Energetic electron variations during magnetic storms: Comparative study between Arase observations and code coupling simulations

*Yoshizumi Miyoshi[1], Vania Jordanova[2], Yuto Katoh[3], Shinji Saito[4], Satoshi Kurita[5], Sandeep Kumar[1], Yoshiya Kasahara[6], Shoya Matsuda[7], Masafumi Shoji[1], Fuminori Tsuchiya[3], Atsushi Kumamoto[3], Ayako Matsuoka[5], Satoshi Kasahara[8], Shoichiro Yokota[9], Tomoaki Hori[1], Kunihiro Keika[8], Yoichi Kazama[10], Shiang-Yu Wang[10], Chae-Woo Jun[1], Takefumi Mitani[7], Takeshi Takashima[7], Nana Higashio[7], Iku Shinohara[7]

1. Institute for Space-Earth Environmental Research, Nagoya University, 2. Los Alamos National Laboratory, 3. Tohoku University, 4. NICT, 5. Kyoto University, 6. Kanazawa University, 7. JAXA, 8. The University of Tokyo, 9. Osaka University, 10. ASIAA

We simulate dynamics of the energetic electron distributions and the plasmasphere with the RAM-SCB simulation during magnetic storms, which calculates evolution of the electron distribution function and density of the thermal plasma with a self-consistent magnetic field. In the simulation of the March 2017 and September 2017 storms, we compare the simulated electron flux and thermal plasma density with the data from LEPe/MEPe/HEP/XEP and PWE/HFA. The RAM-SCB simulation reproduces successfully the observed variations of energetic electrons, such as, injections and subsequent energy dispersion spectra of electrons. Using the simulated distribution functions and the ambient density and magnetic field, we also calculate the linear-growth rate of whistler mode waves and compare them with the plasma wave observation data obtained by Arase. We also conduct a code-coupling simulation that consists of RAM-SCB and the self-consistent electron hybrid simulation as well as GEMSIS-RBW test particle simulations for wave-particle interactions.

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