

Atmosphere Model Working Group (AMWG) Introduction

Rich Neale
NCAR



 NESL's Climate & Global Dynamics

CGD

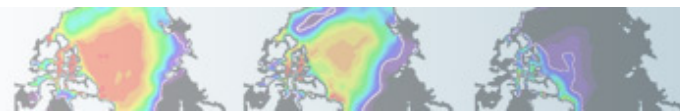


U.S. DEPARTMENT OF
ENERGY



Community Earth System Model

CESM



AMWG co-chairs

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Minghua Zhang (Stony Brook) mzhang@notes.cc.sunysb.edu

Christiane Jablonowski (U. Michigan) cjablono@umich.edu



Christiane Jablonowski (U. Michigan)
Welcome!



Mark Taylor (DOE/Sandia)
Thanks!

Agenda and Local Arrangements

- Physics parameterizations (Wednesday AM)
- Joint AMWG/WACCM/ChemClim session (Wednesday PM)
- Dynamical cores and regional refinement (Thursday AM)
- CAM5.5 physics decisions/recommendations (Thursday PM)
- Climate variability applications and strategic plan (Friday PM)

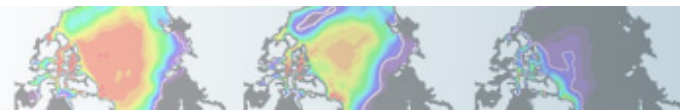
Meeting ends midday Friday

CESM Tutorial (applications close end Feb)

Web-release forms (being webcasts)

Lunch in the cafeteria (follow locals)

Reception this evening (cafeteria)



CAM Development Webpage

Documenting development simulations and activities

Home - About - Administration - Working Groups - **Models** - Events - Publications - Projects - Closures/Emergencies

NCAR | UCAR | **CESM** COMMUNITY EARTH SYSTEM MODEL *earth • modeling • climate*

Google Custom Search Search

CAM Development

CAM6 DEVELOPMENT ACTIVITIES

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

- Minghua Zhang. [CAM development plan and CAM6 timelines](#). AMWG Discussion at the CESM 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, ...)

- Yaga Richter. [Higher vertical resolution in CAM. Do we need it? CESM 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

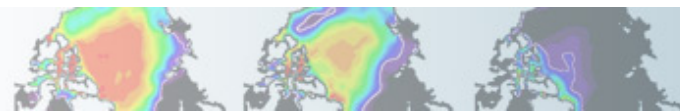
ID	Casename	Case Description	Diagnostics	Details/Comments
AA1	f.e12.F1850PDC5.ne30_ne30.amip_L30.001	AMIP type run	w/ obs	Details
AA2	f.e12.FAMIPCS.ne30_ne30.amip_L30.001	AMIP type run	w/ obs w/ FV 1d var_diags var_diags (FV 1d)	Details

60-LEVEL

ID	Casename	Case Description	Diagnostics	Details/Comments
AB1	f.e12.F1850PDC5.ne30_ne30.amip_L60.001	AMIP type run with L60 (Byron configuration)	w/ obs w/ L30 w/ Yaga's L60	Details
AB2	f.e12.F1850PDC5.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.F1850PDC5.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		

