

Plasma wave in low-latitude boundary layer

Hiroyuki Kawabata[1], Hirotsugu Kojima[2], Hiroshi Matsumoto[2], Toshifumi Mukai[3]

[1] School of Electrical and Electronic Engineering, Kyoto Univ, [2] RASC, Kyoto Univ., [3] ISAS

The origin of the plasma of plasma sheet is believed to be the solar wind. However, the thermalization process of the solar wind cold plasmas to the hot plasma sheet plasmas is still unclear. The GEOTAIL satellite observed that the particle of the solar wind origin and the particle of the magnetosphere origin are mixed through low-latitude boundary layer (LLBL) into the plasma sheet. Since space plasmas are collisionless, exchange of kinetic energies can be conducted via plasma waves. Therefore, the plasma wave features observed in the LLBL reflect the thermalization process of solar wind plasmas.

In order to make clear the plasma wave signatures in the LLBL region, we performed the statistical analyses and detailed waveform analyses based on the GEOTAIL plasma wave instrument data. As results of performing statistics analysis using the data for three years obtained by GEOTAIL, in LLBL, it turns out that the electric field intensity of the frequency near lower hybrid resonance frequency is strongly enhanced. This shows the possibility that the plasma wave near lower hybrid resonance frequency is excited in LLBL. Moreover, the observed electric field intensities show the asymmetric distribution in the morning side and in evening side.

According to waveform analyses, in LLBL, we've found that the whistler-mode wave of the oblique propagation can be observed. The wave normal analyses of theirs show the possibility that the whistle-mode waves are excited in the LLBL region and propagate in the outward direction from the LLBL region.