MASS TRANSPORT IN THE MAGNETOTAIL LOBES

HAALAND S.1, Lybekk B.2, Svenes K.3, Pedersen A.2, Foerster M.4, Vaith H.5, Torbert R.5

1. Max-Planck Institute, Germany and University of Bergen, Norway
2. University of Oslo, Norway
3. Norwegian Defense Research Establishment, Norway
4. GeoForschungsZentrum Potsdam, Germany
5. University of New Hampshire, USA

The Earth's magnetosphere is populated by particles originating from the solar wind and the terrestrial ionosphere. A substantial fraction of the plasma from these sources are convected through the magnetotail lobes. In this paper, we present a statistical study of convective mass transport through the Earth's magnetotail lobes for various geomagnetic conditions. The results are based on a combination of density measurements from the Electric Field and Waves Experiment (EFW) and convection velocities from the Electron Drift Instrument (EDI) on board the Cluster spacecraft. The results show that variations in the plasma mass flow is primarily attributed to changes in the convection velocity, whereas the plasma density remains fairly constant and shows little correlation with geomagnetic activity. During disturbed conditions there is also an increased abundance of heavier ions, which combined with enhanced convection, cause an accentuation of the mass flow. The convective transport is much slower than the field aligned transport. A substantial amount of plasma therefore escape downtail without ever reaching the central plasma sheet.

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Stein Haaland, Max-Planck Institute, Germany and University of Bergen, Norway