中性粒子によって観測される経度方向に離れた２つのカスプイオンインジェクション領域

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Two azimuthally separated regions of the cusp ion injection observed via energetic neutral atoms

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When IMF is northward, the Low-Energy Neutral Atom (LENA) imager on the IMAGE spacecraft often detects neutral atom signals in the direction of the high-latitude magnetopause. These signals have been interpreted as being due to the ion injection from cusp reconnection. In this study we statistically examined the occurrence of the LENA cusp signal for northward IMF in terms of its arrival direction and the IMF clock angle to identify the characteristics of the cusp ion injection. Results of analyses show that the occurrence ratio of the injection is high around noon meridian when the clock angle is positive and relatively small (less than 45^o). Results also show that another high occurrence ratio can be identified in the prenoon sector for clock angles between ~30^o and ~60^o, indicating that injections occur in two azimuthally separated regions for clock angles of ~30^o to ~45^o. The prenoon part of these two regions expands smoothly toward the postnoon as the clock angle increases from ~45^o. When the clock angle is more than ~75^o, the region of high occurrence ratio occurs at a relatively wide region spanning the prenoon and postnoon sectors. This smoothly expanding feature suggests that the high ratio of the signal in that region is due to a common process, i.e., injection form dayside reconnection. In other words, the LENA signals identified in the prenoon sector for clock angles between ~30^o and ~60^o is due to injection from dayside reconnection in a situation that is unfavorable for antiparallel reconnection. This can explain a recent study showing that the brightening of proton aurora often occurs in the unexpected prenoon sector of the ionosphere during positive B_Y and positive B_Z.