Dynamics of the ring current ions during magnetic storms observed by a low-altitude satellite

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Statistical dynamics of ring current ions during magnetic storms are not well understood. So, we've investigated it by using 30-80keV ions data during 1992 - 1993 observed by MEPED on board NOAA-12. Our statistical results are as follows;

(1). During the quiet time, fluxes of the ring current ions in the dawn and the dusk side show a weak asymmetry.

(2). Ring current ions in the dusk side penetrate below L=4 during the main phase and quickly disappear after Dst minimum. On the other hand, there are not significant changes in ring current ions distribution in the dawn side during the main phase. However, just after Dst minimum, ion fluxes enhanced because of a drift motin from dusk to dawn.

(3). 1.5 days after Dst minimum, ion flux is enhanced in the region of L=4 in the dawn side. This flux enhancement has characters that were very localized near L=4 and very narrow width (dL less than 1).

We've named this feature Narrow Ion Belt. There are two possible mechanisms. One is the result from the stagnant point formation by the convection electric field. Ions drift slowly near that point. So NOAA can observe ions staying the same region longer. However, since the electric field in the dawn side is not well understood, it is only in speculation. The other is the pitch angle scattering by wave-particle interaction with EMIC wave. Ion flux observed by NOAA seems to increase by this process. Ground Pc1 pulsation thought to be related to the EMIC wave and the narrow ion belt showed good correspondence with the ground Pc1 appearance. The observation of the EMIC wave at low-altitude satellite(Freja) and the narrow ion belt also showed good correspondence in MLT and latitude. As a result, the relation between the EMIC wave and the narrow ion belt is strongly suggested. Further observations are necessary to obtain information of the ion composition, the electric and the magnetic field to verify the EMIC wave growth.