

Ion composition variations in the plasma sheet in response to IMF Bz turning: GEOTAIL/EPIC observations

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Plasma in the Earth's magnetosphere is supplied from two sources. One source is the solar wind, and the other is the ionosphere. For example, He²⁺ can be assumed to be all from the solar wind, and He⁺ or O⁺ is thought as ionospheric origin.

Within the magnetosphere, there is a boundary called geopause. The dynamics within this boundary is dominated by ionospheric plasma, and regions outside, by plasma of solar wind. The geopause is moved by the solar wind variation (especially IMF Bz).

In order to understand plasma dynamics, we analyzed plasma density variations of H⁺, He⁺, He²⁺, and O⁺ in the plasma sheet in response to IMF Bz turning. IMF data obtained from ACE were used.

We used the data from the Suprathermal Ion Composition Spectrometer (STICS) sensor of the Energetic Particle and Ion Composition (EPIC) instrument on GEOTAIL when it was located in the region of inside 14 Re, X is positive or Y=-20 Re to 20 Re, X=negative in the AGSM coordinate. The data span a period from January 1998 through November 2003.

We found that the O⁺ density around X=-15 Re increases in one hour and tends to be large at dawn side after IMF Bz southward turning.

When we examine the temporal variations of the O⁺ density globally (i.e., within the magnetosphere and plasma sheet), the O⁺ density increased in about 200 minutes after southward turning.

We will show results of H⁺, He⁺, He²⁺, and O⁺ variations in detail and compare the variation between them.