

Inter-channel calibration of the high-energy electron experiments (HEP) instrument onboard the Arase satellite

*Tomoaki Hori¹, Takefumi Mitani², Takeshi Takashima², Park Inchun¹, Satoshi Kurita¹, Mariko Teramoto¹, Nana Higashio³, Satoshi Kasahara⁴, Shoichiro Yokota⁵, Yoshizumi Miyoshi¹, Iku Shinohara²

1. Institute for Space-Earth Environmental Research, Nagoya University, 2. Japan Aerospace Exploration Agency, Institute of Space and Astronautical Science, 3. Japan Aerospace Exploration Agency, 4. Graduate School of Science, The University of Tokyo, 5. Graduate School of Science, Osaka University

An inter-channel comparison of electron fluxes measured by the HEP instrument onboard the Arase satellite is conducted with a focus on the apparent non-uniformity in detection efficiency and relative offset of the background flux level between the channels, which was partly reported previously. We extend the data set to cover the entire two-year period since the start of the regular observations. The flux ratio of different channels is sorted by the electron flux level of much higher energies that was simultaneously measured by the extremely high-energy electron experiment (XEP) instrument onboard Arase. The result shows that the HEP flux of all azimuthal channels is more or less affected by MeV electrons which are most likely to have penetrated into the instrument box and directly hit the detectors. However, it is also revealed that the non-uniform count distribution over the channels still remains even when the penetrating electrons are absent. We conduct a set of Geant-4 simulations to trace electrons with various energies and incident angles to the detector plane in order to give a quantitative interpretation for the resultant count distributions, in terms of the effects of penetrating electrons and obliquely-colliding incident electrons.

Keywords: Arase satellite, particle instrument, calibration