2016 Workshop: High Latitude Geospace System

Long title
Grand Challenge: The High-Latitude Geospace System
Grand Challenge
CEDAR-GEM
Conveners
Joshua Semeter
Cheryl Huang
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Matthew Zettergren
Description

This workshop provides a forum for the community of investigators studying geospace system dynamics in Earth's geomagnetic polar regions. Contributions are welcome in the form of brief focused presentations. Of particular interest are investigations combining ground-based and space-based perspectives, and/or attempts to synthesize diverse measurements through physical, statistical, and empirical modeling. The sessions will include time for open discussion assessing progress and discussing future directions.

Agenda

Session 1:

1. Joshua Semeter (session overview, PMAFs and small-scale convection cells)

2. Toshi Nishimura (polar cap precipitation and interpretation)

3. Seebany Datta-Barua (Lagrangian coherent structures)

4. Robert Gillies (RISR-C / PolarDARN / SWARM / Imager comparisons)

5. Roger Varney (topside experiments with RISR-N and RISR-C)

6. Hassan Akbari (Ionospheric destabilization: drivers and consequences)

Session 2:

1. Ildiko Horvath (stormtime flows, presented by Cheryl Huang)

2. Yanshi Huang (DMSP-ESR conjugate studies of plasma state)

3. Ryan Mcgranaghan (ionospheric variability and AIMIE-2)

4. Matthew Zettergren (Mesoscale density structures and grad-drift instability)

5. Ying Zou (SWARM observations of polar FACs)

6. Manbharat Singh Dhadly (ion-neutral interactions and climatology)

Justification

The magnetosphere, ionosphere, and thermosphere respond as a coherently integrated system to variations in the solar wind. This ‘system science’ paradigm is well recognized as the path forward for advancing space weather predictive capabilities, as embraced by the CEDAR Strategic Plan and the NRC Decadal Survey. Nowhere is the systems approach more important than at high geomagnetic latitudes, where solar wind power enters the geospace system through a cascade of interacting multi-scale processes.

Recent years have witnessed a rapid expansion of instruments and networks deployed to the geomagnetic polar regions. These measurements are being supported by an increasingly sophisticated suite of models (assimilative, empirical, first-principles) and conjugate observations from new and legacy orbital platforms (ePOP, SWARM, DMSP, Cubesats). Efforts to reconcile ground- and space-based perspectives have called into question our understanding of four key areas: (1) electromagnetic energy input and transfer in the geomagnetic polar regions, (2) sources and impacts of instabilities and turbulence on the high-latitude I-T system, (3) affects of extreme gradients on electrodynamic coupling with the polar magnetosphere, and (4) sources and mechanisms of high-latitude plasma escape. The purpose of this grand-challenge workshop is to provide a forum for the community of investigators addressing these and related processes in Earth’s open geomagnetic field region from disparate perspectives.

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