Statistical Analysis of Latitudinal Electron Density Distribution in the Plasmasphere

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Plasma density distributions along magnetic field lines give important information on plasma supply mechanisms from the ionosphere.However, most observations so far are biased near the equatorial plane; there have been few observations which give information on the density along field lines.The geospace exploration satellites Arase and Van Allen Probes(RBSP) have orbital inclinations of about 31 and 10 degrees, respectively.These satellites sometimes fly at different latitudes on the same field line, simultaneously.Using such conjunction data, the field aligned profile of the electron density can be estimated.

The electron densities were calculated from the Upper Hybrid Resonance frequencies obtained by HFA / PWE onboard Arase or the EMFISIS Waves instrument onboard RBSP.In this study, we assumed a power-law density model in which the density decreases with the m_{th}-power of the geocentric distance by comparing electron densities at Arase and RBSP-A or B.

At this moment, the conjunction events on April 5, 2017 were analyzed, and the following results were obtained.For flux tubes of 3.20 The expected power-law index m depends on the plasma supply model. In the collisionless models, m is close to 4.On the other hand, in the diffusive equilibrium model, close to 0.5~1.So our results suggest that the plasmasphere is in diffusive equilibrium.

In this presentation, we will introduce further results and discuss the plasma supply mechanism.

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