磁気嵐時の内部磁気圏高エネルギー電子とホイッスラー波動

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Evolution of energetic electrons and whistler mode waves during the storm time

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In the inner magnetosphere, whistler mode waves play an essential role in the loss and acceleration of energetic electrons. The generation and damping of whistler mode waves are determined by various parameters; the temperature anisotropy of hot electron distribution functions, the thermal plasma density, and the ambient magnetic field. The linear growth rate of whistler mode waves should be important for the subsequent non-linear growth of whistler mode chorus waves. In order to understand the temporal-spatial variation of whistler mode waves during the storm time, we calculate the linear growth rate of whistler mode waves with the RAM-electron code [Jordanova and Miyoshi, GRL, 2005], considering a hot electron distribution function with a temperature anisotropy and a loss cone. The thermal plasma density is determined from the dynamic plasmasphere model. When we simulate a magnetically active period whistler mode waves are generated from post-midnight to the morning side. Since the linear growth rate depends on the ratio of the plasma frequency to the gyrofrequency, the intense whistler mode waves are found near plasmapause. We compare the average spatial distribution of the whistler mode waves, hot electrons, and thermal plasma density as function of magnetic activity with statistical observational results from the CRRES satellite.