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Multi-peak Structure of Outer Electron Belt

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In order to clarify the acceleration processes of the highly relativistic electrons in the radiation belt, we have examined a multi-peak structure of the outer radiation belt seen in March 1991 super storm, paying a particular attention to the plasma waves. Innermost peak of relativistic electrons was formed in a so-called slot region during the storm main phase. With the quick transport of electrons together with the betatron acceleration a new belt was built. No additional increase of relativistic electrons was seen in a new radiation belt with the lack of plasma waves. Follow-up injections of intermediate-energy electrons were performed during the storm recovery phase, which gave rise to two additional peaks in the outer radiation zone. Intensity of relativistic electrons increased as time progressed, which was largely due to the internal acceleration by intense plasma waves. This series of processes demonstrated that plasma waves play an important role to increase the intensity of the relativistic electrons and that internal acceleration processes actually take place when there exist strong plasma waves.