

## The statistical analysis of the cold, dense plasma in the magnetotail

# Katsuyuki Sagisaka[1]; Tsugunobu Nagai[2]

[1] Earth and Planetary Sci., Titech; [2] Tokyo Institute of Technology

<http://www.geo.titech.ac.jp/lab/nagai/sagikatu>

The plasmas in the magnetotail sometimes become colder and denser than those in the normal conditions. It is important to study occurrence of the cold and dense plasma sheet in order to understand the entry processes of the solar wind plasmas into the magnetosphere. The statistical study by Thomsen et al.[2003] shows that the 4-hour averaged IMF Bz higher than -5 nT produces the dense plasma at 6.6 Re in the magnetotail and that the dense plasma sheet is preceded mostly by a shock or a northward of IMF Bz. The event study by Wing et al.[2003] indicates that the plasma in the dawnside flank of the magnetotail becomes colder and denser rapidly after the shock of the solar wind. In this study, we make statistical analysis of the plasma sheet plasmas using the Geotail data in order to deduce the general characteristics of the plasma sheet.

We have examined measurements between January 1996 and December 2005 to identify the dense plasma event. For each event we computed the average value of the IMF Bz component observed at ACE or WIND over the 4-hour interval, and show a histogram of these average Bz values. For an evaluation of the interplanetary conditions preceding the cold and dense intervals, we examined each individual event with regard to four quantitative criteria.

- (1) Was there an interplanetary shock?
- (2) Did the IMF turn into the southward direction?
- (3) If the answer to either of the first criteria was yes, were there at least 3 hours of northward Bz preceding the shock or southward turning?
- (4) If the answer to either of the first criteria was yes, were there at least 3 hours of very weak Bz preceding the shock or southward turning?

According to the Thomsen et al.[2003], all of the shock and/or southward-turning events were preceded by at least 3 hours of either northward or weak field. We discussed about the difference between the results of the Thomsen et al.[2003] and the results of this study.