

Data processing in the Software-type wave-particle interaction analyzer on board the ARASE satellite

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The software-type wave-particle interaction analyzer (S-WPIA) is software function on board the ARASE (ERG: Exploration of energization and Radiation in Geospace) satellite, which measures amount of energy transfer involving wave-particle interactions in the magnetosphere. The amount of energy exchange between wave/particle can be represented as inner product of electric wave field vector and velocity vector of particle. The phase difference of the wave and particle determine the accuracy of S-WPIA measurement. In order to obtain the accurate relative phase, whole information of individual particle at every particle detection timing and instant wave fields with high sampling timing are collected. These collected large volume data contain electric and magnetic wave and data set of multiple particle instruments over a wide energy range and the ambient magnetic field. These data are transferred to onboard data storage. The data combination of waves and particles in S-WPIA calculation can be selected flexibly using the stored data set of waves and particles. The calculation results of S-WPIA as well as raw data of particles and plasma waves are transferred to telemetry. The present paper describes the detailed design of S-WPIA algorithm on board the ARASE satellite.