

Paleoclimate Working Group Current Status and Plans

Co-Chairs: Charles Jackson (Univ. Texas – Austin),
Bette Otto-Bliesner (NCAR)

Paleoclimate Working Group Meeting – 2 March 2017

Status of developments and future plans

- Isotopes (for CESM2 release)
- Coupling to Community Ice Sheet Model (CISM)
- CESM2 – Testing of Low-resolution version (FV2x1)
Tools for Deep-time simulations
- PaleoWG participation in CMIP6

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Summary of iCESM2 Developments

CAM6: *Water Isotopes currently working with the MG2 microphysics, and development is underway to implement with CLUBB, allowing for complete compatibility with the default configuration for CAM6 and CESM2.*

CLM5: *Carbon isotopes implemented, but need to be tested. Work is underway to add the water isotope tracers fully into CLM5. A first stage has been implemented.*

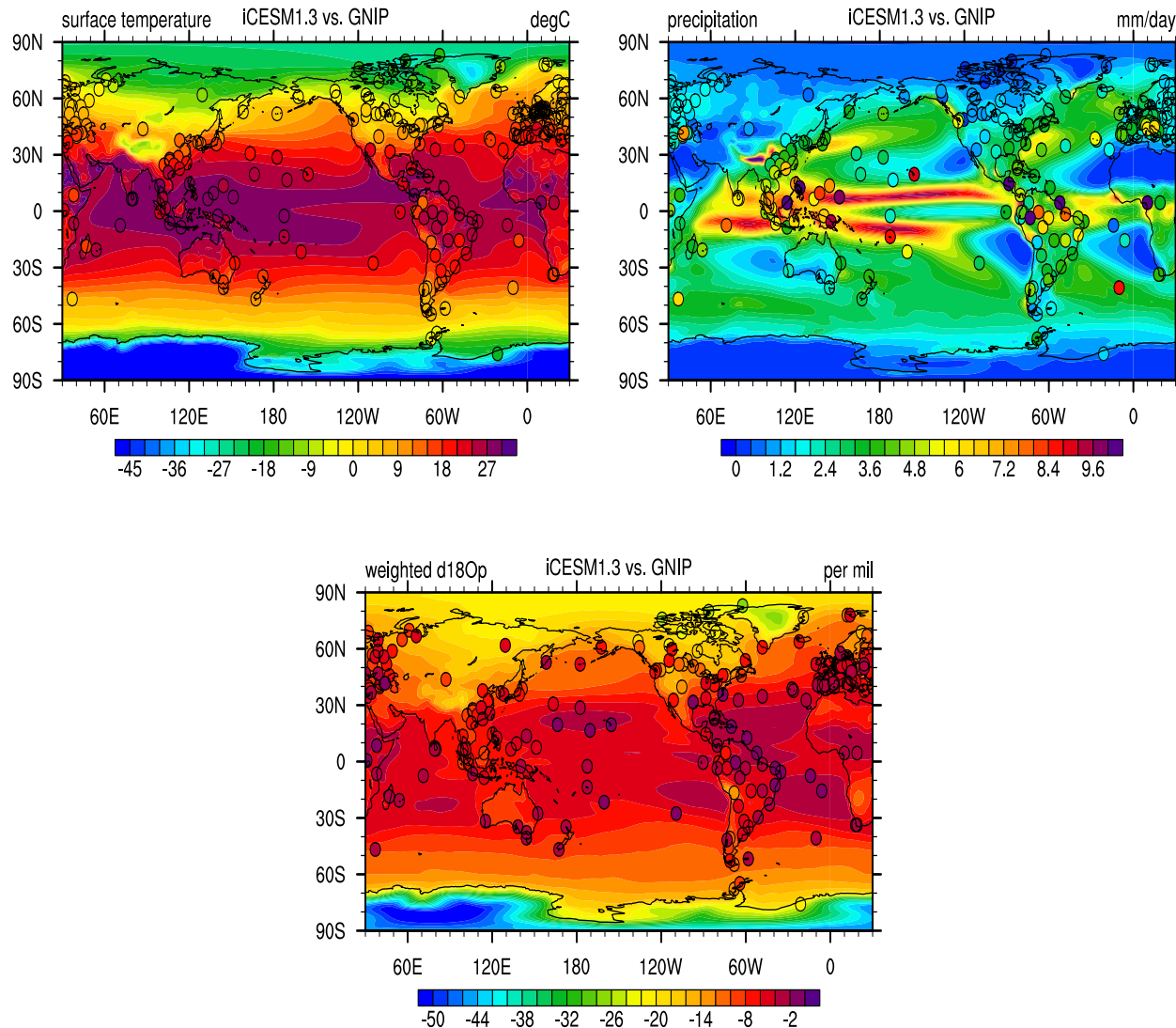
POP2: *water and carbon isotopes as passive tracers have been implemented. The water isotope module needs to be incorporated into the trunk and an implementation with the Estuary Balance Model needs to be developed.*

CICE5: *Water isotopes are currently implemented with both CICE4 and CICE5 physics. Currently testing the new “mushy physics” in CICE5.*

