**E040-P008** Time: May 29 17:15-18:45

# Ion charge and acceleration mechanism estimated from time dispersion of flux increases observed in the dayside magnetosphere

# Tohru Fujimori[1], Masahito Nose[2], Kunihiro Keika[1], Richard W. McEntire[3], Tsugunobu Nagai[4]

[1] Dept. Geophysics, Kyoto Univ., [2] DACGSM, Kyoto Univ., [3] JHU/APL, [4] Dept.Earth & Planet. Sci.

Charged particles are accelerated in the nightside region to be injected to the inner magnetosphere during substorms. These particles drift to the dayside magnetosphere, and are observed by satellites as sudden increase of particle fluxes. Sudden increase of particle fluxes is time-dispersed, because drift velocity of ions depends on their energy and charge states. Therefore, by analyzing dispersion of particle fluxes, we can obtain information on charge state of particles and estimate where these paricles were accelerated.

We used the data from Ion Composition System (ICS) sensor of the EPIC instrument on the GEOTAIL. ICS can measure the mass and energy of various energetic ions with energies of 50 keV to 3 MeV. In this study, we used proton, He, and O data from the lowest 5 energy channels (less than about 700 keV), because the flux in a higher energy range was too low to identify the dispersive flux increase. Using data set in the period of October 2000 to March 2001, we could visually identify 15 events whose flux dispersion was clear enough to be analyzed.

In this analysis, we assumed that the terrestrial magnetic field was given as the dipole field, and that all particles were accelerated at the same time at a point (not a broad area). Particles are thought to move by the E*B, gradient B, and curvature drift. However, the gradient B drift is estimated to be more than 10 times larger than the E*B drift in relatively quiet conditions for particles in the ICS energy range, so we ignored the latter. Moreover, we omitted the curvature drift on the following assumption that GEOTAIL stayed on the magnetic equatorial plane. Furthermore, the direction in which ICS observed paricles was perpendicular to the satellite-spin axis, and the spin axis was nearly parallel to the Z (GSM) axis. Consequently, this sensor observed particles whose pitch angles were all near 90 degree. Therefore, we can consider that particles move by only the gradient B drift, so that their drift speeds were proportional to their energy (W)/charge (q).

From the assumtion above, start times of flux enhancement (T) were proportional to q/W. We obtained the T-q/W relation with the proton (q=1) arrival times (T) in 5 energy ranges. Using this linear relationship, we could know the charge states of O and He for each energy channel. Moreover, as for the T-q/W relation, considering the particle having infinite energy, its arrival time (T) was thought to be the time of acceleration because the particle with infinite energy can reach the satellite in a moment just after acceleration. We estimated the acceleration point by tracing back along the circular drift path.

Analysis revealed that charge states tended to be higher in both O and He ion as the energy range became larger. To explain this, two ideas would be possible. First, the charge distribution of particles before injection would be similar and all the particles would be accelerated in the same way. Second, the mechanism that can accelerate particles having higher charge to the higher energy would exist. All injection points were distributed in the region from dusk to midnight in MLT.

We plan to collect more events by scanning data in a longer period and to analyze them with a more precise method, and will present statistical results.