

Atmosphere Model Working Group (AMWG) Overview

Rich Neale
NCAR



 NESL's Climate & Global Dynamics

CGD

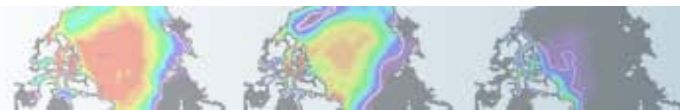


U.S. DEPARTMENT OF
ENERGY

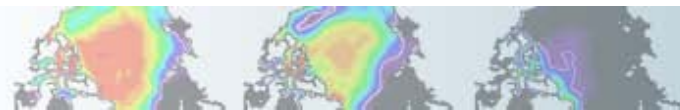
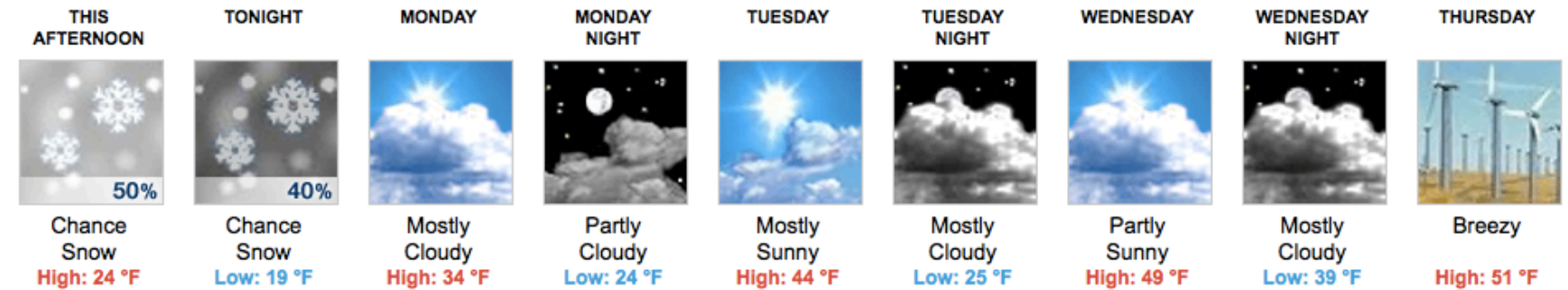


Community Earth System Model

CESM



Boulder Forecast



AMWG co-chairs

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Local Arrangements

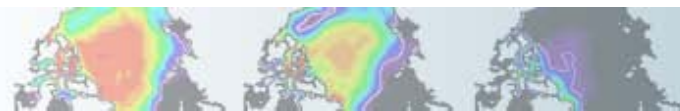
Joint AMWG/ChemClim session (Tuesday AM)

Joint AMWG/WACCM session (Wednesday PM)

CESM Tutorial/web-release forms

Lunch in the cafeteria (follow locals)

Reception this evening (no alcohol)



CESM Planning

CESM2 Timelines:

