# GEMSIS-RC モデルに基づいた内部磁気圏における ULF 波動分布に関する研究

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# Study of the global distribution of ULF waves in the inner magnetosphere based on the GEMSIS-RC model

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Electron acceleration mechanisms to cause drastic variation of the Earth's outer radiation belt is one of key issues of the geospace researches. While the radial diffusion of the electrons driven by ULF waves has been considered as one of the candidate mechanisms, efficiency of the mechanism under realistic ULF characteristics and distribution is far from understood. GEMSIS (Geospace Environment Modeling System for Integrated Studies) of STEL, Nagoya University, is the observation-based modeling project for understanding energy and mass transportation from the Sun to the Earth in the geospace environment. Aiming at understanding the dynamics of the inner magnetosphere during the geospace storms, the GEMSIS-Magnetosphere working team has developed a new physics-based model for the global dynamics of the ring current (GEMSIS-RC model). The GEMSIS-RC model is a self-consistent and kinetic numerical simulation code solving the five-dimensional collisionless drift-kinetic equation for the ring-current ions in the inner-magnetosphere coupled with Maxwell equations.

We applied the GEMSIS-RC model for pressure pulse events to test its capability of describing fast time scale phenomena like SCs and ULF waves. Comparison with observations of SCs shows the good agreement in the polarity of the initial pulse. Two cases of background profile, i.e., cases with/without plasmasphere are compared. The result shows that in the case with plasmasphere, initially-given poloidal mode is converted partially to the toroidal mode. In order to investigate the global distribution of ULF waves and its dependence on frequency, next we simulated the global distribution of ULF waves for several cases of boundary conditions with monochromatic ULF waves. The obtained conversion from E_phi to E_r is consistent with reflection and mode conversion at plasmapause and may influence the efficiency of the radial transport of high-energy electrons by ULF waves.