

Plasma Wave Experiment (PWE) on board the ARASE (ERG) Satellite (Initial Report)

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The ERG (Exploration of energization and Radiation in Geospace) project is a mission to study acceleration and loss mechanisms of relativistic electrons around the Earth. To achieve comprehensive observations of plasma/particles, fields, and waves, the Plasma Wave Experiment (PWE) is installed on board the ERG satellite to measure electric field in the frequency range from DC to 10 MHz, and magnetic field in the frequency range from a few Hz to 100 kHz. Varieties of operational modes are implemented in the PWE, and the telemetry data consists of several kinds of data such as power spectrum, waveform, spectral matrix and DC E-field. Innovative instruments named S-WPIA (Software-Type Wave Particle Interaction Analyzer) was installed on the satellite to measure energy exchange processes between plasma waves and particles directly, and the PWE will provide raw waveform data to the S-WPIA collaborating with the other scientific instruments.

The PWE will generate two kinds of mission data; nominal data and burst data. The former consists of wave spectra in VLF/HF range and waveforms in ELF range, and will be generated continuously as survey data. The nominal data will be downloaded to the ground. On the other hand, the latter is essentially raw waveform data in VLF range and the data amount is quite huge. They will be once stored in the mission data recorder (MDR) and partial data will be downloaded after data selection. In order to obtain maximum science output, it is very important to check and analyze the nominal data quickly and select valuable data from burst data stored in the MDR.

The ARASE has passed its critical operation phase and we have confirmed successful extension of the wire-probe antennas as well as the masts. The onboard instruments including the PWE are now in the initial check out phase. In the present paper, we introduce the specification of the PWE and its initial data. We also introduce our data processing plan on the ground.

Keywords: Plasma Wave Experiment (PWE), Arase (ERG), Inner Magnetosphere, Chorus, EMIC, Ground data processing