2011 Workshop: Ionospheric Data Assimilation

Long title
Ionospheric Data Assimilation: Current Status and Future Plans
Conveners
G. Bust
X. Pi
S. Datta-Barua
Description

This workshop will focus on two primary Ionosphere-Thermosphere (IT) data assimilation topics. The first half of the workshop will be devoted to brief (5 minutes each) reports on the current status of IT data assimilation algorithms, and next-stage research and development plans for these algorithms. The second half of the workshop will be a planning discussion on developing a community wide data assimilation self-assessment and validation of the state of IT data assimilation. The idea here is for the community to come together, in a cooperative, joint, interactive manner, and honestly assess the current state (accuracy, robustness etc) of IT data assimilation algorithms. The planning discussion will include the following:

1) Data Comparisons

a. Determine a set of days that will be used for the validation
b. For those days, determine what data sets will be used as comparisons against the data assimilation results.
c. Define a set of common metrics that everyone will use for the comparisons.
d. Who will be responsible for collecting independent data together, and where will it be hosted

2) Simulation Comparisons

a. Determine model that can be used to simulate the IT system.
b. Determine data sets that will be simulated from the model
c. Determine who will run the models and simulate the data and where will results be hosted.

We hope that the outcome of this planning meeting will result in the various data assimilation models being run over the time periods decided upon, both for data and model simulations. And that a data assimilation workshop will be planned for ~ 6 months later where results will be presented by the various groups, comparisons made with the independent data sets and simulations and metrics cross-compared. Based upon the results the workshop will then focus on what the areas of data assimilation are that need improvement, and what are possible ways forward. An expected outcome of both the CEDAR and future data assimilation workshops is that the entire data assimilation community will adopt a close cooperative research approach.

For this workshop we welcome all members of the IT data assimilation community to make brief presentations on the current status of their algorithms, and future plans. We also welcome the entire CEDAR / GEM community to be part of the planning discussion, since these data assimilation algorithms are of benefit to the entire community.

Overview

“Ionospheric Data Assimilation: Current Status and Future Plans” will review current state-of-the-art techniques in Ionosphere-Thermosphere data assimilation, and serve as a planning platform for a coordinated assessment forum. The development of IT data assimilation requires self-assessment of accuracy, robustness, strengths, and weaknesses of the various assimilation algorithms. This workshop intends to discuss and develop an assessment plan that will continue to foster greater cooperation and interaction among the various research groups into IT Data assimilation begun at previous CEDAR meetings.

For this workshop we welcome all members of the data assimilation community to make brief presentations on the current status of their algorithms and future plans. We also welcome the entire CEDAR / GEM community to be part of the planning discussion, since these data assimilation algorithms are of benefit to the entire community.

Agenda

Workshop Part 1 (1 hour)

The first half of the workshop will be devoted to brief “state-of-the-field” reports on the current status of IT data assimilation algorithms, and next-stage research and development plans for these algorithms. Confirmed speakers to date include:

- X. Pi
- G. Bust
- S. Datta-Barua
- L. Scherliess
- A. Richmond

Workshop Part 2 (1 hour)

The second half of the workshop (1 hour) will be a planning discussion on developing a community-wide data assimilation self-assessment and validation of various algorithms and the state of IT data assimilation, in a cooperative, joint, and interactive manner.

Topics for the open forum Discussion Session include:

1) Data assimilation test bed

- Simulated data sets and truth
- Actual test data sets and validation data sets
- Metrics to quantify performance improvements

2) Data Assimilation (DA) Workshop

- Define degree of cooperation and sharing ideas / results / problems that is achievable and useful for the whole DA field
- Develop 5 year plan for ionospheric DA field direction to take, cooperatively and individually
- Science topics that DA methods could address over the next 5 years

3) Potential Technical and/or Programmatic Issues

- Implementation issues regarding development of data assimilation test bed
- Workshop issues: When, where, how supported
- How can the data assimilation consortium move forward as a group?
- What are the 2-3 leading technical issues ahead?

Justification

IT Data assimilation workshops have been held for the last 2 CEDAR meetings. Those workshop have led to greater cooperation and interaction among the various research groups.

However, we are at a state where it is time for the community to begin to self-assess where we are in terms of how accurate the various assimilation algorithms are, what are their strengths and what are their weaknesses.

Based upon these assessments, if we discover certain techniques or methods that seem to work well, these can be shared with both the data assimilation and wider CEDAR community. Further, as we make this assessment, we hopefully will be able to identify what areas of improvement there are, and we can jointly and cooperatively make plans to implement these improvements.

This workshop will lay the ground work for such an assessment plan, with the hopes that at the following workshop we will be able to report on the results of our validation assessment.

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