

CESM Whole Atmosphere Working Group Meeting

11 – 12 February 2013

Mesa Lab, Damon Room

National Center for Atmospheric Research – Boulder, Colorado

Webcast Instructions:

AUDIO: Dial this access number: 1-866-740-1260 – Enter access code 4971358

VIDEO: Go to www.readytalk.com; under "join a meeting" enter access code 4971358

MONDAY, 11 February

- 8:00 *Coffee (Damon Room)*
- 8:30 Co-chairs – Welcome / Updates
- 8:45 Nick Pedatella – Data assimilation in the Whole Atmosphere Community Climate Model
- 9:00 Fabrizio Sassi – The lower thermosphere during the Northern Hemisphere winter of 2009
- 9:15 Valery Yudin – Upper atmosphere dynamics of WACCM-X constrained by MERRA
- 9:30 Hanli Liu – Upper atmosphere day-to-day variability
- 9:45 *Break*
- 10:15 Andreas Baumgaertner – Towards a comprehensive Global Electric Circuit model: Conductivity and its variability in WACCM model simulations
- 10:30 Stan Solomon – Ionosphere module development
- 10:45 Doug Kinnison – Chemistry updates for CCM1
- 11:00 Bo Tan – Effects of inertial gravity wave forcing on the stratospheric polar region and cold pole bias of general circulation models
- 11:15 Lynn Harvey – WACCM Studies at CU / LASP
- 12:00 *Lunch*

Joint Session: AMWG / WAWG – Main Seminar Room >>>> Webcast: www.fin.ucar.edu/it/mms/ml-live.htm <<<<

- 1:15 Co-chairs – Welcome / Updates
- 1:30 Mike Mills – Navigating CAM5 physics in WACCM
- 1:45 Christoph Erath – New Finite Volume semi-Lagrangian based tracer transport schemes for Community Atmospheric Model (CAM-SE) – Performance and scalability with a focus on Yellowstone
- 2:00 Peter Caldwell – Impact of numeric choices on CAM5 climate
- 2:15 Charles Jackson – Metrics for model selection and uncertainty quantification
- 2:30 Steve Ghan – Nudging as a testbed for atmospheric physics
- 2:45 *Break*
- 3:15 Trond Iversen – About NorESM, a model based on CCSM4, but with significant amendments
- 3:30 Jason English – Microphysical simulations of large volcanic eruptions: Pinatubo and Toba
- 3:45 Juan Fontela – Solar Spectral Irradiance effects on tropospheric regional climate? WACCM4 preliminary results, ENSO, and volcano issues
- 4:00 Dan Marsh – Downward coupling
- 4:15 Curt Covey – Atmospheric tides in WACCM and the latest (CMIP5) generation of climate GCMs
- 4:30 Discussion
- 5:00 *Reception – ML Cafeteria*

TUESDAY, 12 February

Joint Session - Main Seminar Room >>>> Webcast: www.fin.ucar.edu/it/mms/ml-live.htm <<<<

- 1:15 AMWG co-chair update
- 1:30 PCWG co-chair update
- 1:45 WAWG co-chair update
- 2:00 CCWG co-chair update
- 2:15 Mariana Vertenstein – Yellowstone update
- 2:30 Lorenzo Polvani – Stratospheric ozone and Antarctic sea ice trends
- 2:45 Discussion
- 3:15 *Break*

