selection criterion. Propagation in the vicinity of the geomagnetic equator has been used as an additional criterion for recognition of EN. We have identified more than 2000 events during the investigated time period. We demonstrate that EN can occur at all the analyzed L-shells. However, the occurrence rate at L-shells below 2.5 and above 7.0 is very low. We show that EN occurs in the plasmasphere as well as outside of the plasmasphere but with a lower occurrence rate.