

PRESSURE CHANGE ASSOCIATED WITH DIPOLARIZATION IN THE NEAR-EARTH PLASMA SHEET

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We have studied pressure changes that occur in association with dipolarization in the plasma sheet of the near-Earth magnetotail around substorm onsets. We performed a superposed epoch analysis using Geotail data. Here the contribution of high-energy particles to the ion pressure was considered. It is found that, unlike the previously reported results, the ion pressure increases in association with dipolarization at $X \sim -10 R_E$ where the initial dipolarization takes place. This pressure change is largely contributed by high-energy particles. Tailward of this region, the ion pressure does not significantly increase even after the beginning of dipolarization, while it decreases in some cases; in both cases, the contribution of high-energy particles is not very large. Furthermore, the ion beta enhances around substorm expansion onset in the close vicinity of the magnetic equator of the initial dipolarization region. These observations suggest that the characteristics of the dipolarization differ between the initial dipolarization and tailward regions. We also examine in detail a few individual cases that were observed by Geotail and THEMIS in the vicinity of the magnetic equator. We also discuss implications for the rarefaction wave proposed in the current disruption model.

magnetotail, dipolarization, pressure

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