Characteristics of lobe reconnection obtained from IMAGE/LENA and SuperDARN observations

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Our survey for the simultaneous observations of high- and low-altitude cusps from the low energy neutral atom (LENA) imager on the IMAGE spacecraft and the SuperDARN radars has revealed that the reverse convection is enhanced in the ionosphere in concurrence with the intensification of the LENA emissions in its field-of-view looking into the region poleward of the high-altitude cusp, or the plasma mantle/lobe. This concurrence suggests that LENA emissions are associated with the cause of the reverse convection, i.e., lobe reconnection. Using the plasma data from 3D MHD simulations for northward IMF and the distributions of the exospheric hydrogen density we have modeled neutral atom emission distributions. The result of the modeling shows that the LENA emissions in that direction can be interpreted as results of the charge-exchange of the reconnection jets with exospheric neutral hydrogen atoms. This interpretation suggests that the temporal and spatial variations of the emissions in LENA's field-of-view looking into the plasma mantle/lobe reflect the variations of lobe reconnection. We show the characteristics of such variations, and compare them with the variations of the backscattered signals representing the reverse convection, and with those seen in the modeling result. From this comparison we will discuss the temporal and spatial variations of lobe reconnection.