A statistical study on high-energy electron injection events observed by Arase (ERG)

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The substorm injection is a critical phenomenon for supplying the free-energy necessary to generate relativistic electrons in the radiation belts. Numbers of studies on substorm injections have been demonstrated. However, how the injected electrons penetrate the inner magnetosphere and get their energy remains unclear. The energization of the particle injection is thought to be resulting from the transient enhancement of the electric field associated with the dipolarization, although there is no observational evidence such large electric fields accelerate injection particles.
Arase (ERG) often observes electron injections whose maximum energies reach hundreds of keV, while the typical maximum energy of injected electrons is about 100 keV or less. In this study, we would like to address how injected electrons are accelerated to such high energies. Collecting injection events during the period when the apogee of Arase is located in the nightside, we are examining the statistical properties of the high-energy injection events, e.g., the distribution of their estimated source regions, characteristics of energy spectra, pitch angle anisotropy, and other parameters in detail. We expect that finding dependence on the maximum energy is a key to limit the acceleration mechanisms of electron injections.
In the presentation, we will present preliminary results.

