Highly Energetic Electron Dynamics in the Radiation Belt

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Highly energetic electrons in the outer radiation disappear during the main phase of the magnetic storm, and rebuilding of the highly energetic electrons is made during the recovery phase of the magnetic storm. A distribution of the new peak of highly energetic electron flux with respect to the distance from the Earth is inversely proportional to the magnitude of the magnetic storm. In case of the super storm, the outer electron belt is pushed toward the Earth, filling so-called slot region. It is of interest to identify that the location of the intense low frequency plasma waves, which appear during the storm recovery phase, coincides with the location of the peak intensity of the highly energetic electrons in the outer radiation belt. This coincidence strongly suggests that an internal acceleration process takes place which leads to a large increase in the intensity of highly energetic electrons in the outer radiation belt during the storm recovery phase. Loss processes are also investigated. Results demonstrate that loss of highly energetic electrons in the outer radiation belt is decided by the combination of adiabatic deceleration, precipitation into the atmosphere and the convection to the dayside magnetopause. Filling of the slot region by the highly energetic electrons are due to the enhanced inward diffusion of the inner edge electrons in the outer radiation belt. Morphological understandings were obtained by the satellite measurements and next subject is theoretical and quantitative understanding of the outer belt dynamics.