WACCM development plans
"to CESM2 and beyond"

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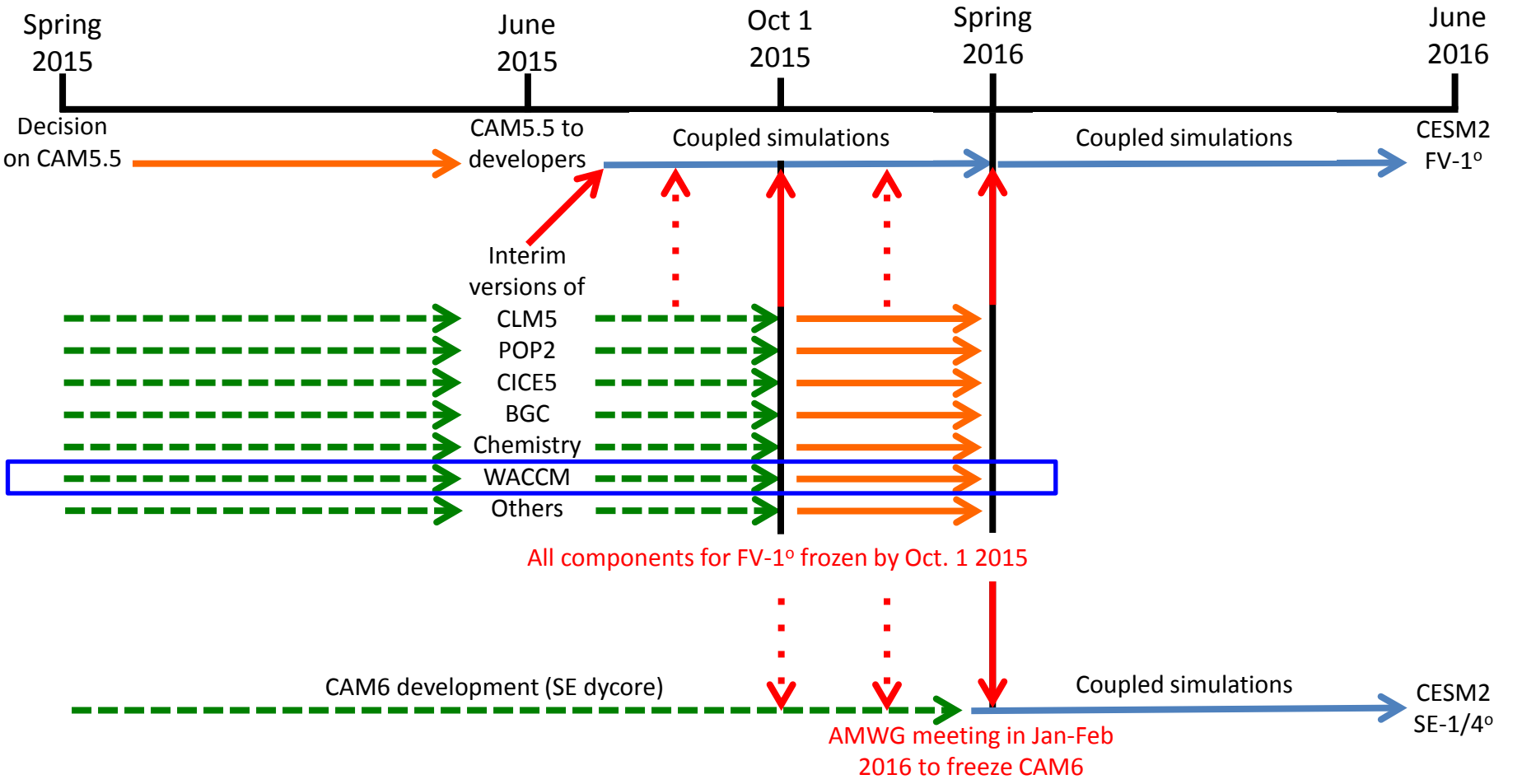
"WACCM Team"

WACCM Development Notes

- Timelines
- Current Progress
- Potential Configurations
- CAM-GW simulations

Timeline for CESM2



Code delivery

Potential code delivery

Potential code development

Assembling and optimizing coupled model

WACCM6 Current Plans/Progress

- Updated Chemistry (From CCMI): Kinnison
- Prognostic Stratospheric Aerosols: Mills
- Updated Gravity Wave Schemes: Garcia
- Inertial Gravity Waves: Smith
- Internally Generated QBO: Richter
- WACCM-X Ionospheric Electrodynamics: Liu
- Parallel Physics to CAM6: Gettelman

