2014 Workshop: ITM Science Challenges

Long title
Grand Challenge: ITM Key Science Challenges during the Van Allen Probes / Great Observatory Era
Grand Challenge
Conveners
Andrew Gerrard
P. Erickson
C. Martinis
Description

The proposed workshop brings together the ITM communities, currently distributed across both NSF CEDAR and GEM, to discuss relevant science issues. The timing of the workshop is motivated by the ongoing highly successful THEMIS and Van Allen Probes spacecraft missions, currently providing unprecedented complementary coverage of the inner and outer magnetosphere. Focused efforts will foster the exploration of key ITM topics, including energetic particle precipitation from the radiation belts, ring current loss to the thermosphere, dynamics of sub-auroral polarization streams (SAPS), ionospheric-modulated electric field diffusivity, and others. Underscoring the relevance of the workshop, recent studies [e.g., Foster et al., 2013; Gerrard et al., 2013; Makela et al. 2014] have highlighted the crucial importance of an interdisciplinary approach to basic ITM research as applied in particular to CEDAR challenges,

We will actively discourage AGU style presentations and instead encourage short-presentation workshop style and open discussion. The session will have 3-5 invited speakers (TBD) to set overall system level context, with remaining time devoted to open discussion and short presentations.

Justification

The August 2012 launch of the NASA Van Allen (VA) Probes has ushered in a new data-driven era of coupled geospace research involving nearly all aspects of the ionosphere-thermosphere-magnetosphere (ITM) system. The current set of ground and space based assets gives for the first time a compelling and wide ranging

simultaneous coverage of processes in e.g. the outer magnetosphere (spacecraft: THEMIS, LANL, GOES geosynchronous), inner magnetosphere (spacecraft: VA Probes), and ionosphere/thermosphere (satellite: DMSP, ePOP, SWARM, C/NOFS; CEDAR ground-based assets). As such, there is a compelling and timely need for organization of the ITM community so that progress in interdisciplinary ITM research can proceed.

The goal of the proposed workshop is to bring together members of the geospace community over the next 3-4 years to present, discuss, identify, and organize the most outstanding scientific questions in ITM research. Ultimately, this workshop seeks to bring closure on such questions. Such motivation satisfies a number of strategic thrusts outlined in the most recent CEDAR strategic plan [CEDAR The New Dimension, June 2011], including:

- Strategic Thrust #2: Explore Exchange Processes at Interfaces and Boundaries
- Strategic Thrust #4: Develop Observational and Instrumentation Strategies for Geospace System Studies
- Strategic Thrust #5: Fuse the Knowledge Base across Disciplines
- Strategic Thrust #6:Manage, Mine, and Manipulate Geoscience Data and Models

The overarching scientific theme of the workshops will be “data-driven ITM science.” We note that this is not exclusive of theory or modeling endeavors, so long as data is utilized for theory and/or model validation. This theme is distinct from other ITM research routes (e.g., CEDAR-GEM modeling challenges).

View PDF