Geophysical Research Abstracts
Vol. 20, EGU2018-5713, 2018
EGU General Assembly 2018

Structure and dynamics of reconnection outflows at the dayside magnetopause

Jean Berchem (1), Giovanni Lapenta (2), Robert Richard (1), Mostafa El-Alaoui (1), Raymond Walker (3), and David Schriver (1)

(1) UCLA, Department of Physics and Astronomy, Los Angeles, California, USA , (2) Centre for Plasma Astrophysics, Department of Mathematics, KU, Leuven, Belgium, (3) UCLA, Department of Earth, Planetary and Space Sciences, Los Angeles, California, USA

Recent observations and numerical simulations have revealed a wide variety of plasma populations and electromagnetic structures in the reconnection outflow regions. They also indicate that a large fraction of the energization occurs as the plasma crosses the reconnection separatrices far away from the diffusion regions. We have carried out 3D semi-global kinetic simulations to investigate how plasma distributions and electromagnetic fields, as well as filamentary structures, develop, evolve and interact in the outflow regions and how these processes affect the amount and partitioning of energy conversion for different plasma parameters and magnetic field shears at the magnetopause. The simulation model uses the results of global magnetohydrodynamic (MHD) simulations to set the initial state and the evolving boundary conditions of fully kinetic implicit particle-in-cell (iPic3D) simulations. This approach allows us to include large domains both in space and energy. We analyze the results of the iPic3D simulations by discussing wave spectra and particle velocity distribution functions observed in the different regions of the simulation domain. We discuss the relevance of our results by comparing them with local observations by the MMS spacecraft.