

Substorm -like energetic electron injection observed at the plasma sheet boundary in the inner magnetosphere

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The Arase (ERG) satellite is possible to observe higher L-value plasma sheet close to the plasma sheet boundary because of its characteristic orbit, and, actually, Arase has observed several lobe entry events just outside of the outer radiation belt. In some of these events, we found that energetic electron bursts up to (sometimes, over) 300 keV appear at the plasma sheet boundary. 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.

However, the observed energetic electron bursts look quite similar to typical dispersionless substorm injection events. If the observed electron bursts are due to the substorm injection, the observation cannot be explained by the standard understanding of the injection because (1) the injection occurs associated with local magnetic field dipolarizations in downstream of the magnetotail reconnection jets (in deep inside of the plasma sheet) and (2) energetic electrons observed at the plasma sheet boundary are thought to be directly accelerated from magnetotail reconnection sites. Since the pitch angle distribution of 100-200 keV electron shows enhancement both of parallel and perpendicular fluxes, the observed results suggest the coexistence of (1) and (2). In this presentation, we will discuss the physical meanings of the observed electron bursts. The discussion is important to address the relationship between magnetotail reconnection and injections, and the results might contribute to a better understanding of electron acceleration processes and energy input to the inner magnetosphere.

Keywords: plasma sheet boundary, electron acceleration