



**WACCM**

*Whole Atmosphere  
Community Climate Model*



# WACCM Status 3/2009

Dan Marsh

CCSM Whole Atmosphere Working Group Meeting

6 March 2009



# WACCM

## Project Goals:

- Develop a state of the art, “high-top”, numerical model with coupled chemistry that will serve the needs of the scientific community
- Conduct research to understand the coupling between atmospheric layers, the role of chemical and physical processes in defining these couplings, and the interaction between the Earth’s atmosphere and the Sun



# WACCM Status

- CCSM Working Group formed and WACCM 3 released to the community 7/2008
- WACCM 3.5 development completed 12/2008 (Doug Kinnison)
- Majority of CCMVal-2 simulations completed (Rolando Garcia)
- WACCM 3.5 is now running within CCSM using interactive ocean
- WACCM-X (thermospheric extension) now producing credible simulations (Hanli Liu PM talk)



# Ongoing science studies at NCAR

- Response of the Brewer-Dobson circulation to GHG warming, ENSO events
- Temperature, dynamics and composition trends in the 20<sup>th</sup> and 21<sup>st</sup> centuries; ozone recovery in the 21<sup>st</sup> century
- Response of the middle atmosphere to solar variability
- Migrating and non-migrating tides in WACCM and observations
- Impacts of geo-engineering on stratospheric composition and ozone recovery



## WACCM SSU

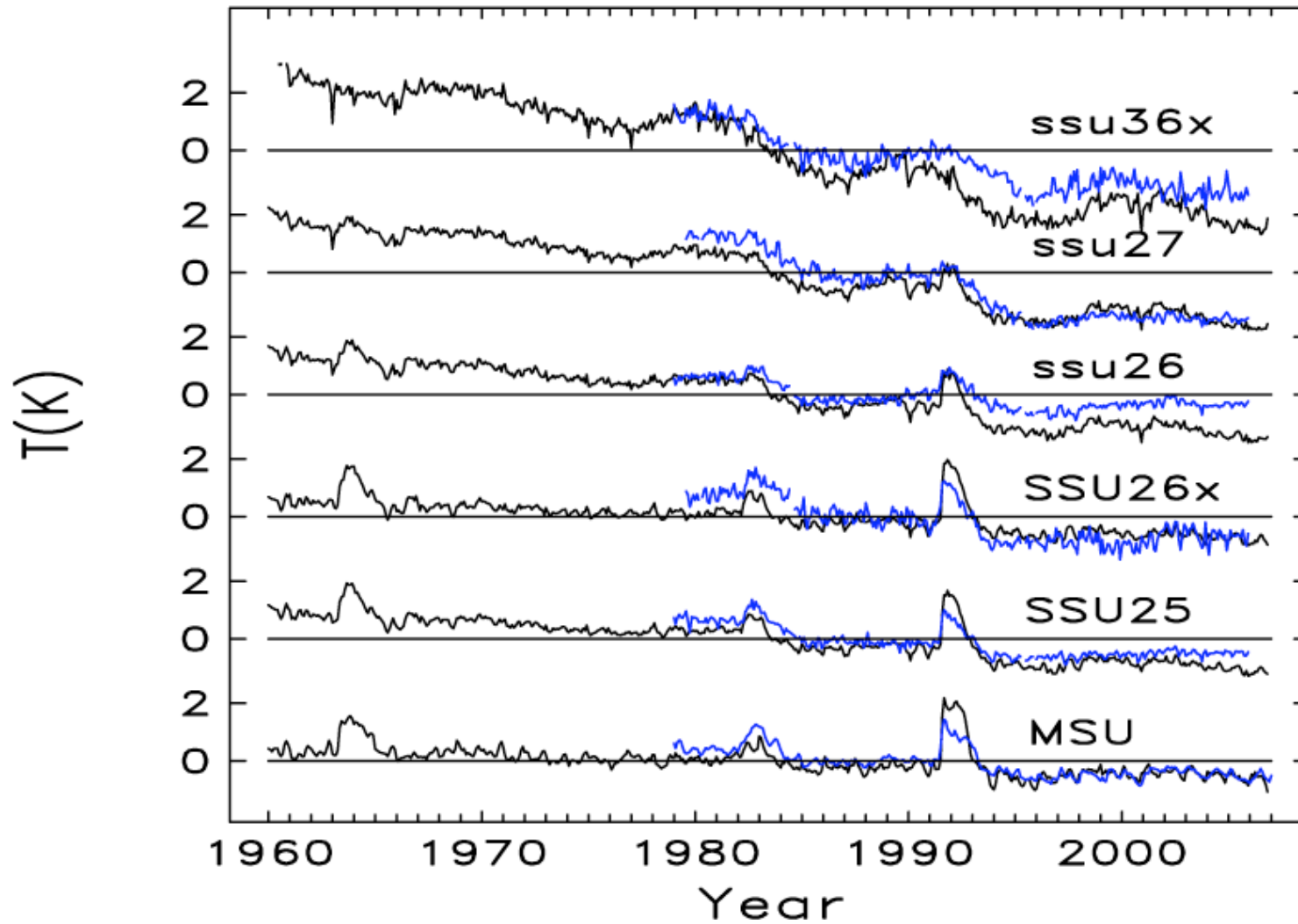


Figure courtesy Bill Randel



# Planned science studies

- Ozone recovery and tropospheric climate: impact on the SH jetstream and polar temperatures
- Simulations in support of AR-5, with coupled ocean
- “World Avoided” simulations – first with an interactive ocean
- Enhanced NMHCs and Organic Bromine
- Asteroid impacts (w/ E. Pierazzo, J. Melosh, U. of Arizona)
- Impact of model parameterizations (gravity wave, mountain drag) on stratospheric sudden warming climatology
- Support of UTLS Science, START08, and field projects



