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Multiple enhancements of the electron density in the cusp for brief southward excursions of IMF

Takuya Shirakawa¹, Satoshi Taguchi^{1*}, Keisuke Hosokawa¹, Yasunobu Ogawa²

¹Univ. of Electro-Communications, ²NIPR

A brief southward excursion of IMF is thought to cause a short-period enhancement of the magnetosheath plasma precipitation along the reconnected magnetic field lines, and of the electron density at F2 peak altitudes in the cusp. Our survey for the high time resolution data from EISCAT Svalbard Radar found events in which multiple enhancements of the electron density in the cusp were detected during a brief southward excursion of IMF. One of the clear events shows that three enhancements occurred within about 2 minutes of each other. This time interval is much shorter than the mean time between successive auroral events in the cusp, i.e., 6 min. Simultaneous observations of the plasma precipitation by DMSP spacecraft show that the cusp electron precipitation region has a few spatial boundaries in terms of the energy and energy flux of the precipitating electrons. We consider how these spatial boundaries can be incorporated in the multiple enhancements of the electron density detected by the radar, and present a picture for the phenomenon triggered in the ionospheric cusp by a brief southward excursion of IMF.

Keywords: cusp, electron density, plasma flow, IMF