Geospace Exploration Project
ERG

Y. Miyoshi (ERG Project Scientist)
More than 100 researchers are working in the project group.
ERG satellite (ISAS/JAXA)

- apogee geocentric distance: 5.5 Re
- perigee altitude: 300 km
- inclination angle: 31 deg (Lmax ~ 9)
- initial apogee MLT: 09:00
- spin period: 8 sec
- planned launch date: 2016/06-08
- nominal mission life: > 1yr
Planned orbit – MLT and Pitch Angle coverage

elevation angle=30deg, 32700km

Launch
Apogee (equator at dawn)
Apogee (equator at dusk)

Equatorial PA
90
60
30
0
dusk
noon
dawn

Day of year, 2016
Planned orbit – MLT and Pitch Angle coverage

MLT and Pitch Angle coverage

Day of year, 2016

Apogee (equator at dawn)

Apogee (equator at dusk)

Apogee

MLT

Equatorial PA

Chorus obs

EMIC obs

Chorus obs

EMIC obs
**ERG: Plasma & Particles**

**PPE: Plasma and Particle Experiment Suite**

- **Plasmasphere**
- **Ring current**
- **Electron radiation belt**

- **3-dimensional observation** with mass discrimination

**Electron composition**
- LEP-e
- MEP-e
- XEP-e
- HEP-e

**Ion composition**
- LEP-i
- MEP-i

**Energy (eV):**
- 1
- 10
- 100
- 1k
- 10k
- 1M
- 10M
- 1G
- 10G
PWE: Plasma Wave and Electric Field Experiment
MGF: Magnetic Field measurement

Electric field

Magnetic field

Frequency (Hz)
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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| FY 2009 | Mission Definition Review.  
                System Requirement Review. |
| FY 2011 | System Definition Review                  |
| FY 2012 | Preliminary Design Review                  |
| FY 2013 | Critical Design Review                      |
| FY 2014 | Development of the flight model             |
| FY 2015 | Integration test                             |
| FY 2016 | Launch                                     |
The ERG ground networks: waves

- **Radar Network:** SuperDARN network
  - global convective electric field
  - ULF pulsation (Pc5)
  - Electric field penetration

- **Magnetometer Network:** MAGDAS/CPMN, 210MM Antarctica Network
  - ionospheric current /ring current.
  - ULF pulsation (Pc5).
  - EMIC (Pc1).
  - diagnostics of plasmasphere

- **VLF Network:** Canada, Antarctica
  - whistler (chorus, hiss).
The **ERG** ground networks: precipitation

- **Optical Imager Network**: Canada, Norway, Siberia, Antarctica
  - Imaging of precipitation of ~keV electrons/ions.

- **Riometer Observations**: Antarctica/Canada
  - Imaging of precipitation of tens keV electrons

- **LF-Radio Wave Network**: Svalbard/Canada
  - Monitoring of D-layer disturbance
    Estimation of MeV electron precipitations

- **Balloon Gamma-ray Observations**: Norway
  - Imaging of precipitation of tens keV ~ MeV electrons.
The **ERG** Science Center

**ERG-satellite data**

**ERG-ground data**

**ERG-modeling data**

**ERG**—science center

- All science data are archived with CDF
- IDL/SPEDAS is a project data analysis software
  - SPEDAS v1.0 includes the ERG-plugin tools.
  - (210MM magnetometer, SuperDARN radars etc)

**users**

- L-2/3 science data will be opened to the public via ERG-science center.
Software resources on the ERG project

Stack plot of multiple satellite and ground data by simple IDL commands and scripts.

Various ground data and satellite footprints can be superposed on the world map.

Conjunction Event Finder (CEF): An easy-to-use quick browsing tool for premade ground-s/c conjunction plots as well as various QL plot sites.

The implemented graphical user interface enables the use of commands without IDL experiences.
3. International Collaboration: A golden era for geospace

US/Van Allen Probes

US/THEMIS

US/DSX

Japan/ERG

Low-altitude satellites
Ground-based observations