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# WACCM Community support



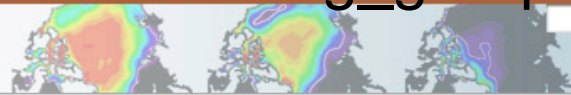


# WACCM

## Whole Atmosphere Community Climate Model

Webpage [http://www.ccsm.ucar.edu/working\\_groups/WACCM/](http://www.ccsm.ucar.edu/working_groups/WACCM/)

Community Climate System Model



Search

### CCSM WHOLE ATMOSPHERE MODEL WORKING GROUP

#### WELCOME TO CCSM

EXPAND  COLLAPSE

- About CCSM
- CCSM Administration
- CCSM Working Groups
- CSEG
- CCSM Research Tools
- Events
- CCSM News
- Publications
- CCSM Support

The [Whole-Atmosphere Community Climate Model \(WACCM\)](#) is a comprehensive numerical model, spanning the range of altitude from the Earth's surface to the thermosphere. The development of WACCM is an inter-divisional collaboration that unifies certain aspects of the upper atmospheric modeling of HAO, the middle atmosphere modeling of ACD, and the tropospheric modeling of CGD, using the NCAR Community Climate System Model (CCSM) as a common numerical framework.

#### Upcoming Meetings

WAWG Meeting, NCAR, Mesa Lab, 6 March 2009 [[announcement](#)]

[14th Annual CCSM Workshop](#), The Village at Breckenridge, Breckenridge, CO, 15-18 June 2009.

#### WAWG Announcements

The WACCM development team is pleased to announce the public release of version 3 of the Whole Atmosphere Community Climate Model (WACCM3). WACCM3 source code, input datasets, run scripts, and documentation can be downloaded from the [Community Data Portal \[http://cdp.ucar.edu/\]](http://cdp.ucar.edu/). Users are encouraged to participate in meetings of the CCSM WACCM Working Group and to sign up to the mailing list.

#### WAWG Community Liaison:

**TBD**

#### Co-Chair Contact Information:

**Dr. Daniel Marsh**

NCAR-ACD, P.O. Box 3000, Boulder, CO 80307-3000

Tel: 303-497-1160, Fax: 303-497-1400, e-mail: [marsh@ucar.edu](mailto:marsh@ucar.edu)

**Dr. Aaron J. Ridley** (07/01/08 - 6/30/10)

Department of Atmospheric, Oceanic, and Space Sciences, 1411B Space Research Building, University of Michigan, 2455 Hayward Street, Ann Arbor, MI 48109-2143

Tel: 734-764-5727, Fax: 734-647-3083, e-mail: [ridley@umich.edu](mailto:ridley@umich.edu)

#### CCSM PROJECT

The [Community Climate System Model \(CCSM\)](#) is a fully-coupled, global climate model that provides state-of-the-art computer simulations of the Earth's past, present, and future climate states.

CCSM is sponsored by the National Science Foundation (NSF) and the U.S. Department of Energy (DOE). Administration of the CCSM is maintained by the Climate and Global Dynamics Division (CGD) at the National Center for Atmospheric Research (NCAR).

#### RELATED

- [CCSM Working Group Co-chairs](#)
- [CCSM Working Group Co-Chairs Terms of Reference](#)
- [WACCM wiki](#)

#### CONTACT INFORMATION

- Email: [CCSM Working Group Co-Chairs](#)
- Email: [CCSM Contact](#)
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New  
co-chair







# WACCM Community Data Portal Traffic

(<http://cdp.ucar.edu/>)

In the first 6 months:

- >40 new WACCM CDP registrations
- 2,237 separate downloads (810 GB of data)
- 27 model source code downloads
- This does not include data and code distributed to collaborators



# WACCM

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## WACCM Forum on CCSM Bulletin Board (<http://bb.cgd.ucar.edu/>)



CGD Forum

Whole Atmosphere Modeling with WACCM

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Forum	Last Post	Threads	Posts
<a href="#">General Announcements</a>	<a href="#">WACCM Working Group Meeting...</a> by <a href="#">drm</a> 01-07-2009 09:56 AM	3	3
<a href="#">Software and Run-time Issues</a>	<a href="#">WACCM bug in TH2d history...</a> by <a href="#">drm</a> 12-08-2008 07:09 PM	4	12
<a href="#">Science Issues</a>	Never	0	0

- Forum Contains New Posts
- Forum Contains No New Posts

**Forum Jump**

All times are GMT -6. The time now is 06:09 PM.



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END



# Development Priorities

- Migrate WACCM to CAM4 code base
  - Add solar variability to new RT code
  - Unify photolysis and heating calculations
  - Provide feedback and evaluation of CCSM4
  - Internally generated QBO
- Contribute to IPCC AR5
  - Evaluate role of the stratosphere in past & future climate
  - Comparisons of CAM, CAM-CHEM and WACCM transient simulations coupled to ocean
- Continued participation in WMO Ozone Assessment, and the WCRP/SPARC CCMVal project
- Evaluate Specified Dynamics WACCM and provide campaign support (AURA, aircraft campaigns)