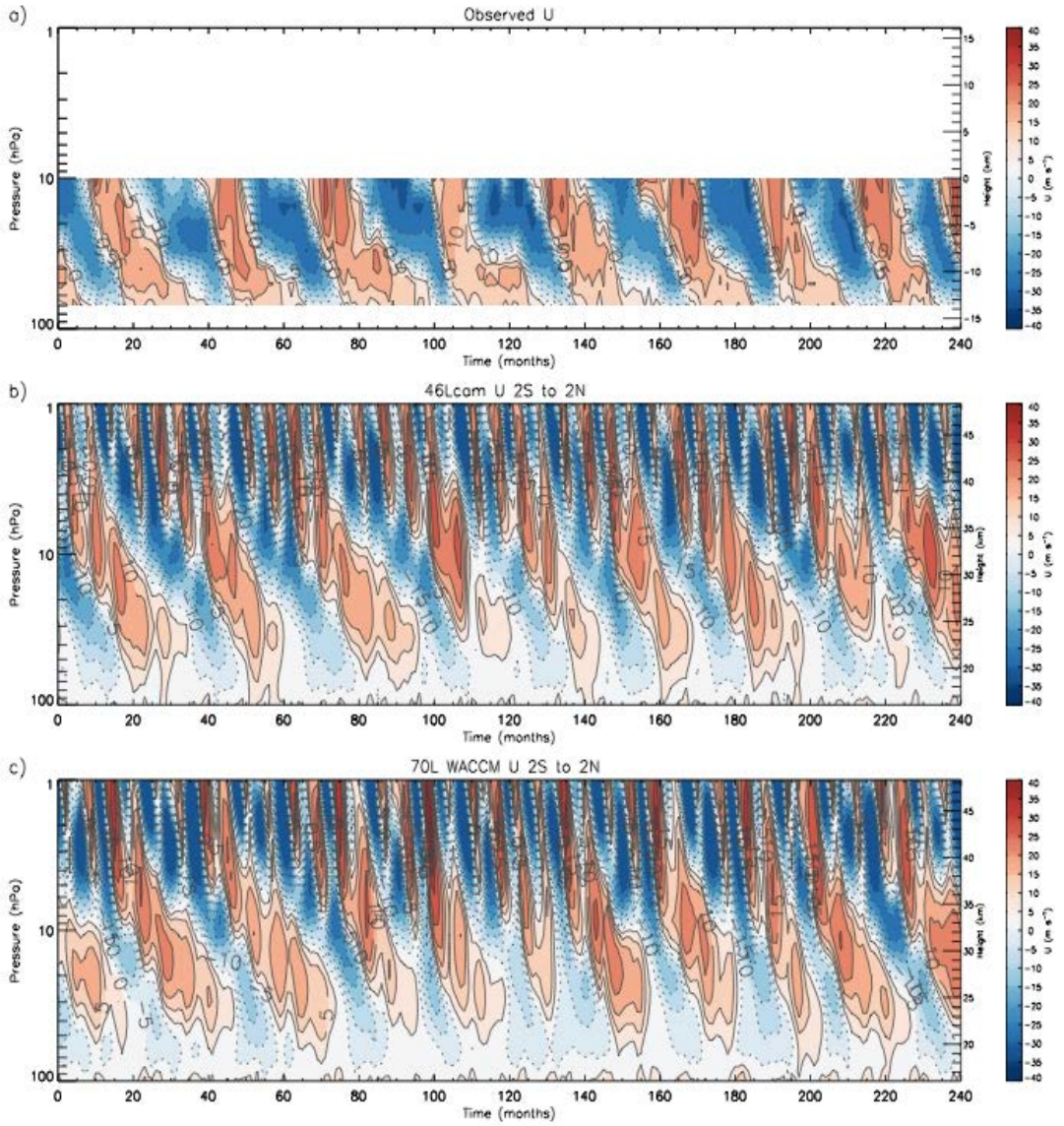
Note: well on track based on June 2014

WACCM QBO

Observed

High top CAM (46L)

WACCM5 (70L)

