Remote sensing of the inner plasmasphere dynamics during magnetic storms using ground-based observations

Satoko Takasaki[1]; Hideaki Kawano[1]; Yoshimasa Tanaka[2]; Akimasa Yoshikawa[1]; Masahiro Seto[3]; Masahide Iizima[4]; Kiyohumi Yumoto[5]

[1] Earth and Planetary Sci., Kyushu Univ.; [2] NICT; [3] T.I.T.; [4] Geophysical Inst., Tohoku Univ.; [5] Space Environ. Res. Center, Kyushu Univ.

The inner plasmaspheric plasma density can be inferred from the observed field-line eigenfrequency if appropriate models of the magnetic field and the plasmaspheric plasma density are assumed. We can identify field-line eigenoscillations and measure their frequencies by applying the cross-phase method [Waters et al., 1991] and the amplitude-ratio method [Baransky et al., 1985] to magnetometer data from two stations closely located along the same meridian.

By using four ground magnetometers located at L=1.32-1.41, we have monitored the plasmaspheric plasma density at L=1.32-1.41 during the interval from Oct. 24 to Oct. 31, 2003, in which a series of CMEs hit the magnetosphere and triggered two large storms in a consecutive manner.

The density was monotonically decreased in a monotone from 06LT to 16LT on Oct. 25, in which the CME did not trigger a magnetic storm; the density at 16LT was half that at 06LT. On the other hand, the density was significantly increased to about two times the pre-storm value from 06LT to 12LT on Oct. 29, during the main phase of the first magnetic storm. We note that we have also found the same feature (an increase in the plasma density during the main phase of magnetic storm) for the second storm, too (from 06UT to 12LT on Oct. 31). We will discuss the response of the inner plasmasphere to the magnetic storm.