On the possible scenario of MeV electrons at the plasma sheet boundary

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We have found that energetic electron bursts up to (sometimes, up to 1 MeV) 300 keV appear at the plasma sheet boundary at substorm onsets. The purpose of this study is to address where do the energetic electron bursts at higher latitude come from and what is the contribution of magnetotail reconnection and its associated acceleration process to the generation of the energetic electron bursts. The electron bursts show uni- and bi-directional components (possibly generated by near-Earth reconnection) in the lower energy part (E < 200 keV), while lack of parallel and anti-parallel components are observed in the higher energy part. The magnetic field line model indicates that the Arase satellite was located in the transition region between dipole-like and tail-like fields. Interestingly, the higher energy component of bursts shows signatures of the drift echo. In order to explain these observational features of the electron bursts at the plasma sheet boundary, we have performed test particle simulations traced from magnetotail. At this moment, a possible interpretation of the higher energy electron burst is a signature of substorm injections in the high latitude. We will discuss the origin of MeV electrons at the plasma sheet boundary based on the particle dynamics as well as comparing the distribution functions with those observed in the magnetotail.

Keywords: high-energy electrons, magnetotail, substorm