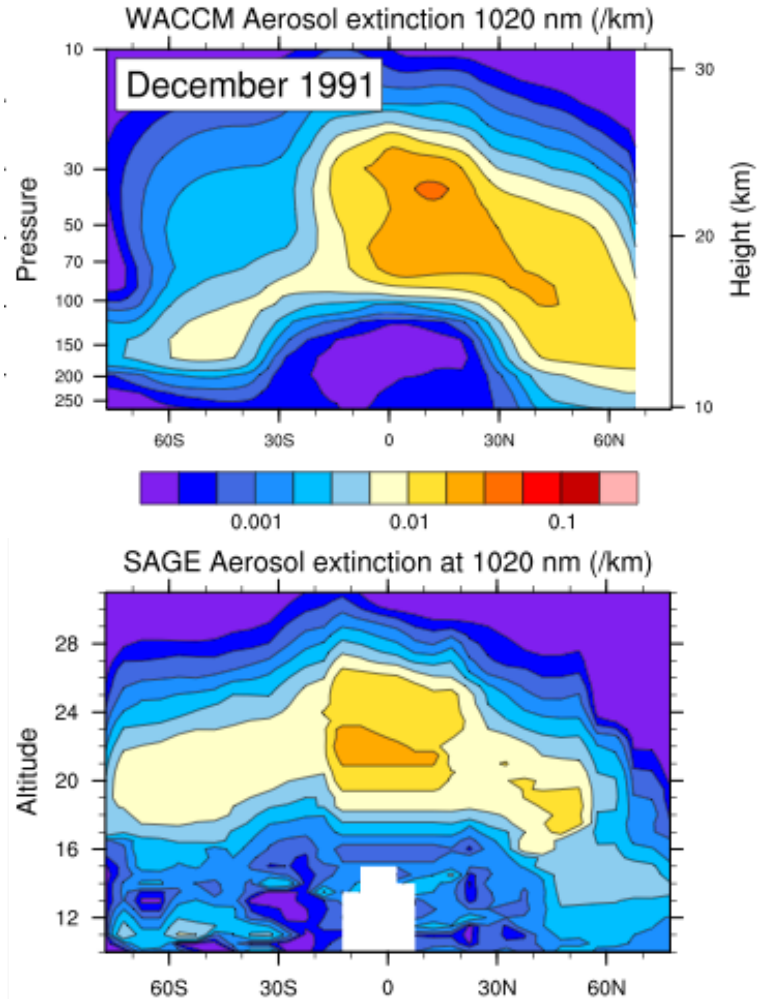


J. Richter, personal comm

Prognostic stratospheric sulfates with MAM

Mike Mills, Anja Schmidt, Ryan Neely

- MAM3 adapted for stratospheric sulfates
- 1850 control run with CCMI chemistry tuned
- Time-varying OCS LBC added
- 20th Century run completed with no volcanoes prior to Pinatubo
- Volcanic input file developed for 1990-2011
- Currently testing sensitivity to input altitude, latitude, and mass with comparison to SAGE v7 4λ data set of extinction and optical depth
- Plans to develop volcanic input file for 1850-1990
- Will be used for GeoMIP “G4” experiment, years 2020-2070 with 5 Tg SO2/year compared to control



Simulations

- CCMI: nearly sorted out (GW)
- WACCM-Last Millenium Simulation: set up
- GEOMIP
- High Res CCMI planned (Spain)
- Others?

Science Priorities: Next Scientific Release (post 2014)

- New CCMI chemistry
- WACCM5: 'keep up with' CAM
- Gravity Waves: fixes and integration
- Increased vertical resolution
- Prognostic volcanic (MAM) aerosols
- WACCM X: Interactive Ionosphere-Plasmasphere

Slide from June 2014 WACCMWG Meeting

Software Engineering Priorities

- GW: intertial GW (Hanli), Bug fixes (Sean/Rolando, Isobaric Coord & Dry static Energy changes (Yudin).
- GW (2): Deep (Yaga) and Shallow Convection (Leslie/Yaga), Oro GW (Julio)
- QBO tuning (includes vertical levels)
- Volcanic Aerosols in WACCM5, CAM5 (Mills)
- Chemistry: CCMI chemistry (Vitt, Kinnison)
- Ionospheric Electrodnynamics (Liu, McInerney)

Also in WACCM6

- New vertical remapping
- Comp-sets for higher vertical resolution
- What did I miss?

Potential CESM2 Configurations

Config	Res	Cost	Pro	Con
32L CAM	FV1	1x	cheap	No QBO
70L WACCM-SC	FV1	2x	Full strat, QBO	
70L WACCM	FV1	3x	Chem, QBO, Full Strat	Cost
46L CAM-GW	FV1	1.5x	Better Strat + QBO	Cost
83L CAM-GW	FV1	3x	V&H Res More Consistent, Better QBO	
110L WACCM (SC?)	FV1 (FV2?)	5x (3x)	Everything "Great Model"	COST

Other notes:

1. V&H resolution "Never bothered anyone before" –Williamson
2. Vertical remapping may look better in 46L CAM than 32L CAM (WACCM OK)
3. Estimates are with MA (Strat) chemistry: Not TSMLT (unified chemistry)

CAM-GW

- CAM + Non-Orographic GW
  - Frontal and Convective, not IGW yet
  - Initial results: + momentum & low top = bad (puts momentum in top layer at 40km, 3mb)
  - Experimenting with a ‘flux-through’ top boundary
  - Will want to add IGWs
- Goal: can we have all the GW schemes running all the time in CAM & WACCM?
  - Possibly if Flux-Through Boundary & Low cost