2017 Workshop: WACCM X Users Group

Long title
WACCM-X Users Group
Conveners
Hanli Liu
Dan Marsh
Stan Solomon
Description

The NCAR Whole Atmosphere Community Climate Model - eXtended (WACCM-X) is a general circulation model that spans the altitude range from the Earth's surface to the exobase, including the thermosphere and ionosphere. Recent developments are the implementation of an interactive ionospheric dynamo solver and F-region ion transport. Together with the previously implemented interactive ion-chemistry, time-dependent electron and ion temperature solver, and high-latitude inputs, WACCM-X now has a fully functional and interactive ionosphere. This new version of WACCM-X is one of the atmospheric components of the NCAR Community Earth System Model version 2 (CESM2). This workshop will provide an overview of WACCM-X, presentations of some recent results illustrating its new capability, basic tutorials on how to use it, and a discussion of new development priorities. This is an opportunity for members of the community to learn about the model and also to make recommendations about where it should go next.

Agenda

Stan Solomon: Introduction (pdf)

Hanli Liu: WACCM-X Model Overview (pdf)

Dan Marsh: Using CESM/WACCM-X (pdf)

Jing Liu: Ionosphere simulated by WACCM-X (pdf)

Nick Pedatella: WACCM-X Data Assimilation (pdf)

Justification

a. Identify the relevant CEDAR Science Challenge:

“A key focus of the CEDAR program is to contribute to the understanding, prediction, and potential mitigation of space weather impacts on our technologically reliant society through the development of…whole atmosphere models.” (CEDAR strategic plan, executive summary)

i. How the associated questions will be addressed:

The overarching goal and specific scientific objectives require comprehensive numerical modeling of the entire atmosphere-ionosphere system.

ii. What resources exist, are planned, and/or are needed:

The model development team at NCAR plans to continue efforts to validate, improve, and extend the model, but needs community input concerning future directions. The team welcomes community participation in development and validation efforts.

iii. How progress should be measured:

In addition to scientific outcomes, an important metric of progress is access and use by the larger community.

b. Justification for the workshop - Articulate a challenge and its significance and fit with 2011 CEDAR Strategic Plan:

“An outstanding challenge in terrestrial upper atmosphere research is specifying the state of the space-atmosphere interaction region (SAIR) at a particular time and location; a limitation manifest by significant levels of variability that often rival the value of the mean state. This variability is driven by the nonlinear, dynamical response of the SAIR to temporally and spatially changing fluxes of energy, mass, and momentum that cross its boundaries from space and the lower atmosphere.” (CEDAR Strategic Plan)

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