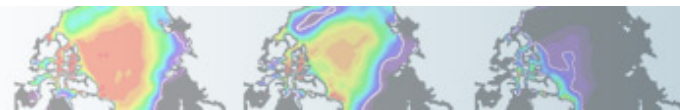
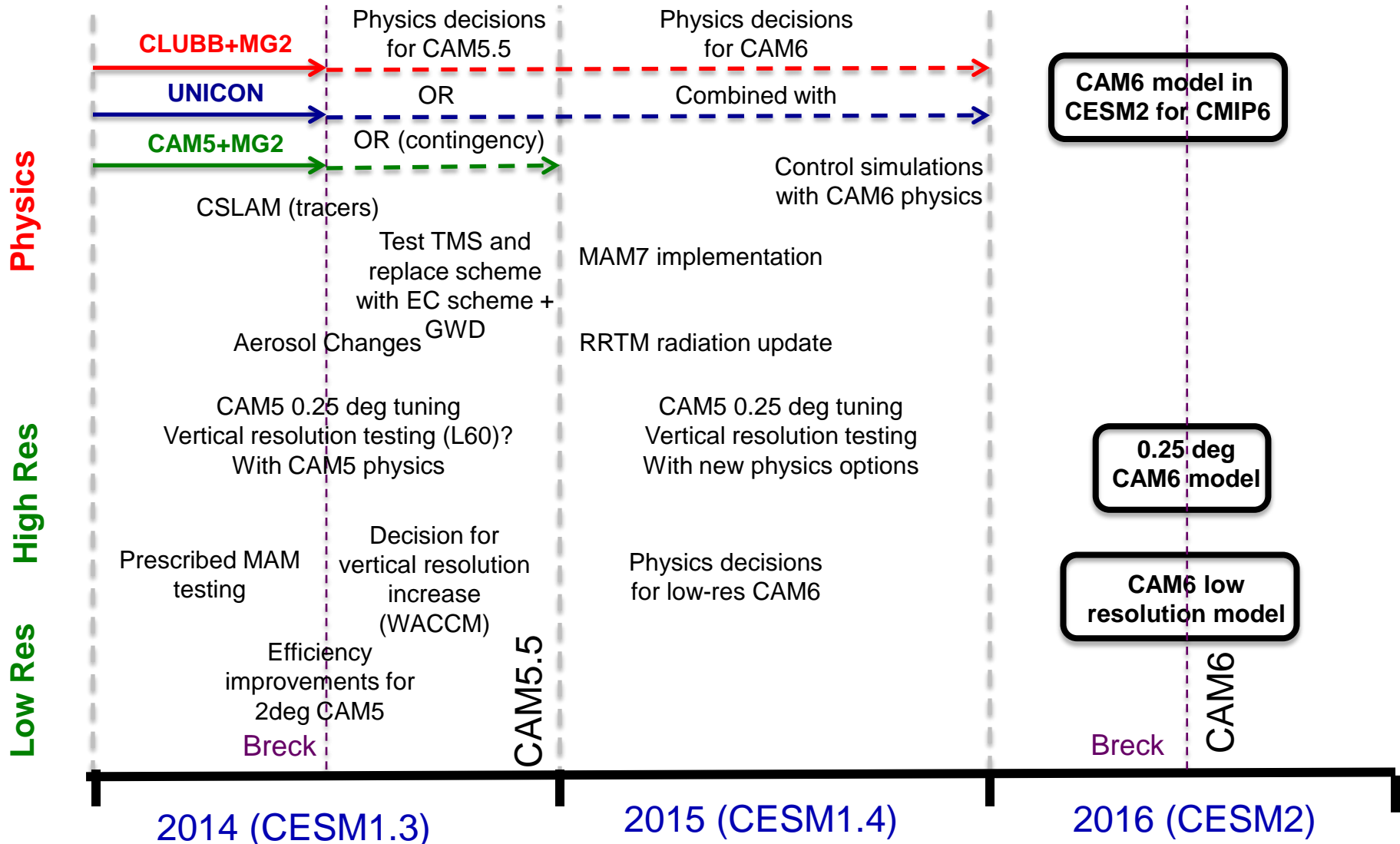
http://www.cesm.ucar.edu/working_groups/Atmosphere/development/cam6/

Available from AMWG homepage



CAM Development Timelines

The path towards CESM2 and CMIP6 (as of May 2014)

