Evaluation of response characteristics of the XEP onboard the Arase spacecraft

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The extremely high-energy experiment (XEP) onboard the Arase spacecraft was designed to measure 0.4-20MeV electrons. Electrons are detected by five solid-state silicon detectors (SSDs) and a single-crystal inorganic scintillator of cerium-doped gadolinium orthosilicate (GSO). The SSDs detect 0.4-5.4MeV electrons and the GSO detects 6-20MeV electrons. While the XEP plays an important role in observing the main components of the radiation belt, its energy response has not been fully examined. In this study, we reproduced XEP geometry which is almost the same as the flight model and conducted an irradiation test using the Geant4 toolkit to examine its energy response in detail. The simulation results show how high energy electrons affect low energy bins. We have found that when high-energy electrons (about 5 MeV or more) are incident, the SSD detection area detects most of them as about 1.8-2.8 MeV. We have also performed a more accurate calibration of the observed data using the response function matrix obtained from the simulation. We will present pre- and post- calibration comparisons of observed data.

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