Project Details

ROSES ID: NRA-00-OSS-01
Selection Year: 2001
Program Element: Independent Investigation: LWS

Project Title:
Preparing for Multi-spacecraft Missions: Auroral Space-Time Scales and Magnetotail Assimilation Model

PI Name: Simon Wing
PI Email: atn@g.ucla.edu
Affiliation: Applied Physics Laboratory
Summary:
The roadmap of NASA SEC STP calls for launch of several multispacecraft missions, namely Magnetospheric Multiscale (MMS), Magnetospheric Constellation (MC), and Geospace Electrodynamic Connections (GEC). NASA SEC LWS program will also launch complementary multispacecraft missions, e.g., Ionospheric Mappers (IM). Our proposed work will help these missions in 2 areas: (1) develop a method to assimilate unprecedented multi-point data sets in unified and coherent manners, and (2) determine the optimal spacecraft orbit and spacing. These objectives will contribute significantly to the LWS program goals of (1) establishing a space weather research network and (2) developing cost-effective techniques for assimilating data from networks of spacecraft. These studies are described below.
1. We will exploit coincidences between FAST and one or more DMSP satellites to study (1) Large-scale electron acceleration events on the nightside and (2) Morning sector diffuse aurora. The particular focus of the study is space-time scales of energy transfer (in the form of particle precipitation) from the magnetosphre to ionosphere and thermosphere in the auroral zone, which affects the conductivity, Joule heating, and the electrodynamics, including horizontal and perpendicular currents. From this study, we will be able to recommend the optimal/maximum/minimum IM spacecraft spacing and orbit for measuring auroral particle precipitation.
2. We will develop a magnetotail assimilation model which assimilates multi-point magnetospheric and ionospheric observations into a globally coherent and unified images of the magnetotail (tailward of ~8-10 Re). This model will be based on our recently developed technique which integrates ionospheric observations to create 2-D/3-D global images of the plasma sheet ion pressure, temperature, and density. We will verify and refine our technique with mid-altitude (Polar) and high-altitude (Geotail) observations. LWS currently does not plan any mission to the magnetotail, but our proposed method will be able to construct magnetotail plasma images with observations from IM along with MC, MMS, and GEC.

Publication References:

no references