

Study of two-component protons in the dusk flank plasma sheet observed by THEMIS satellites

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It has been known that in the Earth's magnetosphere two-component protons at times emerge under northward IMF. These two components of protons are thought to have different origins; the hot protons (~ 10 keV) are of the magnetosphere proper and the cold protons (~ 1 keV) are from the solar wind. The latter is thought to come through the flanks across the magnetopause. However, the entry process of the cold plasma into the plasma sheet and the mechanism of the coexistence are not still totally understood. To obtain clues to understand these mechanisms, we investigate events where the THEMIS satellites observed two-component protons. Since the 5 THEMIS satellites orbiting the Earth at the magnetic equator are identically-instrumented, they have potential for simultaneous multipoint observation. In this study, we use data mainly from THEMIS B and THEMIS C, whose apogees are at about 30 Re and 20 Re, respectively, during the season of the satellites crossing the dusk flank magnetopause. The data show that the cold-dense plasma sheet with two-component protons develops and disappears at almost the same time in the dusk flank. On the other hand, we find some differences in plasma behavior between THEMIS B and THEMIS C locations. For example, the peak energy of protons observed by THEMIS C is higher than that by THEMIS B. We also find a temperature anisotropy of electrons in the region observed by each satellite. The temperature anisotropy has been known to exist in the cold plasma sheet and it can be useful to diagnose the physical process of the plasma undergoing there. In this presentation, we will show the existence of the two-component protons in the dusk flank region and discuss factors of their development and disappearance.