



Quasi-periodic modulation of equatorial noise intensity

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Equatorial noise (EN) emissions are electromagnetic waves at frequencies between the proton cyclotron frequency and the lower hybrid frequency observed routinely in the equatorial region of the inner magnetosphere. They propagate in the extraordinary mode nearly perpendicular to the ambient magnetic field. Although their harmonic structure, which is characteristic of the proton cyclotron frequency in the source region has been known for a couple of decades, they were generally believed to be continuous in time. The analysis of more than 2000 EN events observed by the STAFF-SA and WBD instruments on board the Cluster spacecraft reveals that this is not always the case, with about 5% of events exhibiting a clear quasi-periodic (QP) modulation of the wave intensity. We perform a systematic analysis of these events, and we discuss possible mechanisms of the QP intensity modulation. It is shown that the events occur usually in the noon-to-dawn magnetic local time sector, and their occurrence seems to be related to the periods of increased geomagnetic activity. The modulation period of these events is on the order of minutes. Compressional ULF magnetic field pulsations with periods about double the modulation periods of EN were identified in about half of the events. These ULF pulsations might modulate the EN wave intensity, similarly as they modulate the intensity of formerly reported VLF whistler-mode QP events.