Source location of Continuum Enhancements calculated from GEOTAIL direction finding data

Minoru Tsutsui [1], Isamu Nagano [2], Hiroshi Matsumoto [3], Roger, R. Anderson [4], Akira Miyamoto [5], Hironobu Takano [2], Yoshito Watanabe [6]

[1] Inst. Computer Sci. Kyoto Sangyo Univ, [2] Kanazawa Univ., [3] RASC, Kyoto Univ., [4] Univ. of Iowa, [5] Infor. Comm. Eng., Kyoto Sangyo Univ, [6] Infor. Comm., Kyoto Sangyo Univ

We have derived source locations of continuum enhancements from a geometrical analysis in a relation between the GEOTAIL orbit and wave arrival direction lines which were precisely obtained from MCA data of the GEOTAIL PWI system. In the analysis, a model of moving source of the continuum enhancement was used, in which the emission source drifts with a constant velocity along a path keeping a constant curvature radius centered at the earth during the concerned time period.

From the calculation, we have obtained that the derived source orbits are in a range between 10 and 15 earth radii in the midnight magnetosphere.

In a wave dynamic spectra derived from the GEOTAIL wave data, we sometimes find strong emissions whose spectral feature is similar to a fire ball and whose dominant frequency is in a range between 10 and 50 kHz. These emissions were first reported by Gough [1982] and was called Continuum Enhancement. From the observation using a wave direction finding technique, Filbert and Kellog [1989] found that these emissions were drifting from the dusk to the dawn in the nightside magnetsphere and concluded that these emissions are generated at the plasmapause by electron beems injections from the near tail in the maganetoshere. However, observationally, the source location of these continuum enhancements have remained unknown.

In order to find out the location of continuum enhancements observationally, we have developed a new analysis method of the GEOTAIL wave data. The analysis consists of two steps; one is to obtain wave arrival direction lines with a high precision, and another is a calculation to obtain the drifting orbit of the emission source, from the geometrical analysis in a relation of multiple lines of the wave arrival direction and the GEOTAIL orbit. In the analysis, we use a model in which the emission source is drifting with a constant velocity along a path keeping a constant curvature radius centered at the earth during the concerned time period.

From the calculation, we have obtained that the derived source orbits are in a range between 10 and 15 earth radii in the midnight magnetosphere. Quantitative analysis using this analysis method will make clear the position of plasmapause and its movement in the nightside magnetsphere and provide us important information on the magnetospheric dynamics.