Energy distribution of electrons near the deep-tail magnetopause observed by GEOTAIL

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Solar wind electrons consist of core(kT = 10eV) and halo(kT = 80eV) components. Solar wind particles can enter into the nightside magnetosphere and form mantle region inside the magnetopause. It is important to investigate the distribution function of electrons with energies less than several hundred eV to study the entering process of solar wind into the magnetosphere.

In this context, we investgated energy distribution of electrons in the mantle and magnetosheath in the distant tail regions using GEOTAIL/LEP data during the interval when the spacecraft potential was reduced by ion emitter. This has been done because the in-situ measurements of electron energy ditribution functions are strongly affected by spacecraft potential and photoelectrons emitted from the spacecraft surface.

The result of our analysis shows that electrons in both magnetosheath and mantle regions had core and halo components as in the solar wind. In addition, temperatures of core and halo components did not change in both regions, but the density of core component decreased more significantly, when the spacecraft entered into the mantle than the halo component. This result implies that some filtering effect should work to the cold electrons but no effective heating is operative for electrons at the distant magnetopause.

In this paper we show typical examples of the events and discuss a possible electron transfer process at the distant magnetopause.