Key elements for data analysis and modeling in the ERG project: Strategies for comprehensive geospace exploration

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Geospace storms are the largest electromagnetic disturbances in the near-Earth space caused by the extreme conditions of the solar wind such as CMEs and CIRs accompanied by the strong southward IMF (interplanetary magnetic field). During the geospace storms, it is observationally known that the particle acceleration up to the relativistic energies are taking place as a consequence of dynamic interactions of the magnetic and electric field and particles. In the course of the acceleration processes, all charged particles in a wide energy range over 6 orders of magnitude (from ˜1eV to several MeV) are potentially important. The occurrence frequency of geomagnetic storms increase with increasing solar activities. Aiming at the next solar maximum, the ERG (Energization and Radiation in Geospace) project is under consideration in Japan. ERG project consists of three parts: 1. Satellite observation of equatorial inner magnetosphere with the particle sensor package and wave instruments that cover potentially important energy and frequency ranges, 2. Ground-based network observations of field configurations to capture global features, and 3. Data analysis, modeling, simulation concept studies to connect satellite and ground-based observations. In this talk, we report on the current status of the 3rd part and discuss on the key issues and scientific strategy of the data analysis, modeling, simulation, and their combination in order to understand the physical processes of the plasma transport and particle acceleration in the inner magnetosphere during the geospace storms.