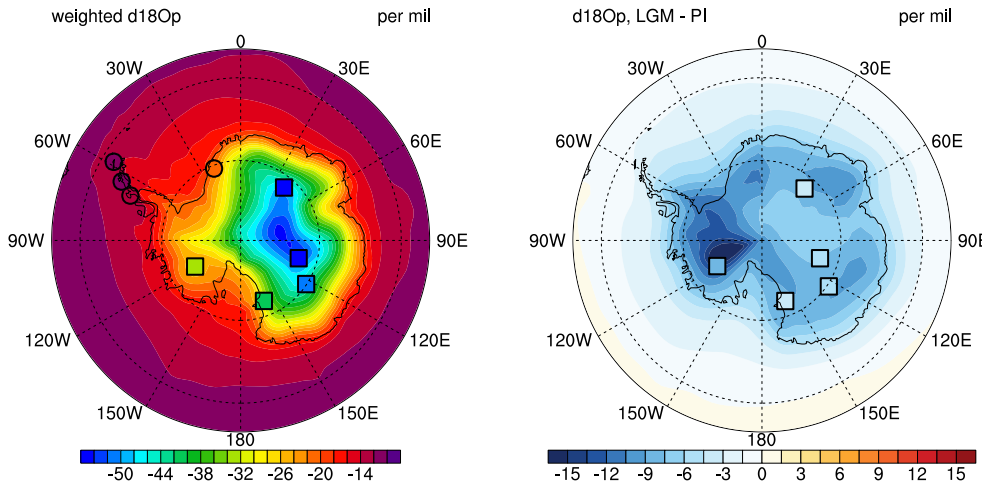
MOSART: *Water isotopes have been implemented in MOSART, but have not been tested yet in the coupled framework.*

iCESM2 team: B. Andre, D. Bailey, E. Brady, C. Craig, A. Gettelman, A. Jahn, E. Kluzek, H. Li, K. Lindsay, Z. Liu, K. Niezgod, D. Noone, J. Nusbaumer, B. Otto-Bliesner, W. Riley, C. Tabor, J. Tang, M. Vertenstein, A. Wong, J. Zhang, J. Zhu

Water isotope results in iCESM1.3

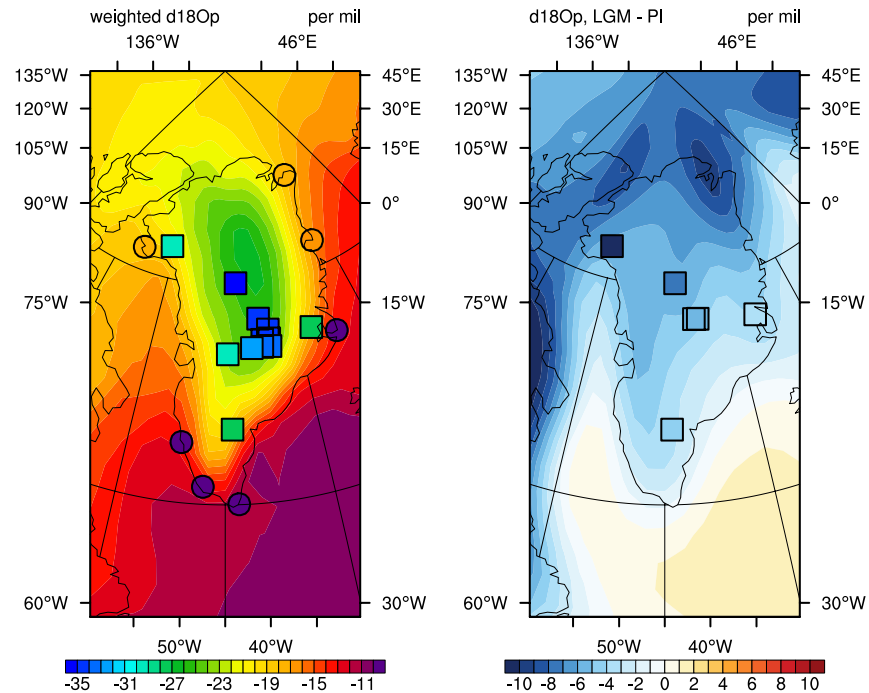


Water isotope results in iCESM1.3

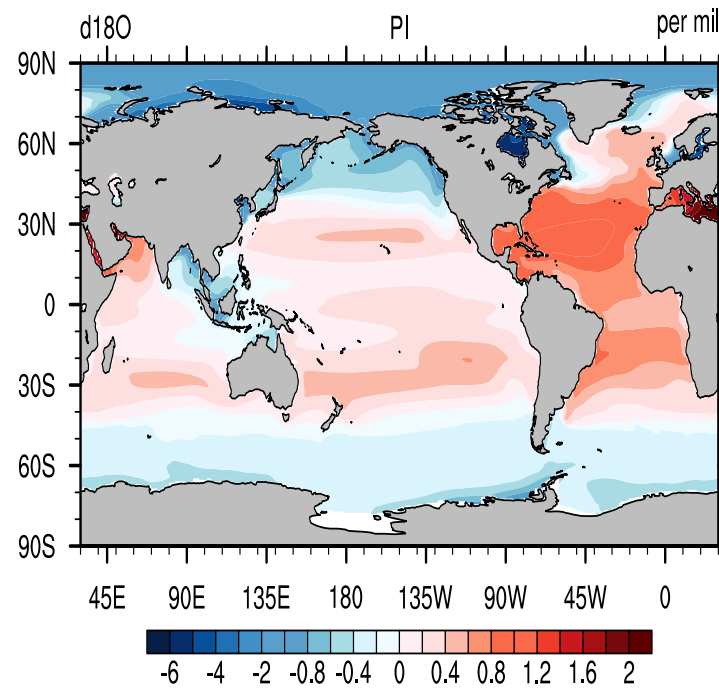
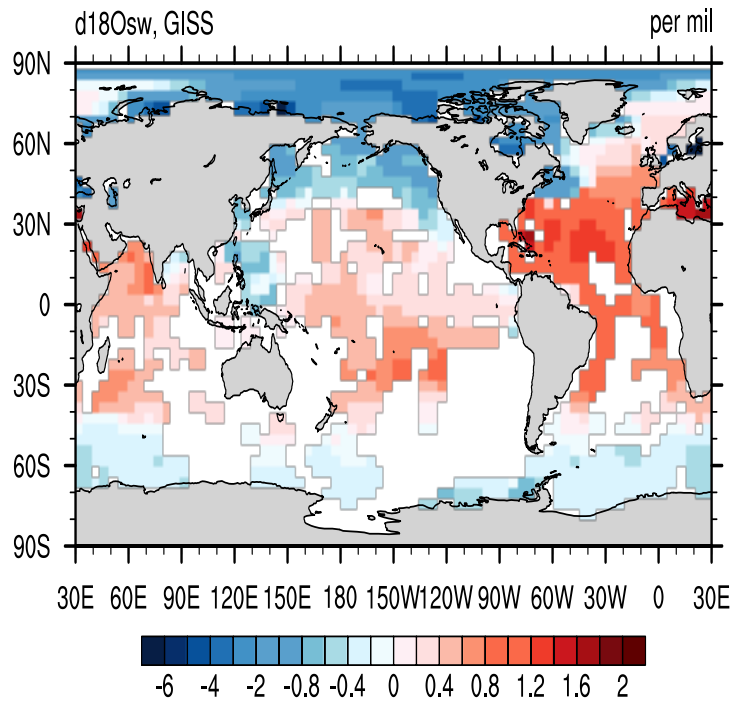