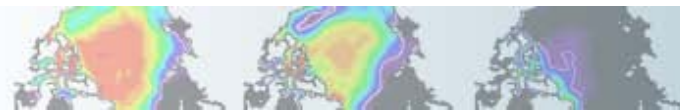
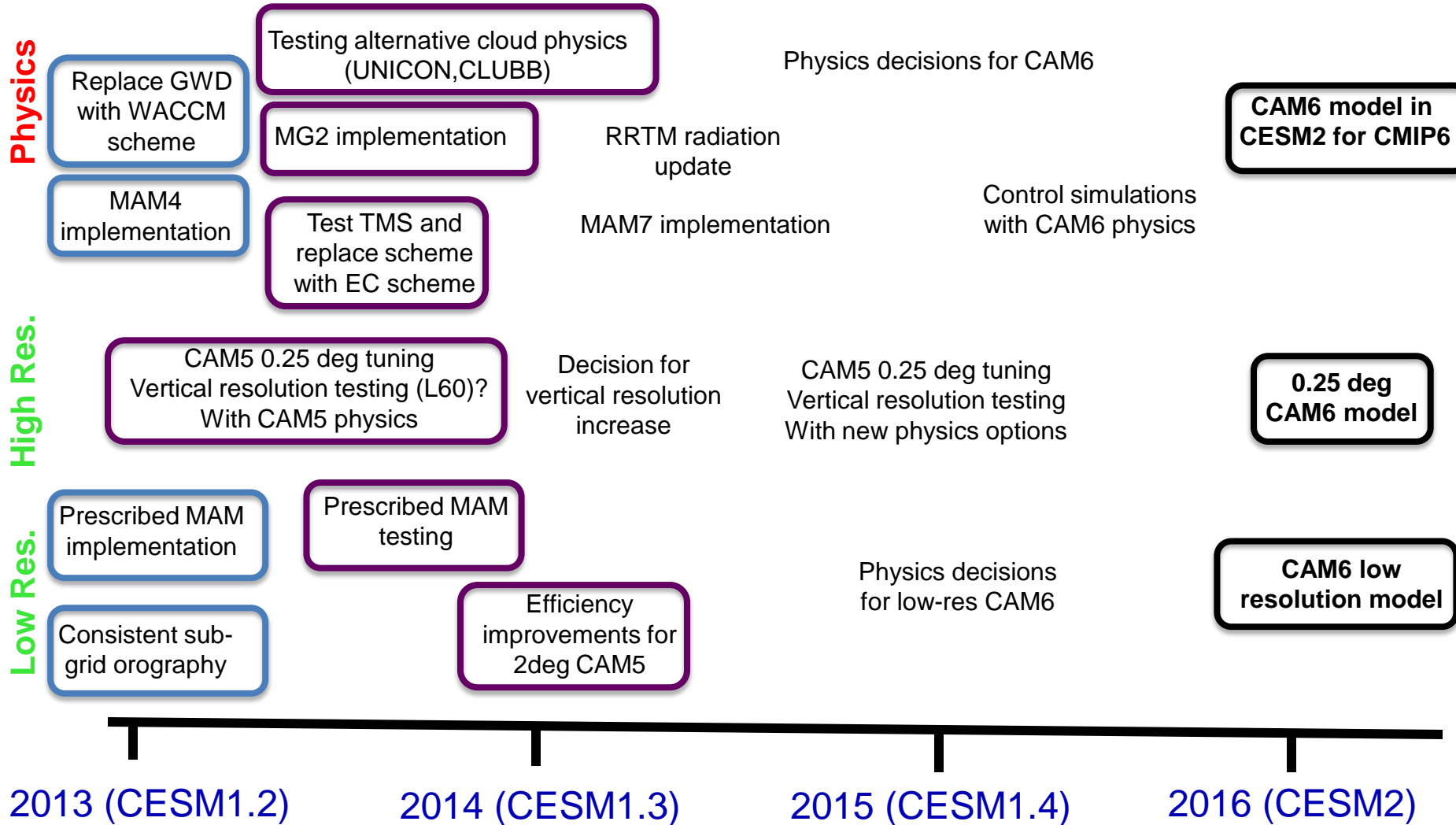
- **Early 2015: CAM5+ model version** finalized, subject to tuning modifications, for use in the WACCM, BGC/chemistry, and CISM configurations.
- **July 2015: Component models for CESM2 are nearly final**, subject to modification (tuning) based on coupled model performance.
- **July-Dec, 2015:** Perform coupled simulations with finalized components for supported configurations; **Tuning**/modification of component models as needed to maximize coupled simulation quality
- **Jan 2016: CESM2 supported configurations are finalized**, including final parameter settings, etc. for different component models
- **Jan-June 2016:** PI control runs and 20th century **runs performed** for supported CESM2 configurations
- **June 2016: CESM2 Model release**; To include PI control run, 20th century run, AMIP runs for supported configurations (at a minimum)
- **Post-June 2016:** CESM2 scenario runs (and others) performed

CESM2 Targets:

- “Bleeding edge” physical climate model version (with CAM6)
- Physical climate model with WACCM
- Carbon cycle/BGC model version with enhanced atmospheric chemistry coupling
- Coupled ice sheet integrations

CAM Development Timelines

The path towards CMIP6



CAM6 Development Webpage

Documenting development simulations and activities

Home · About · Administration · Working Groups · Models · Events · Publications · Projects

NCAR UCAR CSM COMMUNITY EARTH SYSTEM MODEL earth • modeling • climate

Cam6 Development

CAM6 DEVELOPMENT ACTIVITIES

This page is intended to be a summary of the Atmosphere Model Working Group (AMWG) activities in developing the CSM Community Atmosphere Model version 6 (CAM6).

- Minghua Zhang, CAM development plan and CAM6 timelines. AMWG Discussion at the CSM Workshop, Breckenridge, 17 - 20 June 2013.

