Project Details

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Topic: Effects of Ionospheric-Magnetospheric Plasma Redistribution on Storms

Project Title:
Effects of Stormtime Plasma Redistribution on Magnetosphere-Ionosphere Coupling

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Summary:
The Coupled Magnetosphere-Ionosphere-Thermosphere (CMIT) global simulation model will be used to determine how stormtime ionospheric outflows influence 1) the convective transport of ionospheric plasma at auroral and polar latitudes, 2) the distribution and intensity of field-aligned currents at the ionosphere, and 3) the distribution and dynamics of the ionospheric conductivity and Joule dissipation. CMIT integrates the Lyon-Fedder-Mobarry (LFM) global magnetospheric model with the NCAR Thermosphere-Ionosphere Nested Grid (TING) model. This project takes an important step in modeling the magnetospheric and ionospheric-thermospheric regions as a single connected system by including both electrodynamic and inertial couplings between the regions. To this end, we will utilize and advance a recently implemented, multifluid version of the LFM component of CMIT. Proposed extensions to the CMIT model also include causally driven cusp-region, auroral/polar-cap boundary-region, and polar-wind outflows at LFM's ionospheric boundary, regulated by TING's dynamic specification of the ionosphere. This investigation is directly aligned with the goals of LWS TR&T Focused Science Topic b) Effects of Ionospheric-Magnetospheric Plasma Redistribution on Storms. The results will provide a useful touchstone for interpreting measurements, especially mass composition measurements, from existing NASA satellite missions such as Polar and Cluster, and it anticipates future needs to interpret distributed measurements of ionospheric and magnetospheric dynamics from the imminent THEMIS and TWINS missions, the LWS Radiation Belt and IT Storm Probes, and the GEC and MMS satellites.

Publication References:

no references