[EE] Evening Poster | P (Space and Planetary Sciences) | P-EM Solar-Terrestrial Sciences, Space Electromagnetism & Space Environment

[P-EM16]Dynamics of Earth's Inner Magnetosphere and Initial Results from Arase

convener:Danny Summers(Memorial University of Newfoundland), Yoshizumi Miyoshi(Institute for Space-Earth Environmental Research, Nagoya University), Keisuke Hosokawa(電気通信大学大学院情報理工学研究科, 共同), Yusuke Ebihara(Research Institute for Sustainable Humanosphere, Kyoto University)
Tue. May 22, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
Earth's inner magnetosphere is a fascinating source of space research problems. There remain many fundamental questions concerning the physics of the radiation belts, the ring current, the plasmasphere and the ionosphere. The JAXA spacecraft Arase(ERG) was successfully launched in December 2016, and has since been providing excellent data on waves, particles and fields over a range of L-shells in the inner magnetosphere. This session particularly welcome submissions related to the Arase mission. As well, data from other recent missions to the magnetosphere are also welcome, including the Van Allen Probes, MMS, and THEMIS. Topics of interest include charged particle interactions with the predominant electromagnetic wave modes such as whistler-mode chorus and hiss, ion cyclotron waves, magnetosonic waves, and ULF waves. Projects involving the prevailing issues of particle acceleration and loss, and particle transport are also of interest. In addition, projects involving the coupling of plasma populations in the inner magnetosphere are also timely. Studies involving observations, simulations, theory and modeling are all invited.

[PEM16-P01]Development of Ray Tracing Applicable for Whistler Mode Waves in the Inner Magnetosphere

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The Arase satellite was launched on December 20, 2016, and the Plasma Wave Experiment (PWE) on board the Arase revealed various kinds of plasma waves in the inner magnetosphere. The PWE has a function of direction finding of the plasma waves by measuring two components of electric fields and three components of magnetic field. Analysis of the propagation paths is indispensable to elucidate the propagation characteristics of the waves.

Ray tracing is a method to calculate propagation paths of plasma waves numerically. A general purpose ray tracing program applicable to whistler mode wave has been published by Kimura and Goto [1]. In the present study, we improved this program and made it possible to apply whistler mode waves in the inner magnetosphere.

In the ray tracing calculation, a series of differential equations determining a ray path is given and a ray path can be derived by solving the differential equations numerically when we provide an appropriate plasma density profile and an ambient magnetic field model. In the conventional program [1], the global core plasma model (GCPM) version 2.2 and the International Reference Ionosphere (IRI) model 2007 were available for plasma density profile, and the 10-th generation of the International Geomagnetic Reference Field (IGRF) model was introduced for magnetic field model. In the present study, we updated the plasma model to GCPM version 2.4 and IRI 2016. We also improved the magnetic field model by combining the 12-th generation of the IGRF model and the Tsyganenko model (TS05). Thanks to the

improvement, we expect to trace the ray paths of chorus generated outside of the plasmasphere under more realistic parameters. In the presentation, we introduce the performance of our ray tracing and show some trials applied to the chorus events observed by the Arase/PWE.

[1] I. Kimura and Y. Goto, Ray Tracing, http://waves.is.t.kanazawa-u.ac.jp/ (cited Feb. 19, 2018)