HIGH HORIZONTAL RESOLUTION

We expect that global climate models in the next decade will run routinely at horizontal resolutions of 25 km or lower. High-resolution simulations targets simulations of tropical cyclones, improvement in important regional and mesoscale circulation, etc...

- Bacmeister et al. Exploratory High-Resolution Climate Simulations using the Community Atmosphere Model (CAM). Submitted to J Climate.
- High resolution development simulations

INCREASED VERTICAL RESOLUTION

Higher vertical resolution improves the ability to represent certain aspect of physics or dynamics better (QBO, sudden stratospheric warmings, ...)

- Yega Richter. Higher vertical resolution in CAM. Do we need it? CSM Workshop, Breckenridge, 17 - 20 June 2013.
- Increased Vertical resolution simulations
- Potentially level dependent physics
- Figures of the vertical levels high low

CLOUD PHYSICS

There are several Community development activities related to the improvement of the cloud physics (CLUBB, UNICON, deep convection activities).

Sensitivity to vertical resolution

AMIP TYPE RUNS

30-LEVEL

ID	Casename	Case Description	Diagnostics	Details/Comments
AA1	f.e12.F1850PDCS.ne30_ne30.amip_L30.001	AMIP type run	w/ obs	Details
AA2	f.e12.FAMIPCS.ne30_ne30.amip_L30.001	AMIP type run	w/ obs w/ FV 1d var_diags var_diags (FV 1d)	Details

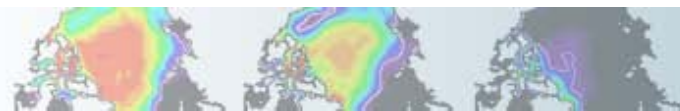
60-LEVEL

ID	Casename	Case Description	Diagnostics	Details/Comments
AB1	f.e12.F1850PDCS.ne30_ne30.amip_L60.001	AMIP type run with L60 (Byron configuration)	w/ obs w/ L30 w/ Yaga's L60	Details
AB2	f.e12.F1850PDCS.ne30_ne30.amip_L60.002	AMIP type run with L60 (Byron configuration) +a2l = 30-> 10	w/ obs w/ L30 w/ AB1	Details
AB3	f.e12.F1850PDCS.ne30_ne30.amip_L60.003	AMIP type run with L60 (Byron configuration) +a2l = 30-> 10 + rhminl=0.8975->0.8850	w/ obs w/ L30 w/ Yaga's L60	Details
AB4	f.e12.FAMIPCS.ne30_ne30.amip_L60.003	AMIP type run with L60 (Byron configuration) +a2l = 30-> 10 + rhminl=0.8975->0.8850	w/ obs w/ L30 w/ Yaga's L60 var_diags	Details
		Same as AB4		

http://www.cesm.ucar.edu/working_groups/Atmosphere/development/cam6/

Available from AMWG homepage (recently updated, finally!)

- New diagnostic package (updates coming soon)
 - Timeseries history output
 - Chemistry and WACCM specific plots
 - Updated variability package



Further CAM developments

Ongoing model developments and diagnoses (+ many more!)

- ✓ Fix microphysics/activation liquid cloud fraction inconsistency + droplet mass/# inconsistencies – LLNL
- ✓ Implementing PDF-based macro/micro schemes – LLNL/NCAR
- ✓ Further development of 7-mode MAM (MAM7) – PNNL
- ✓ Unified scheme for aerosol vertical transport, activation, and removal in convective clouds – PNNL/LLNL
- ✓ Advanced microphysics in convection - UCSD/NCAR
- ✓ Applying new ice nucleation in mixed phase clouds – PNNL/LLNL/DRI
- ✓ Dust wet deposition and wet scavenging updates - Cornell
- ✓ Deriving vertical velocity variance from TKE - NCAR
- ✓ Implementing sub-columns for physics – NCAR/SBU
- ✓ Atmospheric nudging to diagnose biases - NCAR/LLNL/SBU
- ✓ CAPT experiments to diagnose biases - NCAR/LLNL
- ✓ Model for prediction across scales (MPAS) – NH core - NCAR/LANL
- ✓ Adaptive mesh refinement – LBNL
- ✓ CAM-SE regional mesh refinement – Sandia
- ✓ CSLAM tracer transport in flux form - NCAR/Sandia
- ✓ Blocked flows and turbulent mountain stress – NCAR
- ✓ Conserved energy changes required in physics - NCAR