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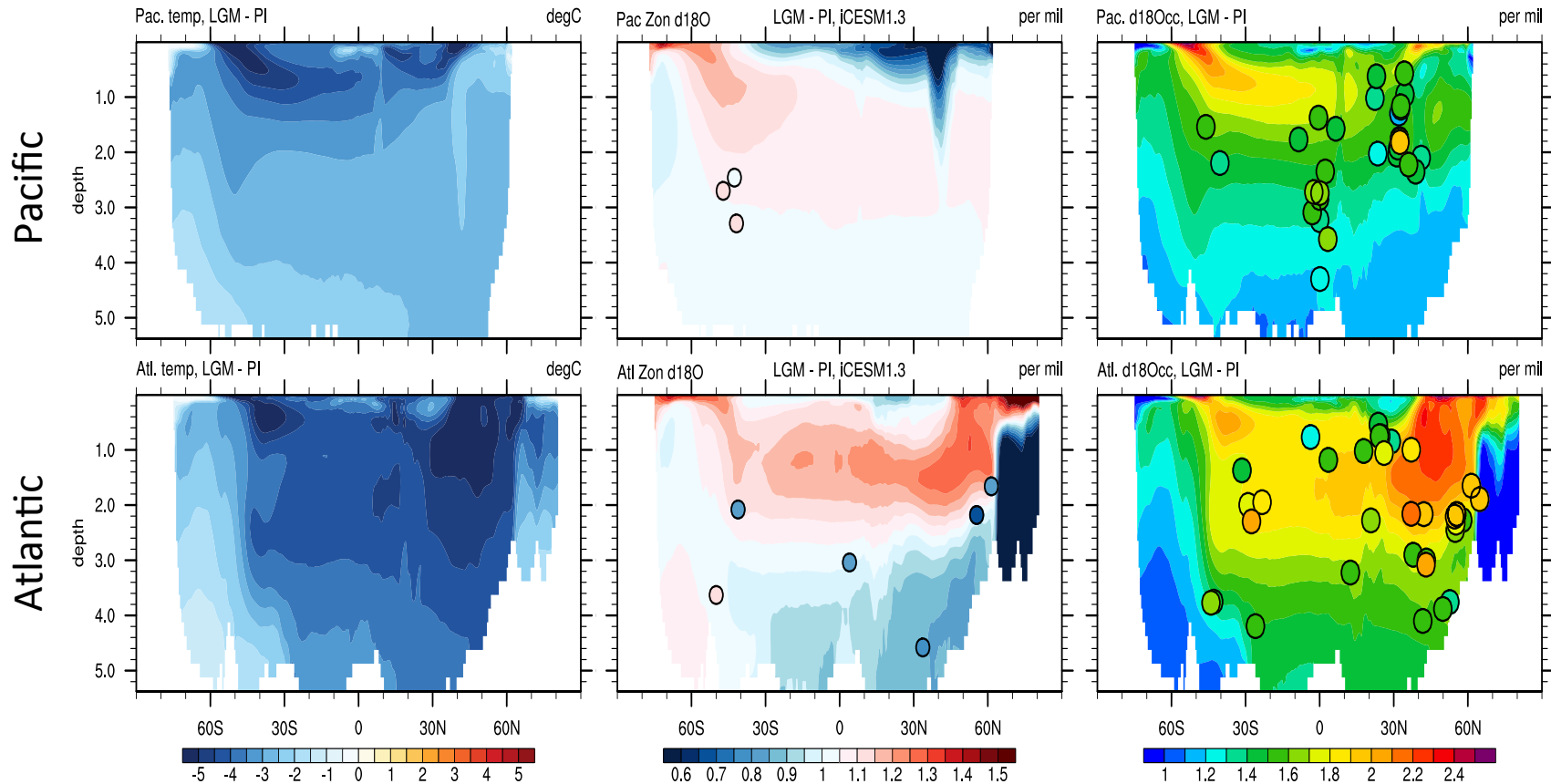
GREENLAND