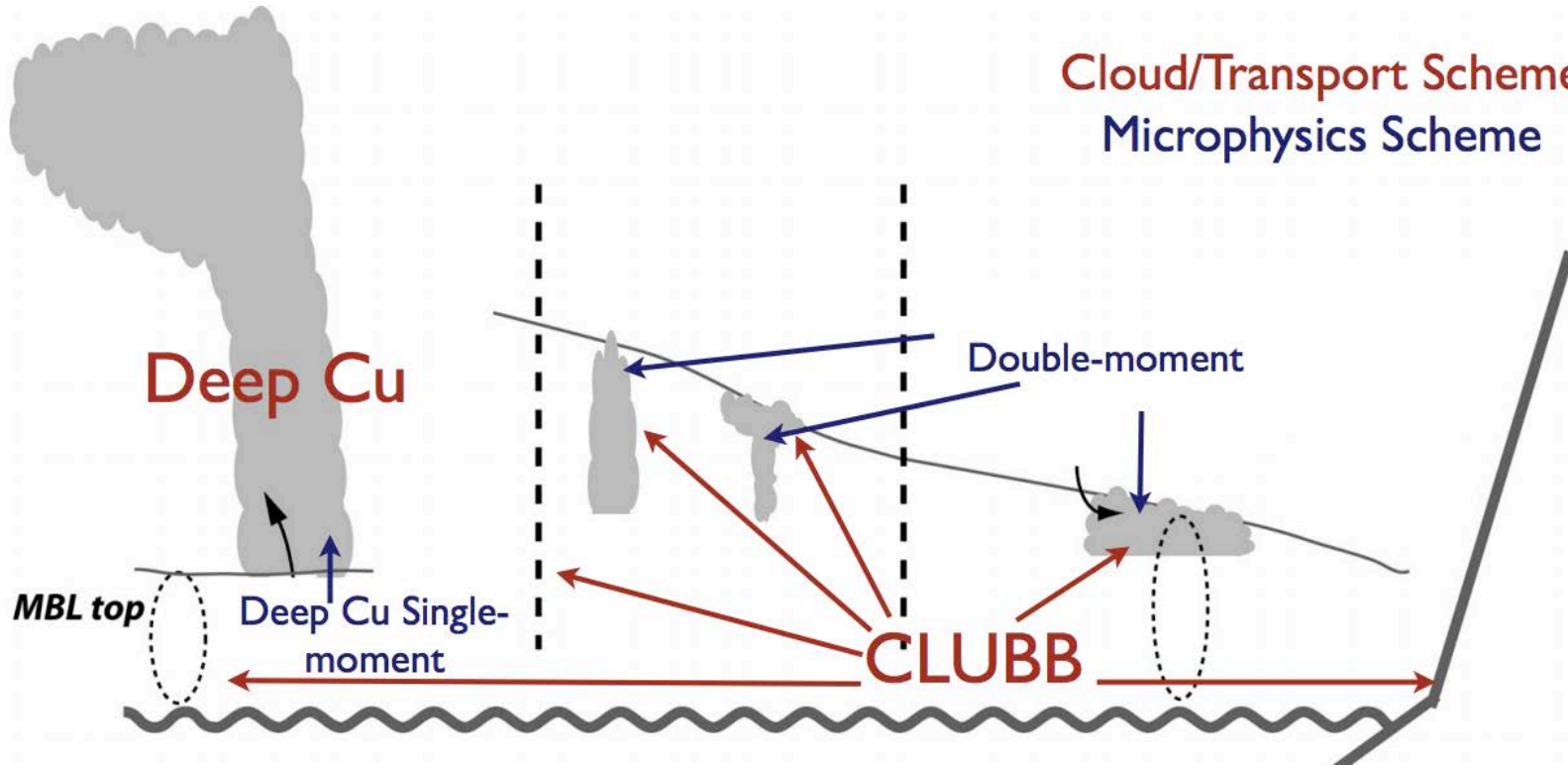


CLUBB: Cloud Layers Unified By Binormals

Thanks
Pete Bogenschutz

CAM-CLUBB standard

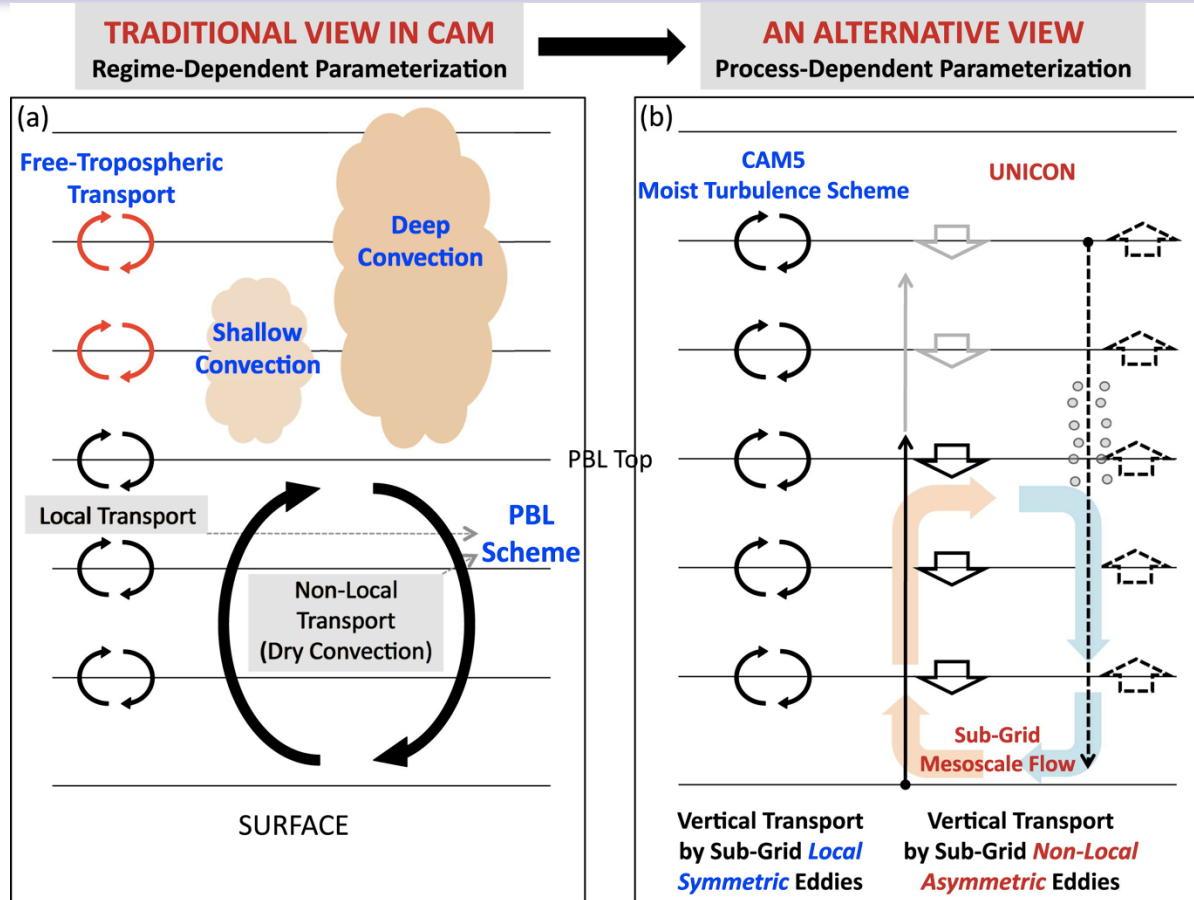
Cloud/Transport Scheme
Microphysics Scheme



- High order turbulence closures (1 third order, 8 second order)
- Unifies moist and dry turbulence (except deep convection)
- Use two Gaussians to describe the sub-grid PDF of each quantity