WACCM/WACCM-X Update

Han-Li Liu

High Altitude Observatory/NCAR

Development Updates: Recent Model Releases

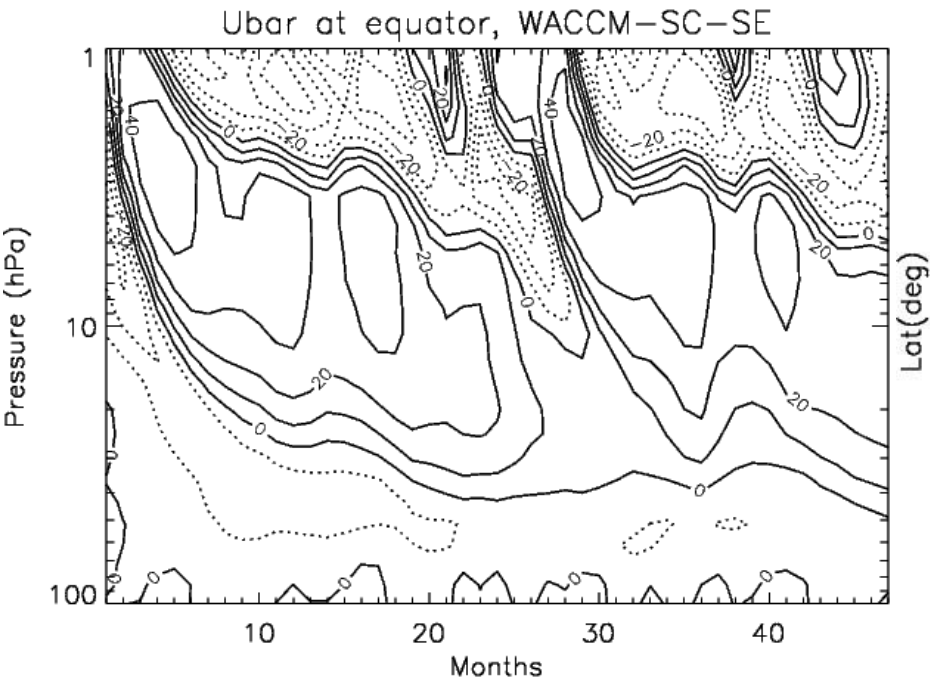
- CESM1.0.4 (February, 2012): WACCM-X.
- CESM1.1 (November, 2012):
 - Community Aerosol and Radiation Model for Atmosphere (CARMA).
 - WACCM5 Compatibility.
 - WACCM-X Solar minimum component set and 5-year simulations.
 - Turbulent Mountain Stress turned on for WACCM specified chemistry and specified dynamics.
- **CESM1.0.5** and CESM1.1.1 (January, 2013):
 - Infrastructure and model scripting changes. Most notable: Yellowstone and Titan support.
 - CESM1.0.5/WACCM should be used for scientific studies.

Development Updates: Recent Model Development and Testing

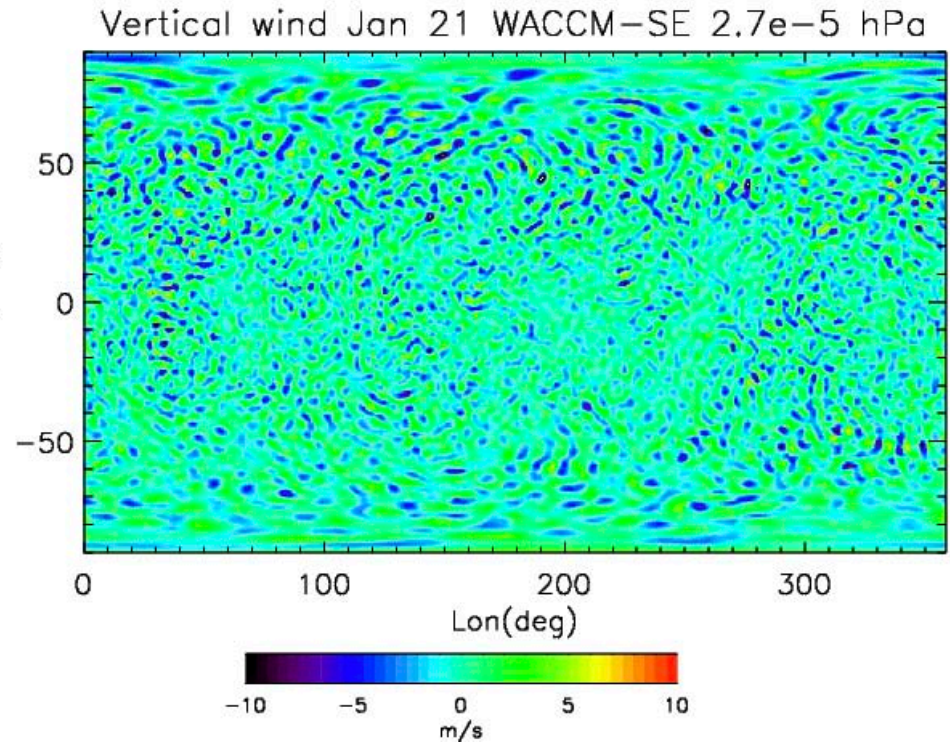
- WACCM5-FV test runs (25 years) (Talk by Mills)
- WACCM4-SE (ne30) test runs (5 years).
- WACCM/DART (Talk by Pedatella)
- WACCM/WACCM-X with specified dynamics (SD) (Talks by Sassi and Yudin).
- WACCM with Specified Chemistry (SC-WACCM)
- WACCM Component Set with reduced complexity/reduced resolution above the mesosphere (Discussion).

