

Simultaneous existence of the cusp aurora and polar cap arcs during northward IMF

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The cusp aurora for northward IMF is created by the particle precipitation caused by high-latitude reconnection poleward of the cusp. The aurora generally appears at 75 - 80 MLAT in the daytime sector. In this sector the polar cap arcs are also often seen when IMF is northward. In this research we show the spatial and temporal features of the cusp aurora and polar cap arcs by examining events in which both exist simultaneously. We analyzed the 630 nm auroral image data from a highly sensitive all-sky imager at Longyearbyen, Svalbard in Norway, and the precipitating particle and ion drift data from the DMSP spacecraft. The spacecraft data show that lobe convection exists in the daytime sector, and that the cusp electron precipitation and higher-energy electron precipitation occur at different places simultaneously. It is also clear from the all-sky image data that the former and latter produce the cusp aurora and polar cap arcs, respectively. Detailed examination of the all-sky image data obtained immediately before and after the time when whether the observed auroral structures are the cusp proper or polar cap arcs are undoubtedly determined reveals their spatial and temporal features.

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