2017 Workshop: Physics and Sensor Models

Long title
Combining Ionosphere and Sensor Models to Improve CEDAR Science Research
Conveners
John Swoboda
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Description

This workshop will highlight research that uses combinations of physical and sensor models. This could include using data from a physics based model to drive a sensor model to get example outputs. Another set of cases could be how to plan experiments using physics based models or if they used to diagnose issues with a sensor.

One of the main goals of this workshop is to foster greater collaboration between sensor focused and modelling communities within CEDAR. Those with a specific focus on sensors or physical modelling but searching for possible collaborators are encouraged to attend.

Agenda

(1:30-1:40) John Swoboda Shun-rong Zang – Intro (pdf)

(1:40-1:50) Shun-rong Zang – F1 Region Composition (pdf)

(1:50-2:10) John Swoboda – Exploring Model Inputs with SimISR (pdf)

(2:10-2:30) Lindsay Goodwin - The effect of high latitude distorted ion velocity distributions on radar and satellite observations (pdf)

(2:30-2:50) Kay Deshpande - Interfacing ionospheric propagation and plasma instability models for GNSS scintillation studies (pdf)

(2:50-3:00) Matt Zettergren - Interfacing models and data (from sounding rocket campaigns (pdf)

(3:00-3:20) Ashton Reimer - Signal Statistics and Parameter Estimation (pdf)

(3:20-3:30) Discussion and Short Presentations

Justification

In order to build a successful experiment and or sensor system, knowledge of the physical phenomena is needed to accurately measure its impact and disambiguate its effects from other possible drivers. Ionospheric sensors, such as incoherent scatter radar, have grown in complexity but now have greater measurement capability. This complexity often necessitates the development of computational models of these systems to predict their performance. The sensor models can be driven with simple phantoms or contrived inputs but this may not answer questions concerning specific phenomena. This can lead to problems for those trying validate physical models as they try determine predictions that can be made give the performance of a sensor.

Interfacing physics based Ionosphere models and sensor models can help alleviate possible confusion between these two disciplines within the CEDAR community. This increased collaboration can lead to better planning for experiments and or better sensor development.

This session addresses both scientific strategic thrust #4: Develop observational and instrumentation strategies for geospace system studies. Along with scientific strategic thrust #6: Manage, mine and manipulate geoscience data and models.

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