2013 Workshop: CEDAR ETI Modeling Challenge

Long title
CEDAR ETI Modeling Challenge
Conveners
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Description

CEDAR community has been leading the CEDAR Electrodynamics Thermosphere Ionosphere (ETI) Challenge since 2009 in order to assess accuracy of IT model predictions against observations. The results of the first round of CEDAR ETI Challenge were published in two papers in Space Weather. The Challenge has been expanded to include global TEC/NmF2/hmF2, Joule heat, climatological study, and the study of role of high-latitude drivers on the ionosphere/thermosphere parameters by using global MHD model outputs along with Weimer-2005 and AMIE (Assimilative Mapping of Ionospheric Electrodynamics) potential models (information on GEM-CEDAR Challenge) .

For the study of role of high-latitude drivers (MI coupling), CCMC developed tools based on the Kameleon converter and interpolator for 2D ionosphere electrodynamics files to swap ionosphere drivers at any position (geomagnetic latitude and MLT) or on any grid with any time resolution. During the CEDAR-GEM Challenge Meeting at the 2013 Space Weather Workshop (April 15, 2013), the modelers and CCMC reached an agreement on the format of the code that will be used for swapping electrodynamics drivers with the tools.

In order to move forward with MI coupling study, in the session this year we will discuss topics on the list below:

Topics for discussion and tentative agenda:

- MI coupling study: Tools for swapping drivers - We will review progress in tool development since April 2013, and discuss next step action items.

    - High latitude electric potential
    - Particle precipitation
    - Penetration electric field
- Model-Data Comparison - People are invited to present on this topic.
    - How to quantify storm impact on the ionosphere and thermosphere
- Climatology study
    - Climatology study of IT models in low solar flux conditions
- Preparation for a new model/data comparison project - Data will be available soon and we will discuss the priority of various time intervals.
    - Ne and Te at ISS locations in 2012

Agenda

- Different Drivers
    - Ja Soon Shim (CTIPe and TIEGCM with Weimer 2005, AMIE-ASTRA, and SWMF)
    - Aaron Ridley (GITM)
    - Masha Kuznetsova (Kameleon, drivers, aurora (Add Ovation Prime)
- Tim Fuller-Rowell, Metrics for Ionospheric Processes in Storms
    - Discussion:

1. Do orbit averaged 400km CHAMP neutral density to find energy input
2. Do O/N2 from SSULI, SSUSI, GUVI for boundary between sharp gradient between high and mid to low latitudes
3. Do TEC from MIT to see structure and enhancements at mid-latitudes
4. Add Conde's SDI/FPI for neutral winds over Alaska; Add CHAMP Ne equatorial anomaly (EA) peaks (co-locate peaks for comparison, 1/e fall-off distance, and distance between EA NH and SH); Add Delores Knipp's F15 Poynting flux to compare with model QJ (in addition to CHAMP 400km neutral density)

- Barbara Emery, Climatology Assessment of Ionosphere/Thermosphere Models in Low Solar Flux Conditions for the CCMC CEDAR Challenge: Status, Lessons Learned, and Future Plans
    - Discussion: Add more ~Dec smin C/NOFS and CHAMP data sets to 07325-08020 study; Add another climatology period - probably with storm in March 2013 - from Feb-Apr 2013, to study both storm and climatology periods with PINOT (Nov12 and Mar13) campaigns etc (Will have to back up to similar March F107~120 conditions of CHAMP Un etc, but can use C/NOFS obs in 2013.)

Justification

This workshop will address the CEDAR Strategic Thrust #5 as the workshop will facilitate collaboration among modelers, data providers and research communities in order to address the differences between various modeling approaches, to track model improvements over time, and to provide feedback for further model improvement. The workshop will also address MI coupling that is relevant to one of scientific goals of the Decadal Survey for Solar and Space Physics. We will discuss how high-latitude drivers obtained from different potential models affect the ionospheric/thermospheric parameters.

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