AOGS 2005

Science objectives of the ERG satellite mission

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It has been known that the energetic particles in the ring current and radiation belts are drastically changed during magnetic storms. The mechanisms of variation, however, are still poorly understood. Comprehensive observations of particle, fields and waves are necessary to understand key process of particle acceleration in the inner magnetosphere. The radial profile of phase space density is important to determine which of physical processes is most responsible for the energization of the outer radiation belt. Moreover, the measurements of both electric and magnetic component of plasma waves together with thermal plasma environment are necessary to evaluate relativistic particle acceleration mechanism of non-adiabatic process. Besides the physics of the radiation belts, the investigation of ring current and plasmasphere evolution during storm time is important subject in the inner magnetosphere, and the measurement of ion species is key observations for those studies.

In order to investigate the acceleration process of relativistic particles in the inner magnetosphere and the global dynamics of Geospace, the small satellite mission; ERG (Energization and Radiation in Geospace) is proposed in Japan. The ERG satellite will be launched into a geosynchronous transfer orbit with small inclination during next solar maximum, and the satellite will observe particles of a wide range of energies from a few eV to 10 MeV with measurement of ion species. The satellite will also observe fields and waves for both electric and magnetic component. The combinations with ground based networks such as SuperDARN, CPMN magnetometers and optical measurements are considered in the ERG project, and these combinations will provide the spatial coverage essential for the global monitoring of Geospace. It will be possible that international collaborative observations with LWS storm probes (US) and ORBITALS (Canada) during same period, and the ERG project will make an important contribution to ILWS program.