Water isotope results in iCESM1.3



Water isotope results in iCESM1.3



Status of developments and future plans

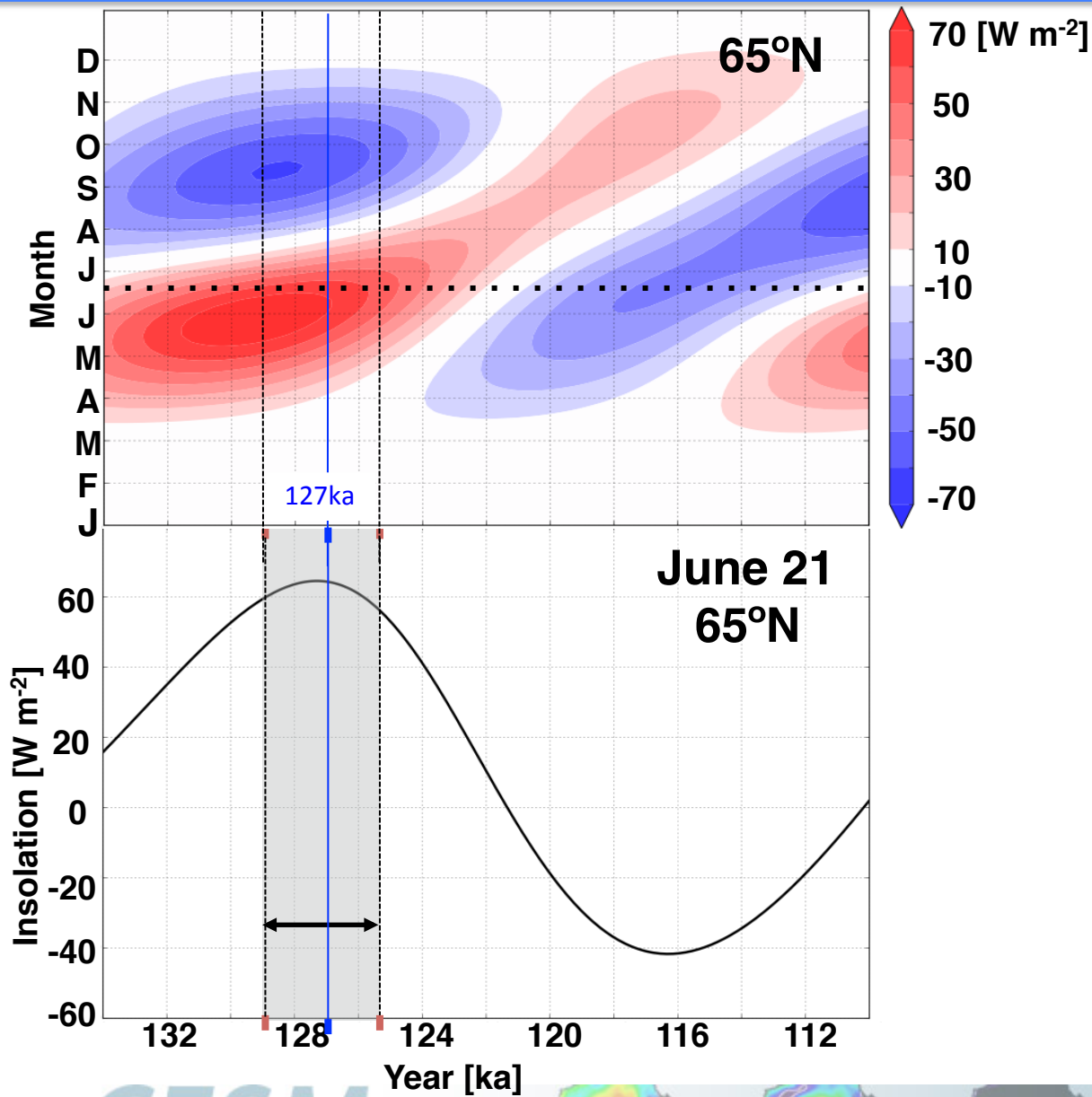
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Paleo application of CESM - CISM Greenland

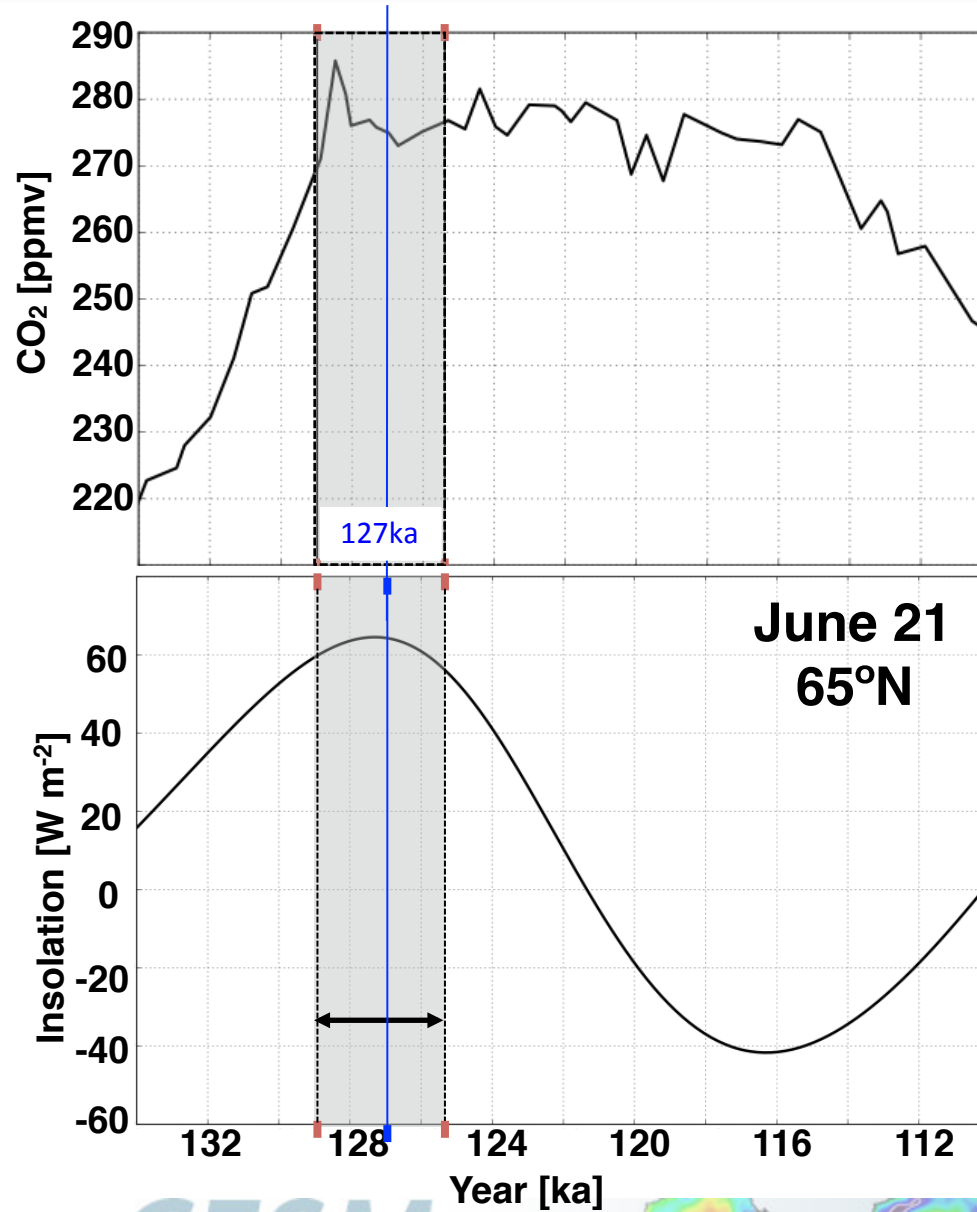
Component	Model	Resolution
Atmosphere	CAM5.4	~2°x2°
Land	CLM5.0	~2°x2°
Ocean	POP2	~1°x1°
Sea ice	CICE5	~1°x1°
River	MOSART	0.5°x0.5°
Ice sheet	CISM2.1	4x4 km

