2013 Workshop: Data assimilation at MIT boundaries

Long title
MIT boundary region science enabled by data assimilation
Conveners
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Description

Data assimilation has been developing in recent years as a viable method for specification and forecast of upper atmospheric dynamics. Its advantages include the ability to initialize physical models and optimize model boundary conditions and parameters with actual measurements, and importantly to facilitate inference of unobserved physical parameters from observations using first-principles. This makes it a powerful technique for examining the science at the boundaries of regions for which there are typically distinct models and there is abundant observation in one region but not in the other overlapping region, e.g., between the thermosphere and ionosphere, the magnetosphere and ionosphere, and the lower atmosphere and upper atmosphere.

This workshop will focus on the capabilities and complexities of using data assimilation for improved understanding of dynamical coupling, particularly at the overlapping magnetosphere-ionosphere-thermosphere (MIT) regions. The science challenge to be addressed by this workshop is: what new insights on coupling at the boundaries does data assimilation give us? What does it have the potential to provide? What are the current limitations of data assimilation, and what strategies, techniques, and data could and should be brought to bear to address the limitations?

This workshop will give an overview of new science on exchange processes between boundaries of the coupled region as enabled by existing algorithms, techniques, and

the data sets and models that underlie them. Papers dealing with techniques in assimilation of data into models, expansion of data sources available for assimilation, and new science findings enabled by assimilation are welcome.

The session will also include a discussion to identify key elements that underlie the challenges in assimilation, ways to measure progress in assimilative methods, and suggest possible ways forward. Having identified areas for development, we will plan a follow-on workshop to be held at CEDAR 2014 in which these themes are addressed, and progress in the community is self-assessed. This annual feedback process will allow the community to target the fundamental areas that need addressing in assimilative techniques and monitor progress in addressing the challenges we have identified.

Agenda

Indirect Estimation of IT State at High Resolution, by Gary Bust

"Ionospheric Tomography Using Faraday Rotation of Automatic Dependant Surveillance Broadcast UHF Signals" by Alex Cushley and JM Noel

Data assimilation of SuperDARN mid- and high-latitude data, by Ellen Cousins

COSMIC EDP into NCAR/TIEGCM using Ensemble Kalman Filtering, by I-Te Lee

The use of a data assimilation model for the estimation of ionospheric drivers and their use for CEDAR science, by Ludger Scherlies

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