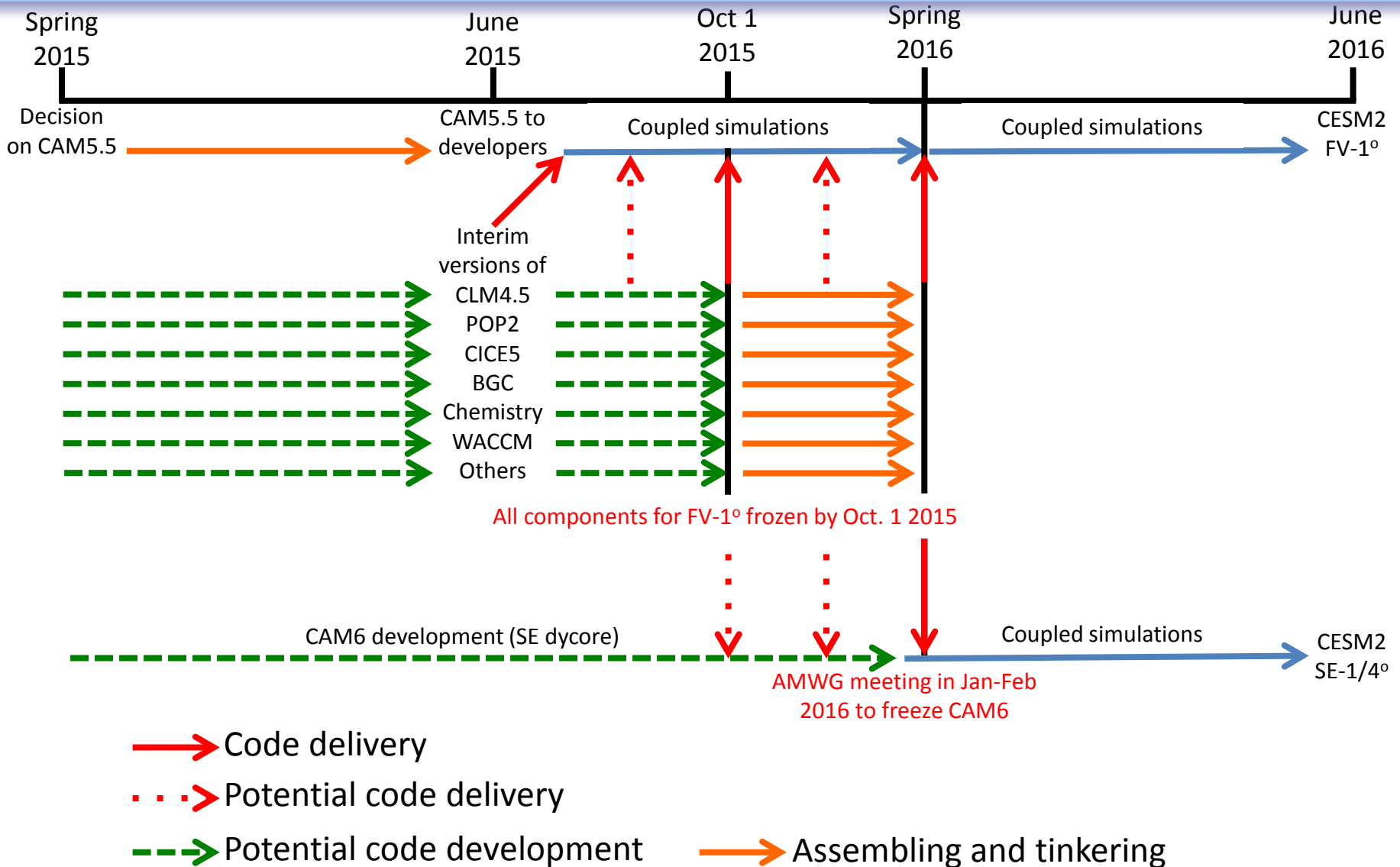
UNICON: Unified Convection Scheme

Thanks
Sungsu Park



- Unifies deep and shallow convection schemes
- Generates forced/free/dry shallow convection + deep convection
- Accounts for sub-grid mesoscale flows

Timeline for CESM2



CAM5.3 (FV not SE)

CAM development

Bug fixes	Dust (erod.+bin)
MG2	Conv. Scav.+Tr.
MAM4	New orog.
Ice+mix. phase	L32
Energy changes	CLM4.5
Volcanic aero.	GWD

CAM6 dev. Web page

CAM5.4

CLUBB+MG2

Bogenschutz
Gettelman

Simulations

CAM5.3+C/M

UNICON

Park

Simulations

CAM5.3+U

Dec 1

ⓔ

ⓔ

ⓔ

**Analysis Panel
(5 members)**

- Code, Pubs., Data, Simulations (AMIP, coupled, AIE, 20th other)?
- Provide document proposing candidate to analysis team.

AMWG Feb 15

CAM5.5

WACCM5

Criteria?
Combinations?
Recommendations?

Simulations

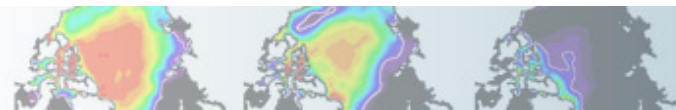
Breck

RELEASE

High-res (SE)