WACCM-SE-SC (NE30)

Equatorial zonal mean zonal wind



Vertical Winds at ~ 120 km



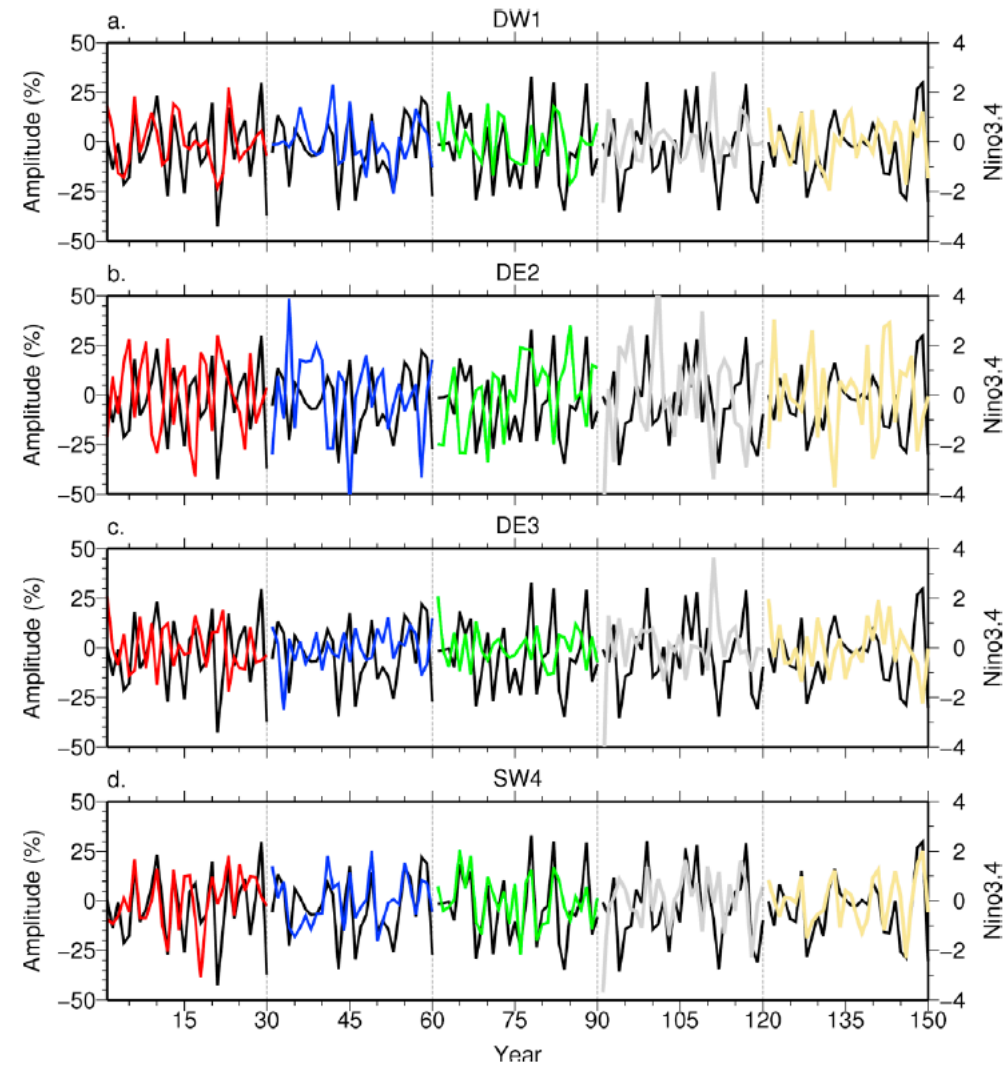
Development Updates: Scientific Modules

- Ionosphere module development (Talk by Solomon).
- Global electric circuit (Talk by Baumgaertner).
- Lunar tide in WACCM/WACCM-X.
- Chemistry updates for CCMI (Talk by Kinnison)
- New volcanic heating for large eruptions (Talk by English).
- Gravity wave parameterization (Talk by Tan).

