Project Details

ROSES ID: NNH06ZDA001N
Selection Year: 2007
Program Element: Focused Science Topic

Topic: Effects of Ionospheric-Magnetospheric Plasma Redistribution on Storms

Project Title:
Auroral Ionosphere-Magnetosphere Plasma Transport with Alfvén Kinetic Effects

PI Name: James Horwitz
PI Email: atn@g.ucla.edu
Affiliation: The University of Texas at Arlington
Summary:
The central objective of this proposed effort will be to understand the interplay of ion and electron and wave dynamics in the field-aligned plasma transport along auroral ionosphere-magnetosphere flux tubes.

We will combine analysis of particle, wave and field observations from aboard recent spacecraft sampling the auroral ionosphere-magnetosphere coupling regions, with the coupling of an ionospheric plasma transport model with kinetic effects and a code for simulating the propagation and effects of Alfv n waves on electron energization, to synergistically explore key aspects of the physics of the high-latitude ionosphere- magnetosphere region extending from the ionosphere to approximately 1 RE altitude. The data utilized will include observations from POLAR, FAST, DMSP and other relevant spacecraft. One important outcome expected from this investigation is the distillation of new useful formulas for the ionospheric plasma outflows as functions of the principal drivers of these outflows. These formulas will be designed for convenient use by global magnetospheric modelers. These and all other projects within this proposal fit under the LWS TR&T targeted objective, T3b: Ionosphere-Magnetosphere plasma redistribution.

The mysterious beauty of the aurora fires the imagination and awe of all who view it. This project is significant because it will determine the dynamic interaction between ionospheric plasma outflow and Alfv n wave driven auroral electron acceleration and the complex auroral region plasma processes from the collision-dominated ionospheric E- region to collisionless regions at very high altitudes.

Publication References:

Summary: no summary

Reference: Zeng, W.; Horwitz, J. L.; (2007), Formula representation of auroral ionospheric O+ outflows based on systematic simulations with effects of soft electron precipitation and transverse ion heating, Geophysical Research Letters, Volume 34, Issue 6, CiteID L06103, doi: 10.1029/2006GL028632

Summary: no summary

Reference: Su, Yi-Jiun; Ergun, R. E.; Jones, S. T.; Strangeway, R. J.; Chaston, C. C.; Parker, S. E.; Horwitz, J. L.; (2007), Generation of short-burst radiation through Alfvénic acceleration of auroral electrons, Journal of Geophysical Research: Space Physics, Volume 112, Issue A6, CiteID A06209, doi: 10.1029/2006JA012131

Summary: no summary

Reference: Moore, T. E.; Horwitz, J. L.; (2007), Stellar ablation of planetary atmospheres, Reviews of Geophysics, Volume 45, Issue 3, CiteID RG3002, doi: 10.1029/2005RG000194