

The spacial distribution and temporal variation of the total pressure in the distant magnetotail (2)

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From observations by Slavin et al. (1985) and Fairfield and Jones (1996), the total pressure in the magnetotail was found to depend on the distance from the earth and also on the solar wind condition. In order to study the dynamics of the magnetosphere, it is important to know the spatial distribution and temporal variation of the pressure.

We statistically analyzed the total pressure measured by GEOTAIL in the magnetosphere at the distance between 30 and 220 Re from the earth. We found that the pressure at distance below 150 Re was, except the effect of the distance from the earth, mainly influenced by the dynamic pressure in the solar wind while that at distance over 150 Re was often determined by the static pressure in the solar wind.

Moreover, we found that, when the solar wind condition quickly changed or the magnetotail condition was disturbed due to the high magnetic activity, the measured pressure is sometimes considerably different from the predicted one from our statistics. As Matsuoka (submitted to PSS) has reported, the pressure disturbance in the magnetotail propagates in the fast compressional magneto-hydrodynamic mode. The time scale for the restoring equilibrium naturally depends on the fast magnetosonic wave velocity.

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