SLICE team: Bette Otto-Bliesner, Bill Lipscomb, Jeremy Fyke, Shawn Marshall, Marcus Lofverstrom, Bill Sacks

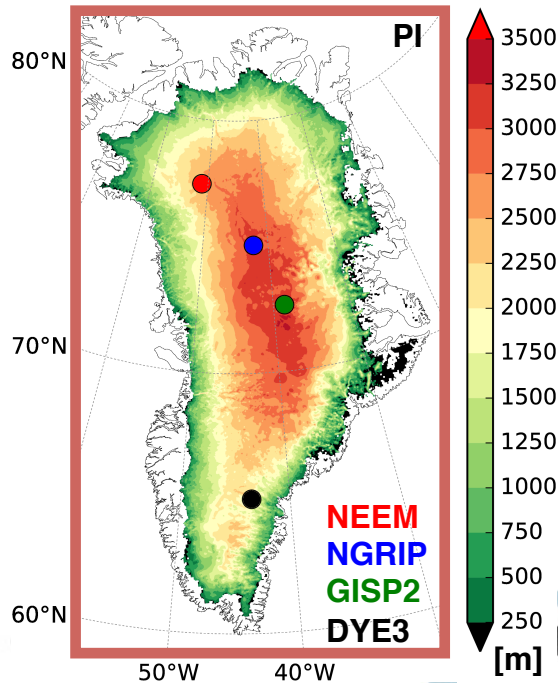
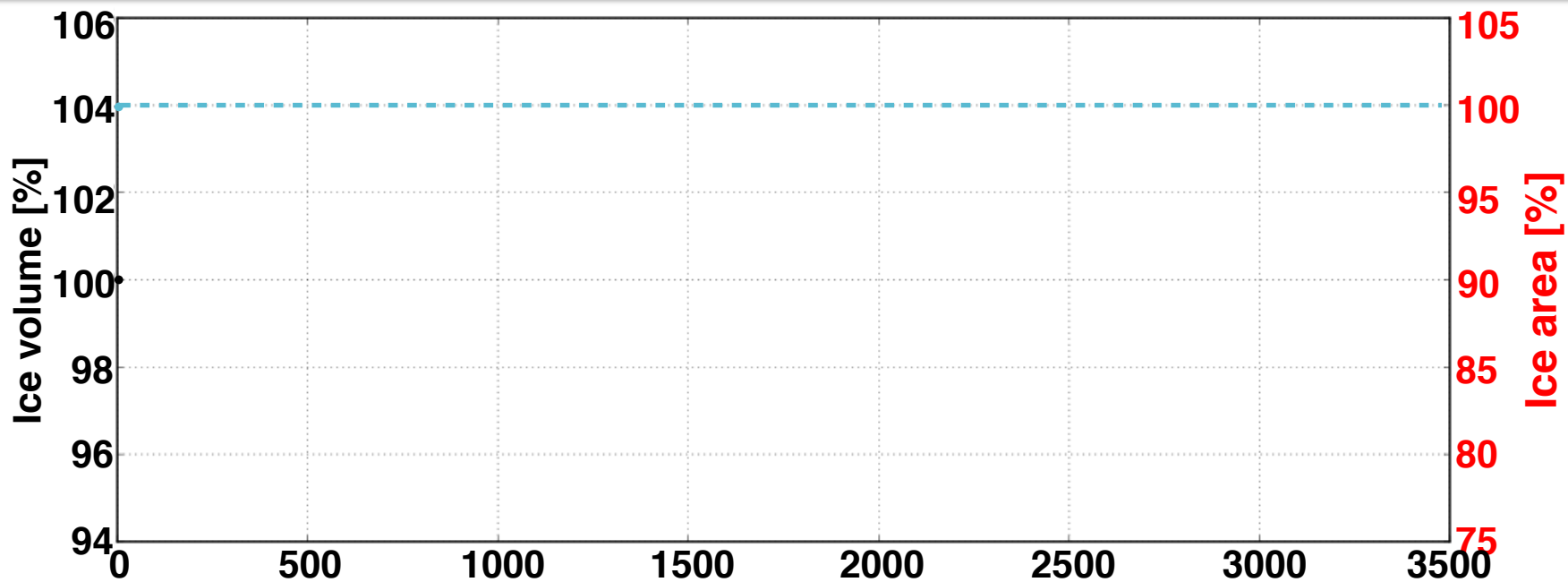
Last Interglacial forcings



