Theory, Modeling, and Integrated studies in the ARASE(ERG) project

Kanako Seki[1]; Yoshizumi Miyoshi[2]; Yusuke Ebihara[3]; Yuto Katoh[4]; Shinji Saito[5]; Takanobu Amano[6]; Yoshiharu Omura[7]; Masafumi Shoji[2]; Tomoaki Hori[2]; Naoko Takahashi[8]; Kunihiro Keika[6]; Shin'ya Nakano[9]; Aoi Nakamizo[10]; Masahito Nose[11]; Shigeto Watanabe[12]; Kanako Seki ERG theory/modeling/integrated studies team[13]

[1] Dept. Earth & Planetary Sci., Science, Univ. Tokyo; [2] ISEE, Nagoya Univ.; [3] RISH, Kyoto Univ.; [4] Dept. Geophys., Grad. Sch. Sci., Tohoku Univ.; [5] Nagoya Univ.; [6] University of Tokyo; [7] RISH, Kyoto Univ.; [8] Univ. of Tokyo; [9] The Institute of Statistical Mathematics; [10] NICT; [11] DACGSM, Kyoto Univ.; [12] Cosmosciences, Hokkaido Univ.; [13] -

The Arase satellite was launched in December 2016 as a part of the Japanese geospace research project, ERG. The science target of the ERG project is to understand underlying mechanisms of drastic variations of the geospace such as magnetic storms with a focus on the relativistic electron acceleration and loss processes in the terrestrial magnetosphere. In order to achieve the goal, the ERG project consists of the three parts, i.e., the Arase (ERG) satellite, ground-based observations, and theory/modeling/integrated studies. The role of theory/modeling/integrated studies part is to promote relevant theoretical and simulation studies as well as integrated data analysis to combine different kinds of observations and modeling. From the planning phase of the ERG satellite, there has been many efforts to develop related simulation codes and new models. In this paper, we provide an overview of simulation and empirical models related to the ERG project together with their roles in the integrated studies of dynamic geospace variations. The simulation and empirical models covered include Radial diffusion model of the radiation belt electrons, GEMSIS-RB and RBW models, CIMI model with either empirical or global MHD electric and magnetic fields, GEMSIS-Ring Current model, plasmasphere model, self-consistent wave-particle interaction simulations (Electron hybrid code and ion hybrid code), GEMSIS-POT model, and SuperDARN electric field models with data assimilation. In the presentation, some examples of integrated studies will be also reported.