Evidence for the longitudinal motion of mesoscale plasma precipitation in the cusp

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Recent studies have suggested that the intense plasma precipitation region, which has a longitudinal scale size of 300-400 km and a latitudinal scale size of about 100 km, can be detached from the open-closed line in the cusp, and moves longitudinally. The moving speed of this precipitation region has been estimated to be approximately 2.5 km per second from the motion of the auroral image. Although this speed is within the reasonable range of flow bursts in the cusp, we require information that can conclusively establish how the moving mesoscale plasma precipitation (MMPP) appears in association with flow bursts in the cusp to understand how the MMPP is generated and how the MMPP affects other phenomena in the cusp/polar cap. In this paper, by using simultaneous observations of proton auroral emissions detected by Far Ultraviolet Instrument on IMAGE spacecraft, convection observed by two SuperDARN HF radars, and ground magnetic perturbations in the Greenland East Coast magnetometer chain, we show evidence that in fact, the MMPP moves with the convection speed longitudinally. We also discuss relationships between the MMPP, the ionospheric signatures of flux transfer events, and the polar patches.