2011 Workshop: Student Tutorial on Data Assimilation

Long title
Student Tutorial on Data Assimilation
CEDAR-GEM
Conveners
Tomoko Matsuo
Description

GOAL: Inform students about the basics of data assimilation, and explain step by step how each component (model, observation, principles of statistical inference) works together to yield an optimal analysis. We will also provide examples from specific applications to high-latitude ionospheric electrodynamics.

Topics:

- Fundamentals of data assimilation (Bayes' Rule)
- Variance, correlation, and covariance
- Observations
- Background (empirical) models
- Roles of background and observational error covariance

This presentation will be offered at the "101 Level", and will emphasize data assimilation techniques for the high latitude ionospheric electrodynamics that do not involve dynamical forecast models.

This joint workshop will be held primarily for the benefit of students but also anyone who is interested in learning basics of data assimilation and space science applications. The basics of data assimilation will be presented step-by-step, how each component (model, observation, principles of statistical inference such as Bayes's rule, covariances etc) works together to yield an optimal analysis. We will offer *three* 30-minute tutorial presentations that cover different DA applications in space sciences, ranging from the ionosphere and high-latitude ionospheric electrodynamics to the radiation belt.

Agenda

Opening Remarks by Delores Knipp (moderator)

- Data Assimilation Techniques 101 (and Their Use for Ionospheric Science and Applications) (pdf) by Ludger Scherliess (Utah State University)
- Understanding Data Assimilation: Applications to High-Latitude Ionospheric Electrodynamics (pdf) by Tomoko Matsuo (University of Colorado, SWPC/NOAA)
- Radiation Belt Data Assimilation: Overview and Challenges (pdf) by Josef Koller and Humberto Godinez (Los Alamos National Laboratory)
- Ionospheric Imaging and Data Assimilation (pdf) by Gary S Bust (Atmospheric & Space Technology Research Associates)

OPEN DISCUSSION & QUESTIONS

Justification

In our 2010 NSF National Space Weather Proposal on Assimilative Mapping we offered to host a student tutorial on data assimilation at the joint CEDAR-GEM meeting. This was called out as a highlight of the funded proposal.

View PDF