Project Details

ROSES ID: NNH07ZDA001N
Selection Year: 2008
Program Element: Focused Science Topic

Topic: Focused science topics for Strategic Goal 4 (Ionosphere-Thermosphere): Determine the sources of daily variability in the thermosphere and ionosphere

Project Title:
Thermal upwelling of neutral particles at high latitudes

PI Name: Marc Lessard
PI Email: marc.lessard@unh.edu
Affiliation: University of New Hampshire
Project Member(s):
- Lund, Eric J; Co-I; null
- CROWLEY, GEOFFREY ; Co-I/Institutional PI; null
- Otto, Antonius ; Co-I/Institutional PI; University of Alaska
- Sadler, Brent ; Graduate/Undergraduate Student; University of New Hampshire

Summary:
Recent results from the CHAMP satellite show the persistence of neutral gas density enhancements at 400+ km in the cusp region. These observations were made using the ultra-sensitive accelerometer on CHAMP and, by comparison with CHAMP magnetic field data, were determined to be associated with strong field-aligned currents in the northern hemisphere cusp region. Unlike the situation at lower latitudes, attempts to understand density enhancements in this region in terms of Joule heating alone have not been successful; competing theories have since been put forth that attribute the upwelling to electrodynamic processes in the cusp, such as those related to ion outflow, etc. The goal of this project is to determine the extent these competing processes contribute. This will be accomplished with an effort that combines data analysis, numerical results of large-scale Joule heating and numerical results of electrodynamic processes. The approach will be to examine data from the FAST satellite during several of its conjunctions with CHAMP, which have already been identified. These data will both support the analytical aspect of this project, as well as provide input for the numerical studies.

Publication References:

Summary: no summary

Reference: Sadler, F. Brent; Lessard, Marc; Lund, Eric; Otto, Antonius; Lühr, Hermann; (2012), Auroral precipitation/ion upwelling as a driver of neutral density enhancement in the cusp, Journal of Atmospheric and Solar-Terrestrial Physics, Volume 87, p. 82-90., doi: 10.1016/j.jastp.2012.03.003