2025 Workshop: WACCM-X Tutorial

Long title
A Tutorial on the NSF NCAR Whole Atmosphere Community Climate Model with Thermosphere/Ionosphere Extension (WACCM-X)
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Description

The Whole Atmosphere Community Climate Model with thermosphere/ionosphere extension (WACCM-X) is the atmospheric component of the NSF NCAR Community Earth System Model (CESM) that spans the domain from the Earth's surface to the exobase. It includes comprehensive packages of radiative transfer, dynamics, physics, neutral and ion chemistry, and ionospheric electrodynamics for the whole domain, and is a powerful numerical tool to study the whole atmosphere and geospace system. There have been many new developments since the last tutorial at the CEDAR Workshop in 2018 after the release of WACCM-X version 2, and WACCM-X with these new features will be released as part of the upcoming CESM version 3 (CESM3). WACCM-X is now also available for Run-on-Request at NASA Community Coordinated Modeling Center (CCMC). Additionally, WACCM-X is currently under development to be an interacting component of the Multiscale Atmosphere-Geospace Environment (MAGE) model of the NASA DRIVE Center for Geospace Storms (CGS). It is thus timely to have a tutorial at the joint CEDAR/GEM Workshop. For the session, we plan to present overviews of CESM3, WACCM-X, WACCM-X model history outputs, and WACCM-X at CCMC. We will also have step-by-step instructions on how to download, setup, build and run WACCM-X, and how to make run requests at CCMC.

Agenda

Opening Remarks (Hanli, 5 min)

CESM/WACCM-X Overview (Nick, 30 min)

Using WACCM-X & Demo (Francis & Joe: 45 min)

CCMC/WACCM-X RoR Overview (Jack 15 min)

CCMC/WACCM-X RoR Demo (Jack 15 min)

Q&A (10 min)

In addition to the Q&A, there will be an office hour from 4-5 pm (Wednesday) in the Multimedia Room.

Google Meet Link:

meet.google.com/atz-qqmp-gwh

Please note google meet works better with Chrome.

File upload
CESM/WACCM-X Overview (2.77 MB)
Using WACCM-X (2.08 MB)
CCMC WACCM-X Run on Request (17.83 MB)
Justification

(1) The NSF NCAR CESM WACCM-X is an open source community model that is being used by an increasing number of researchers and students. (2) Many new model features have been developed and added since the release of WACCM-X v.2 in 2018, and a new release is imminent. (3) WACCM-X is also available at CCMC for run-on-request. We therefore believe that it is timely to introduce these new features to the CEDAR/GEM community, encourage its usage for their research, and demonstrate how the model could be used.

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Short Presentations

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Keywords

whole atmosphere model, atmosphere coupling, numerical method, community model

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