

Electron acceleration in the field aligned current region

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It has been one of hot issues how electrons accelerated to MeV from several eV in the magnetosphere. It seems there are two acceleration processes. One is slow and large scale acceleration that is hard to observe directly while lots of theories are proposed. The other one is the fast acceleration in the confined region. While some observations in the tail region support such small scale acceleration, we don't understand what processes make it. Because most acceleration processes accompany strong pitch angle diffusion, if the electron accelerations had occurred in the equatorial region, for example magnetic reconnection region, we should have observed strong energetic electron precipitation in the low altitude orbit. Even though there are several low altitude satellites observing electron precipitation, intense and small scale precipitation events have not been identified successfully from instrument defections. For the first time, we report observations performed by low altitude satellite, STSAT-1, where electrons are energized in the field aligned upward current region during storm time. Our observation implies high energy electrons can be generated in the small area where about 10 keV electrons precipitated into the Earth and made bright UV emissions. In addition, we observed large magnetic field fluctuation and ionospheric plasma depletion. We convince our observation informs about what condition generates MeV electrons.