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Cluster EDI Observations of the Asymmetric Plasma Convection in the Magnetotail Lobes During Different Levels of Tail Reconnection Rate

Anders Ohma (1), Nikolai Østgaard (1), Jone Peter Reistad (1), Paul Tenfjord (1), Karl M. Laundal (1), Therese Moretto Jørgensen (1), Stein Haaland (1,2)

(1) Birkeland Centre for Space Science, Department of Physics and Technology, University of Bergen, Norway (Anders.Ohma@uib.no), (2) Max-Planck Institute for Solar Systems Research, Göttingen, Germany

In this study we use high quality convection data from the Electron Drift Instrument (EDI) on board Cluster to investigate how tail reconnection affects the average convection pattern in the magnetotail lobes when the interplanetary magnetic field (IMF) has a dominating east-west (B_y) component. We find that the convection chances from a convection dominantly the Y_{GSM}-direction, but opposite in the two hemispheres, to a flow oriented more towards the plasma sheet when reconnection enhances in the near Earth tail. This result is consistent with recent observations of the convection in the ionosphere, which suggest that the nightside convection pattern becomes more north-south symmetric when tail reconnection increases. This is also supported by simultaneous auroral observations from the two hemispheres, which shows that conjugate auroral features become more symmetric during substorm expansion phase when tail reconnection maximizes. The return to a more symmetric state can be interpreted as the result of reduced asymmetric lobe pressure during periods with strong tail reconnection, and is therefore consistent with asymmetric lobe pressure being the cause of the initial asymmetry in the magnetosphere.