Research Progress

- Role of Middle Atmosphere on Climate (Talks by Fontela, Marsh, and Covey)
- Upper atmosphere variability due to coupling with the lower atmosphere.
 - Interannual tidal variability associated with ENSO and QBO.
 - Short-term tidal variability and day-to-day ionospheric variability: planetary wave, solar tides, lunar tide (Talks by Sassi, Yudin and Liu).
 - Impacts of IGW in middle/upper atmosphere (Talk by Tan).

ENSO Impacts on Upper Atmosphere



Pedatella and Liu, 2012

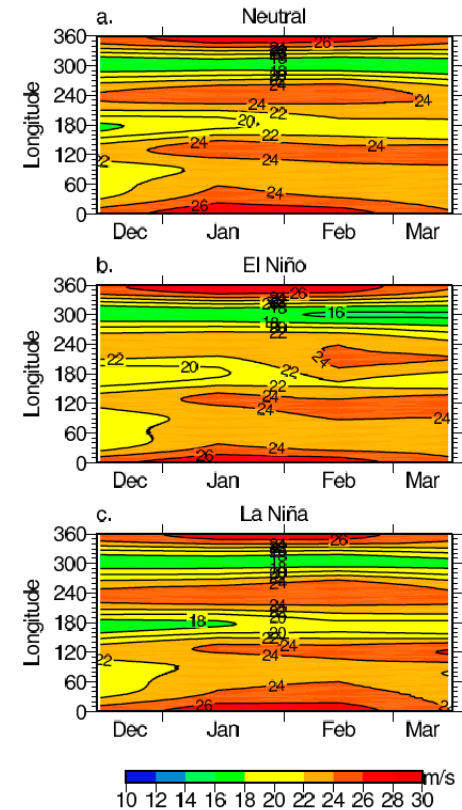


Figure 8. TIME-GCM vertical $E \times B$ drift velocity at the magnetic equator and 300 km for (a) neutral, (b) El Niño, and (c) La Niña time periods. The results are for 11 local time.

Pedatella and Liu, 2013

Production Simulations

- CMIP5: CCSM4/WACCM4 (data released)
- SD-WACCM/MERRA (back to 1979) (Polar stratosphere and UTLS studies) and compared to WACCM with interactive chemistry.
- CCMI: ozone depletion and recovery trend (Talk by Kinnison).
- GeoMIP.
- SPARC/SOLARIS (WACCM sensitivity to SSI).
- SPARC/APSiC (stratosphere aerosols and climate)
- Large-ensemble runs (1900-2100).
- Paleoclimate runs (last Millennium).

Machine Update

- Bluefire is gone. WACCM and WACCM-X are running on Yellowstone. Throughput has improved, and 30% further improvement expected with improved PE configuration (Talk by Vertenstein).

Machine	Resolution	Compset	Total PEs	Cost pe-hrs/yr ↑	ThruPut yrs/day	cpl pes	Ind pes	Ice pes	atm pes	glc pes	ocn pes	Version Date	Comment
yellowstone	1.9x2.5_1.9x2.5	FWX	512	9244.85	1.33	512 512x1 0	512 512x1 0	512 512x1 0	512 512x1 0	512 512x1 0	512 512x1 0	cesm1_0_5_rel03 2013.01.17	
yellowstone	0.9x1.25_gx1v6	B1850C5CN	1008	1795.48	13.47	320 320x1 640	320 320x1 320	320 320x1 0	960 960x1 0	1 1x1 0	48 48x1 960	cesm1_0_5_rel01 2013.01.15	
yellowstone	0.9x1.25_0.9x1.25	FMOZ	512	1776.25	6.92	512 512x1 0	512 512x1 0	512 512x1 0	512 512x1 0	1 1x1 0	512 512x1 0	cesm1_0_5_rel01 2013.01.13	