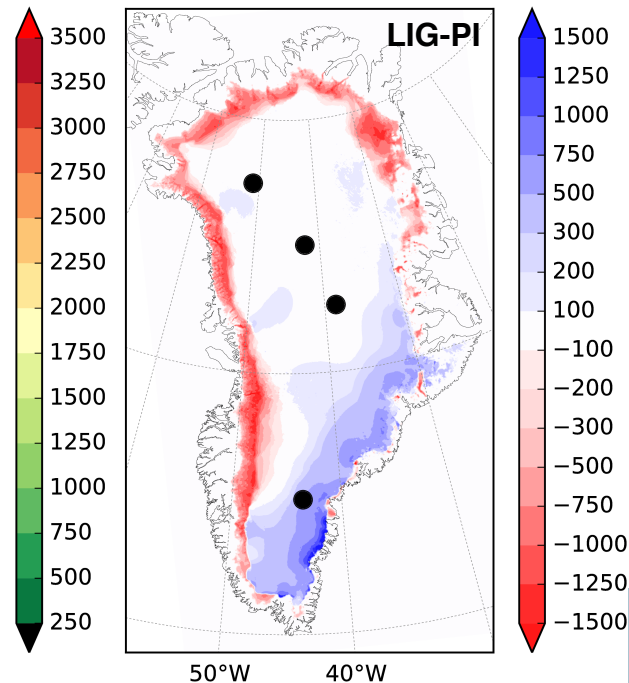
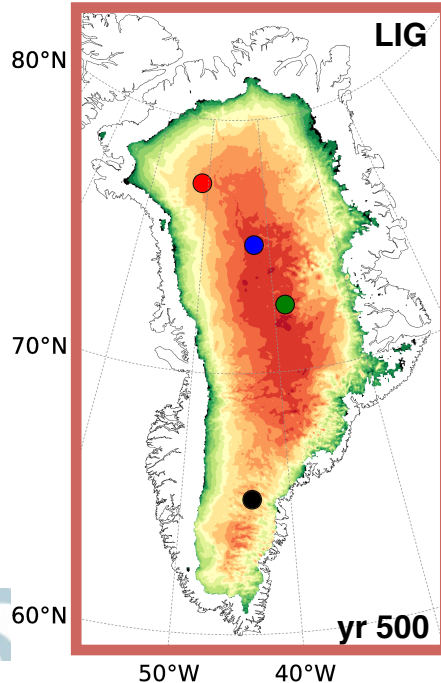
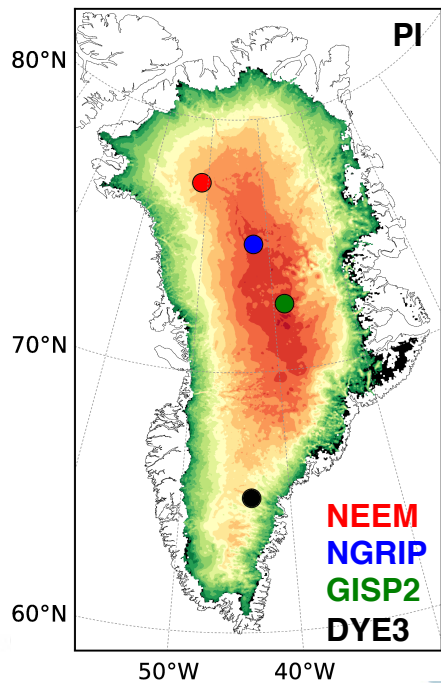
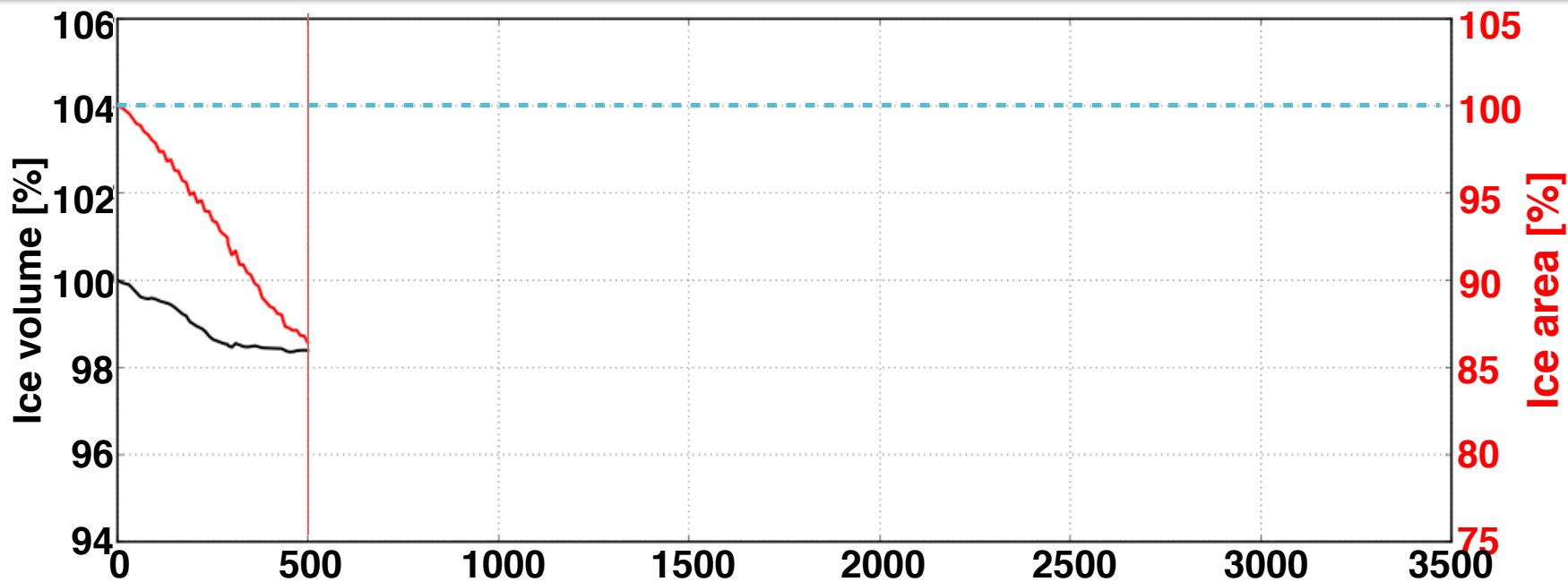
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