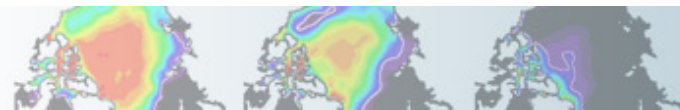
2016

CAM6

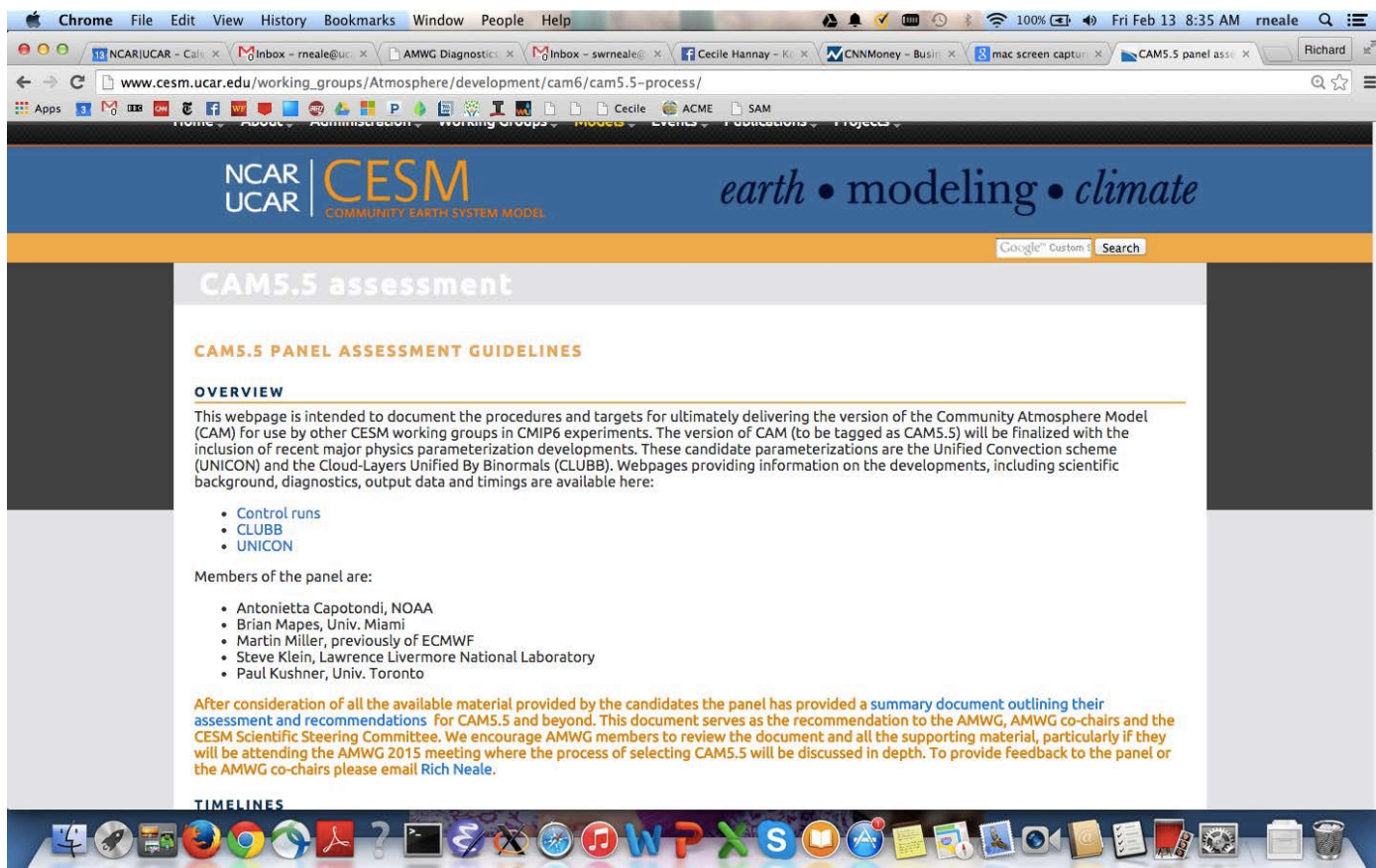


The Panel Process

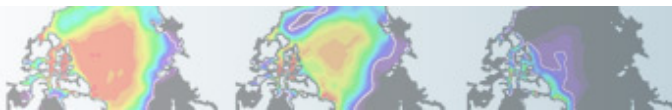
- Aim
 - To assess and select model changes for the next version of CAM (CAM5.5)
 - Just the co-chairs: Too top-down; potential for bias
 - The whole of AMWG: Cumbersome/ bureaucratic (still encouraged)
 - Panel of experts: Useful number for consensus
- Appoint Panel (ok'd by chief scientist)
 - Antonietta Capotondi (CU/NOAA)
 - Steve Klein (DOE/LLNL)
 - Paul Kushner (U. Toronto)
 - Brian Mapes (U. Miami)
 - Martin Miller (formally of NCAR)
- Assessment guidelines
 - Set in place as best as possible guidelines for assessment
 - Did not want to prejudice opinion; so requirements were loose
 - Provide recommendation to AMWG/co-chairs and SSC



AMWG Panel Web page



http://www.cesm.ucar.edu/working_groups/Atmosphere/development/cam6/cam5.5-process/



Boulder Forecast

TODAY



Mostly
Sunny
High: 47 °F

TONIGHT



Mostly
Clear
Low: 31 °F

THURSDAY



Sunny
High: 61 °F

THURSDAY
NIGHT



Partly
Cloudy
Low: 29 °F

FRIDAY



Slight Chc
Rain
High: 54 °F

FRIDAY
NIGHT



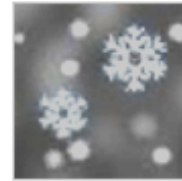
Rain/Snow
Likely
Low: 30 °F

SATURDAY



Snow
Likely
High: 33 °F

SATURDAY
NIGHT



Snow
Likely
Low: 20 °F

SUNDAY



Chance
Snow
High: 30 °F

