Prediction of high-energy electron spectra from quasi-realtime data by the Arase satellite

*Kaori Sakaguchi[1], Tsutomu Nagatsuma[1], Nana Higashio[2], Takefumi Mitani[2], Takeshi Takashima[2], Ayako Matsuoka[2], Yoshizumi Miyoshi[3], Iku Shinohara[2], Masahito Nose[4]

1. National Institute of Information and Communications Technology, 2. Japan Aerospace Exploration Agency, 3. Nagoya University, 4. Kyoto University

High-energy electrons in the radiation belts cause satellites anomalies due to deep dielectrics charging by electrons penetrating and accumulated inside satellites. The penetration depth of electrons into exterior material depends on energy. Therefore, it is important to predict the energy spectrum of high energy electrons to evaluate the risk of deep charging. Particle detectors of XEP (extremely high-energy electron experiment) and HEP (high-energy electron experiment) onboard the Arase satellite measure electron fluxes of energies from ~100 keV to a few MeV, which is a critical range causing deep charging. The data is provided in quasi realtime. Since it is Qualitatively known that the high-energy electrons in the radiation belts are accelerated throughout interaction processes between energy layers, and there are delays in variation between energies and between regions. Simple correlation analyses using observation data of Arase showed delayed peaks of electron variations. In this presentation, we report prediction results of electron energy spectrum using Kalman filter and its prediction accuracy.

Keywords: Radiation belt prediction, Arase satellite, electron energy spectra, Kalman filter

