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Analysis of amplitudes of equatorial noise emissions and their variation with L, MLT and magnetic activity

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Wave-particle interactions are an important mechanism of energy exchange in the outer Van Allen radiation belt. These interactions can cause an increase or decrease of relativistic electron flux. The equatorial noise (EN) emissions (also called fast magnetosonic waves) are electromagnetic waves which could be effective in producing MeV electrons. EN emissions propagate predominantly within 10° of the geomagnetic equator at L shells from 1 to 10. Their frequency range is between the local proton cyclotron frequency and the lower hybrid resonance. We use a data set measured by the STAFF-SA instruments onboard four Cluster spacecraft from January 2001 to December 2010. We have compiled the list of the time intervals of the observed EN emissions during the investigated time period. For each interval we have computed an intensity profile of the wave magnetic field as a function of frequency. The frequency band is then determined by an automatic procedure and the measured power spectral densities are reliably transformed into wave amplitudes. The results are shown as a function of the McIlwain's parameter, magnetic local time and magnetic activity – Kp and Dst indexes. This work has received EU support through the FP7-Space grant agreement n 284520 for the MAARBLE collaborative research project.