

A statistical study of EMIC waves with frequency variations observed by THEMIS.

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Recent observations reported electromagnetic ion cyclotron (EMIC) triggered emissions with rising tones between the H^+ and He^+ cyclotron frequencies in the Earth's magnetosphere. These emissions can play an important role in magnetospheric dynamics and their global distribution has been of great interest.

We develop a program to identify whether EMIC emissions have frequency variations or not, and perform a statistical study of frequency variations of the EMIC waves, that occurred in the equatorial magnetosphere from $L=5.7$ to $L=10$ at all local times, using data from the THEMIS probes during 2013 and 2014. We calculate the sweep rate of EMIC emissions using power spectral density. Results show that rising or falling tones occur during over 30% of times when EMIC emissions were observed. The strong rising tones have high occurrence rate near the dayside magnetosphere where the solar wind dynamic pressure is high. In addition, the frequency sweep rate and growth rate of wave amplitude tend to increase as wave amplitude becomes large.