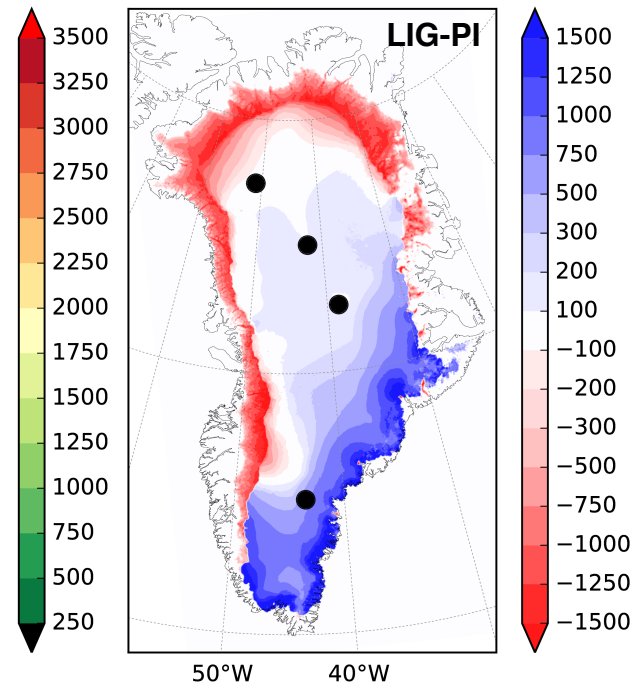
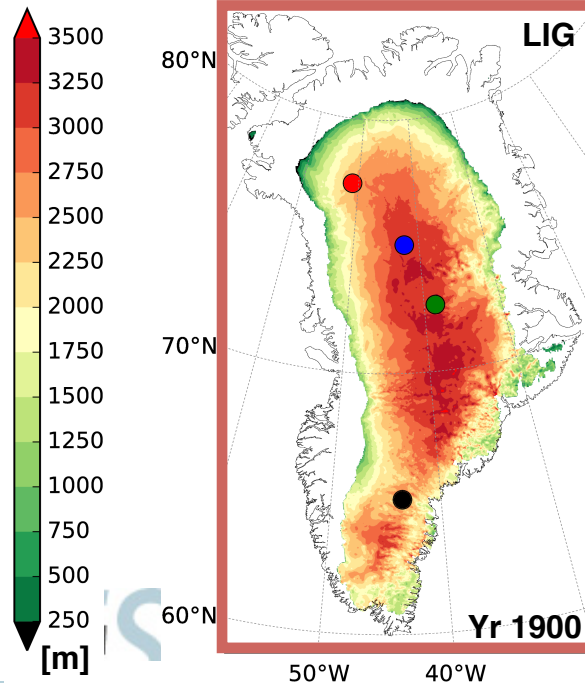
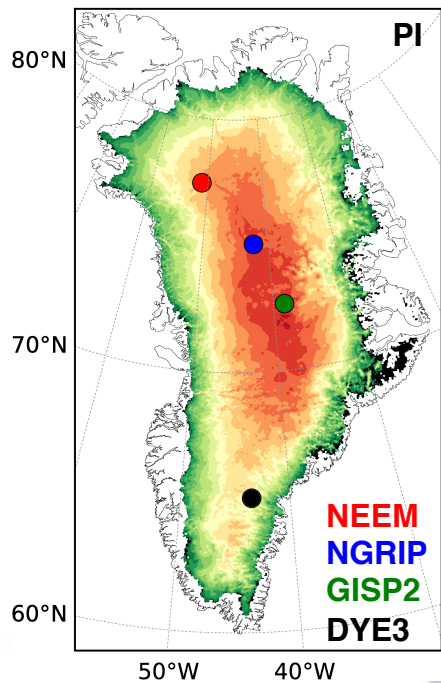
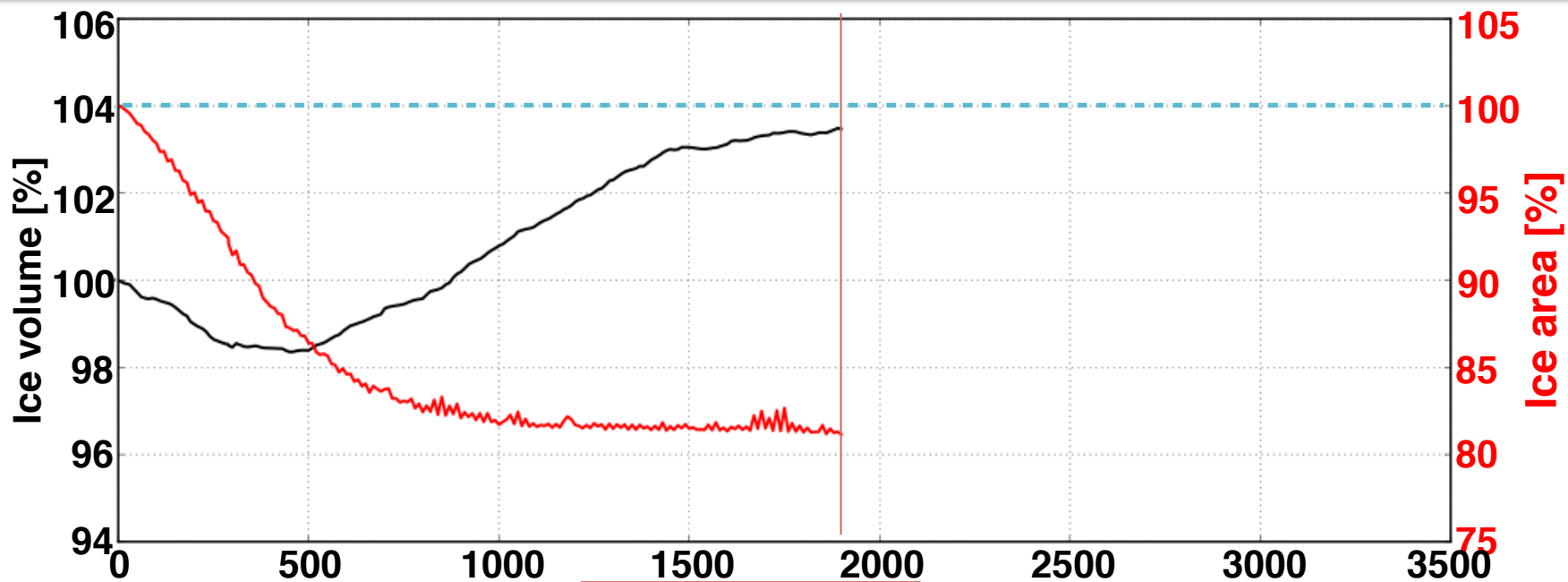
First Results for LIG Greenland Ice Sheet



