# The magnetic field investigation on the ARASE (ERG) mission: Data characteristics and initial scientific results

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The ARASE (ERG) satellite was successfully launched on December 20 2016. A fluxgate magnetometer (MGF) was built for the ARASE satellite to measure DC and low-frequency magnetic field.

The requirements to the magnetic field measurements by ARASE was defined as (1) accuracy of the absolute field intensity is within 5 nT (2) angular accuracy of the field direction is within 1 degree (3) measurement frequency range is from DC to 60Hz or wider. MGF measures the vector magnetic field with the original sampling frequency of 256 Hz. The dynamic range is switched between +/-8000nT and +/- 60000nT according to the background field intensity.

The MGF initial checkout was carried on January 10th 2017, when the MGF normal performance and downlinked data were confirmed. The 5-m length MAST for the sensor was deployed on 17th January. The nominal operation of MGF started in March 2017.

The MGF data are calibrated based on the results from the ground experiments and in-orbit data analysis. The MGF CDF files are distributed by the ARASE Science Center and available by Space Physics Environment Data Analysis Software (SPEDAS).

The acceleration process of the charged particles in the inner magnetosphere is considered to be closely related to the deformation and perturbation of the magnetic field. Accurate measurement of the magnetic field is required to understand the acceleration mechanism of the charged particles, which is one of the major scientific objectives of the ARASE mission. We designed a fluxgate magnetometer which is optimized to investigate following topics;

(1) accurate measurement of the background magnetic field - the deformation of the magnetic field and its relationship with the particle acceleration.

(2) MHD waves - measurement of the ULF electromagnetic waves of frequencies about 1mHz (Pc4-5), and investigation of the radiation-belt electrons radially diffused by the resonance with the ULF waves.

(3) EMIC waves - measurement of the electromagnetic ion-cyclotron waves of frequencies about 1Hz, and investigation of the ring-current ions and radiation-belt electrons dissipated by the interaction with the EMIC waves.

These scientific subjects are now investigated by the ARASE working team colleagues.