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Fate of sub-keV ring current ions observed by Viking

M. Yamauchi and **R. Lundin**

Swedish Institute od Space Physics (IRF), Kiruna, Sweden (M.Yamauchi@irf.se)

Dynamics of the energy-latitude dispersed sub-keV trapped ions inside the ring current region, so called wedge-like dispersions structure, were statistically studied using Viking satellite data. Probabilities with/without these signatures at various local times in the dayside are obtained in terms of different time lags from the substorm activity monitored by the AE index. The structure appears in the early morning sector within a few hours after substorm, and it slowly propagates eastward while decaying with a time scale of several hours. The result qualitatively confirmed the previous model that the wedge-like dispersions are originated from past substorm-related plasma injections into the ring current region, and that the dispersion is formed when these injected plasma slowly moved eastward in the dayside by the drift motion (eastward ExB drift and westward gradient-B and curvature drifts). However, the appearance of the structure is several hours earlier than the model prediction, and some structure reaches even to the evening sector. The results indicate that the substorm-related increase of hot plasma in the ring current region shifts or extends to the early morning sector, and that the drift speed is slightly faster than the model prediction. The substantial electric field driving the sub-keV ion drift is slightly different from the model field. We also detected the evacuating effect starting right after the substorm (or storm) onset. The electric field imposed in the dayside magnetosphere seems to remove the remainder of trapped ions.