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電磁イオンサイクロトロントリガード放射による内部磁気圏高エネルギープラズマ環境の変化
Effects of EMIC rising tone emissions on energetic particles in the inner magnetosphere

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Rising tone electromagnetic ion cyclotron (EMIC) emissions, or so-called EMIC triggered emissions, have been observed in the inner magnetosphere. In order to reproduce the EMIC triggered emissions, we perform self-consistent hybrid simulations with a real scale non-uniform ambient magnetic field model. We obtained two different triggered emissions, coherent rising tone emission and broadband EMIC bursts, which are generated in high and low magnetic field gradient model, respectively. We estimate effects on plasmas by the EMIC rising tone emissions in the inner magnetosphere. For energetic protons, which drive EMIC waves, broadband emissions induce rapid precipitation of energetic protons into the loss cone since the scattering by the concurrent triggering takes place faster than that of the coherent emissions. On the other hand, the coherent triggered emission causes efficient proton acceleration around the equator because of the stable particle trapping by the coherent rising tone emission. The rising tone EMIC waves also causes an effective heating of cold heavy ions by parallel electric field induced by counter-propagating EMIC waves. The generation of the EMIC waves are also modulated due to the cold ion heating. Relativistic electron scattering by the rising tone emissions reproduced by the hybrid simulations are also estimated by test particle simulations. Nonlinear trapping causes significant electron scattering in wide energy range. Broadband EMIC waves induce rapid, weak and continuous precipitations.

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