Multi-Satellite Observations of Source and Seed Populations of Energetic Electron Microinjections

Shiva Kavosi*[1], Adam Micheal[2], and Katariina Nykyri[3]

[1]University of New Mexico – United States
[2]John Hopkins University Applied Physics Lab – United States
[3]NASA Goddard Space Flight Center – United States

Abstract

Despite recent advances in understanding the energetic electron microinjections observed in the dusk region of Earth's magnetosphere, their generation mechanisms have yet to be conclusively identified. Here, we present a multi-satellite case study of electron microinjections observed by Magnetospheric Multiscale (MMS) and their possible source origin observed by Geotail. The multi-satellite analysis and the high-resolution OpenGGCM magnetohydrodynamic simulations created for real solar wind and IMF orientations during the event suggest that the observed Electron microinjections are associated with Flux Transfer Events (FTEs). In addition, the simulation results reveal the formation of new diamagnetic cavities (DMCs) protruding into the trail of FTEs at low latitude magnetopause, characterized by enhanced plasma beta and high fluxes of high-energy electrons. The high-energy electron trapped in these transient component DMCs may be the seed populations of electron microinjections, providing a likely explanation for the acceleration process and the high-energy electrons observed as microinjections.

*Speaker