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Compression-amplified EMIC waves and their effects on relativistic electrons

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During enhancement of solar wind dynamic pressure, we observed the periodic emissions of electromagnetic ion cyclotron (EMIC) waves near the nightside geosynchronous orbit (6.6RE). In the hydrogen and helium bands, the different polarized EMIC waves have different influences on relativistic electrons (>0.8MeV). The flux of relativistic electrons is relatively stable if there are only the linearly polarized EMIC waves, but their flux decreases if the left-hand polarized (L-mode) EMIC waves are sufficiently amplified (power spectral density (PSD)_1nT2/Hz). The larger amplitude L-mode waves can cause more electron losses. In contrast, the R-mode EMIC waves are very weak (PSD<1nT^2/Hz) during the electron flux dropouts; thus, their influence may be ignored here. During the electron flux dropouts, the relativistic electron precipitation is observed by POES satellite near the foot point (_850 km) of the wave emission region. The quasi-linear simulation of wave-particle interactions indicates that the L-mode EMIC waves can cause the rapid precipitation loss of relativistic electrons, especially when the initial resonant electrons have a butterfly-like pitch angle distribution.

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