Multiple spots of enhanced electron precipitation near the equatorward boundary of the cusp

*Satoshi Taguchi[1], Satoshi Kose[1], Kohei Takasu[1], Morio Tanaka[1], Keisuke Hosokawa[2], Yasunobu Ogawa[3]

1. Department of Geophysics, Graduate School of Science, Kyoto University, 2. Department of Communication Engineering and Informatics, University of Electro-Communications, 3. National Institute of Polar Research

Localized enhancements of electron precipitation near the equatorward boundary of the cusp is thought to be caused by enhanced fluxes of soft magnetosheath electrons in the flux tube immediately after localized intermitted reconnection on the dayside magnetopause. A recent study based on an all-sky imager has reported an event which shows that enhanced electron precipitation appears in two separate locations along the equatorward boundary of the cusp, and that the distance between them is approximately 0.2 MLT. In this study we have examined if there is any characteristic scale in the distance between neighboring electron precipitation spots near the equatorward of the cusp to understand the characteristics of the occurrence point of intermittent reconnection. We analyzed 630-nm aurora data from an all-sky imager at Longyearbyen, Svalbard, and electron precipitation and field-aligned current data from DMSP spacecraft, which flied in the field-of-view of the auroral imager. A simultaneous observation event shows that six enhanced electron precipitation regions, each of which is accompanied with an upward/downward pair of mesoscale field-aligned currents, were observed along the pass of the DMSP satellite, and that all of those enhanced electron precipitation regions were also identified as auroral spots in the 630-nm auroral image data. By examining auroral image data obtained before the simultaneous observation event, we traced back to the initial brightening for each auroral spot. The result of analysis has shown that the longitudinal distance between the neighboring spots near the equatorward boundary of the cusp lies between 0.15 and 0.4 MLT. The statistical analysis with data obtained for longer period of time on the same day has also shown a similar tendency. We discuss why localized intermittent reconnection tends to occur in such locations.

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