Imbalance between the electron and ion precipitations in the cusp for northward IMF

Yushin Oda[1]; Satoshi Taguchi[1]; Keisuke Hosokawa[2]
[1] Grad school of Science, Kyoto Univ.; [2] UEC

When IMF is northward, magnetosheath electrons and ions are injected into the cusp via high-latitude reconnection poleward of the cusp. The injected ions (protons) often produce the spot-like proton aurora at 75 - 85 MLAT in the dayside ionosphere, and the brightness of the proton aurora increases during intervals of high solar wind dynamic pressure. In this research we examine the features of the cusp electron precipitation for northward IMF using observations of cusp auroras from an all-sky imager at Longyearbyen, Svalbard, and in situ observations from the DMSP spacecraft. We analyzed the 630 nm auroral image data from the all-sky imager and the precipitating particles and ion drift data from the DMSP spacecraft. The simultaneous observations from the all-sky imager and the DMSP spacecraft during intervals of high solar wind dynamic pressure reveal that the precipitating electron energy flux is much smaller and less structured than the precipitating ion energy flux in the reverse convection region, producing weak 630 nm auroral emissions in the high-latitude part of the cusp. The statistical analysis of the integral number flux data from the DMSP spacecraft also shows that there exists a prominent imbalance between the electron and ion precipitations for northward IMF. Using solar wind parameters other than dynamic pressure and spatial distributions of the cusp electron precipitation, which is obtained from the aurora data, we discuss what determines the imbalance.