Flickering neutral atom fluxes in the direction of the high-altitude cusp: Simultaneous observations from IMAGE and SuperDARN

Yozo Murata[1]; Satoshi Taguchi[2]; Keisuke Hosokawa[2]; Akira Nakao[2]; Michael R. Collier[3]; Thomas E. Moore[3]; Natsuo Sato[4]; Hisao Yamagishi[5]; Akira Sessai Yukimatu[6]

[1] Sugadaira Space Radio Observatory
Univ. of Electro-Communications; [2] Univ. of Electro-Communications; [3] NASA GSFC; [4] NIPR; [5] Upper Atmos. Phys., Natl. Inst. Polar Res.; [6] UAP, NIPR (SOKENDAI, Polar Science)

The Low Energy Neutral Atom (LENA) imager on the IMAGE spacecraft in the dayside magnetosphere can detect neutral particles coming from the direction of the high-altitude cusp. Recent studies have shown that these LENA fluxes are composed of relatively stable high-latitude and flickering low-latitude emissions, and have interpreted the latter emission as the charge-exchange of the ion entry at the equatorward edge of the cusp with the hydrogen exosphere. In this study, we have examined temporal and spatial relations between the flickering LENA emissions and ionospheric cusp signatures identified with Super-DARN radars, using simultaneous observations of the cusp at the two altitudes. Results of analyses show that the enhancement of the SuperDARN backscatter power within the ionospheric cusp correlates with the appearance of the flickering LENA emissions when the latter is delayed by 2 minutes. This strongly suggests that the ions that produce neutral atom emissions at the high-altitude should precipitate into the ionosphere, and that the precipitation contributes to the enhancement of the backscatter power. In other words, the magnetic field lines threading the LENA emission region originate from the ionospheric region having the strong backscatter power. The connectivity from the high- to low-altitude cusp via magnetic filed lines during relatively high solar wind dynamic pressure, for which LENA cusp emissions are often observed, will be discussed.