

Plumes and irregularities near the plasmopause region

H. LAAKSO, P. ESCOUBET, H. KHAN, A. MASSON, H. OPGENOORTH
ESA/ESTEC, Code SCI-SH, Noordwijk, The Netherlands

We investigate the characteristics of plasma density and $\mathbf{E} \times \mathbf{B}$ drift in the plasmasphere, plasmopause, and trough regions. In the dusk sector one can regularly detect plumes, detached plasmaspheric elements, and density irregularities. We examine them in detail during weak/moderate geomagnetic activity, using Cluster and Polar electric field observations that give both density profiles and drift velocities. Plumes are usually 1-2 L shell wide and the plasma drift velocity within the plume is 5-20 km/s westward/noonward, while outside the plume the drift velocity is only a few km/s westward. Increase in geomagnetic activity increase the convection speed in the magnetosphere, forcing the plume to move earthward at 30 km/s velocity. In addition Cluster has witnessed the formation of isolated drifting plasmaspheric flux tubes. These structures may be related to the formation of the plume itself. They drift at the same velocity as the ambient plasma (eastward in the corotation region and westward in the convection region) and their cross sections are about 0.1 L shell.

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