Geophysical Research Abstracts
Vol. 20, EGU2018-4458, 2018
EGU General Assembly 2018

How much flux does a flux transfer event transfer?

Robert Fear (1), Lorenzo Trenchi (1,2), John Coxon (1), and Steve Milan (3)

(1) University of Southampton, School of Physics and Astronomy, Southampton, United Kingdom (r.c.fear@soton.ac.uk), (2) Now at ESRIN, European Space Agency, Frascati, Italy, (3) Department of Physics and Astronomy, University of Leicester, Leicester, UK

Flux transfer events are bursts of reconnection at the dayside magnetopause, which give rise to characteristic signatures observed by a range of magnetospheric/ionospheric instrumentation. One outstanding problem is that there is a fundamental mismatch between space-based and ionospheric estimates of the flux that is opened by each flux transfer event—in other words, their overall significance in the Dungey cycle. Spacecraft-based estimates of the flux content of individual flux transfer events (FTEs) correspond to each event transferring flux equivalent to approximately 1% of the open flux in the magnetosphere, whereas studies based on global-scale radar and auroral observations suggest this figure could be of the order of 10%. In the former case, flux transfer events would be a minor detail in the Dungey cycle, but in the latter they could be its main driver. We present observations of two conjunctions between flux transfer events observed by the Cluster spacecraft and pulsed ionospheric flows observed by the Super Dual Auroral Radar Network (SuperDARN) network. In both cases, a similar number of FTE signatures were observed by Cluster and one of the SuperDARN radars, but the conjunctions differ in the azimuthal separation of the spacecraft and ionospheric observations (i.e. the distance of the spacecraft from the cusp throat). We argue that the reason for the existing mismatch in flux estimates is due to implicit assumptions made about FTE structure, which tacitly ignore the majority of flux opened in mechanisms based on longer reconnection lines. If the effects of such mechanisms are considered, a much better match is found. We also briefly consider the implications for FTEs at Mercury.