

ERG Satellite Mission to Study on the Formation of Radiation Belt

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For the purpose of study on the unresolved major problems underlying in Geospace, a small satellite mission named as ERG (Energization and Radiation in Geospace) is proposed being focused on the formation of radiation belt associated with magnetic storms. A comprehensive measurement of particles and fields onboard a small satellite of less than 150kg is planned based on the heritage of the achievement of previous and undergoing Japanese scientific satellite missions. The on-board scientific instruments are arranged to make definitive evaluation of possible mechanisms for the formation of radiation belt. They are characterized as;

- (1) Distribution functions of electrons and ions in wide energy range such as 10eV to 10MeV for electrons and 10eV to 1MeV for ions.
- (2) DC electric and magnetic fields with resolution of 0.1mV/m and 0.1nT.
- (3) Electric and magnetic components of plasma waves in a frequency range from 1Hz to 5MHz.

The ERG project also involves ground-based facilities of optical measurements (6 stations), Super-DARN HF radars (10 stations), 210° meridian magnetometer chain (25 stations) and CPMN chain (10 stations), which make it possible to detect responses of geomagnetic and ionospheric disturbances associated with geomagnetic storms. Theory and data analysis group analyzes the comprehensive data set comparing with results of computer simulation study to achieve new understanding of radiation belt, based on the structure, electro dynamics, and wave-particle interactions carried out in the Geospace plasma. The ERG project team is planning to collaborate with ORBITALS (Canada) and RBSP (NASA) missions, and still searching for collaboration with possible international projects.

Main characteristics of the proposed satellite are following;

Mission Life: 6 months ~ more than 1 year.

Orbital character: Perigee 250 km, Apogee 6.6 Re, Inclination $\leq 10^\circ$.

Attitude: Spin stabilized (about 4 rpm), directed to sunward.

Telemetry: High speed (~ 0.5Mbps) for key stations, and Low speed for local stations.

Extended sensors: 4 sets of wire antennas of 20m for DC electric field and plasma waves. 1.5 m extensible booms for the magnetometer sensor and loop antennas.

Proposed launch date: before next solar maximum: 2010.

Launch carrier; TBD.