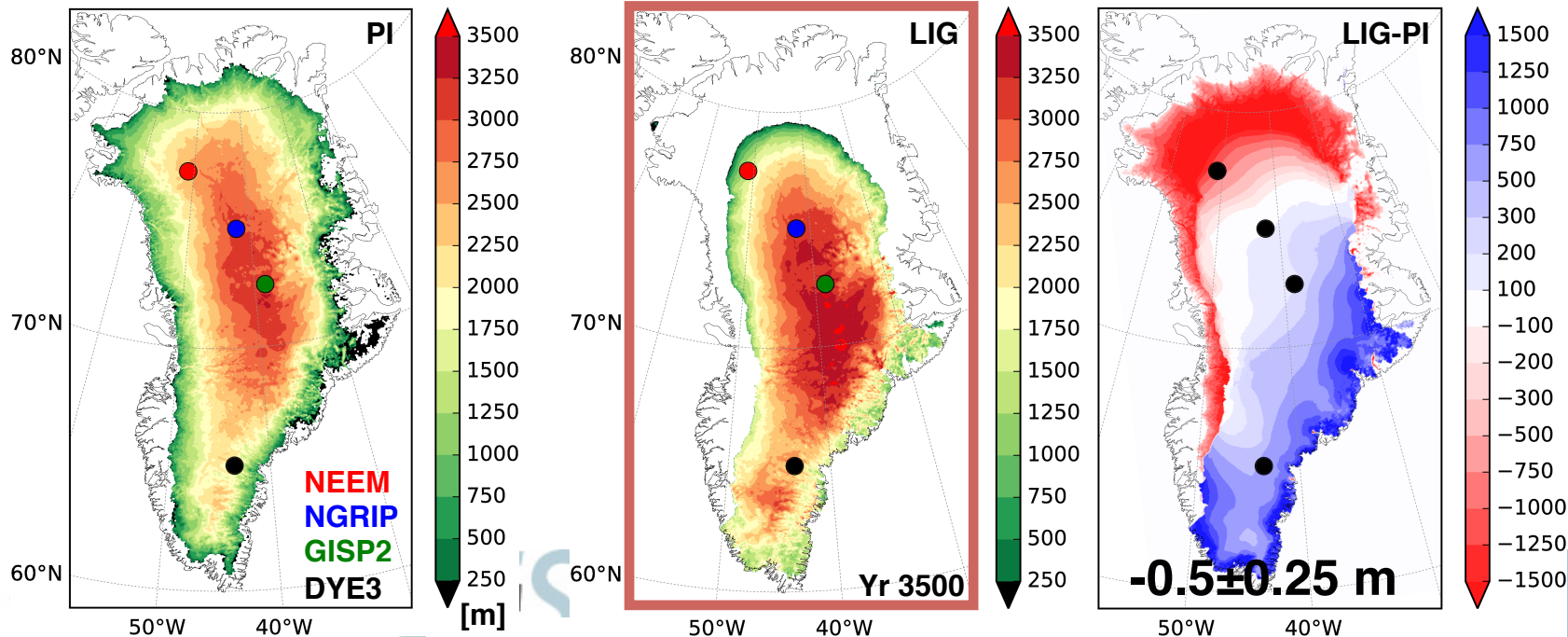
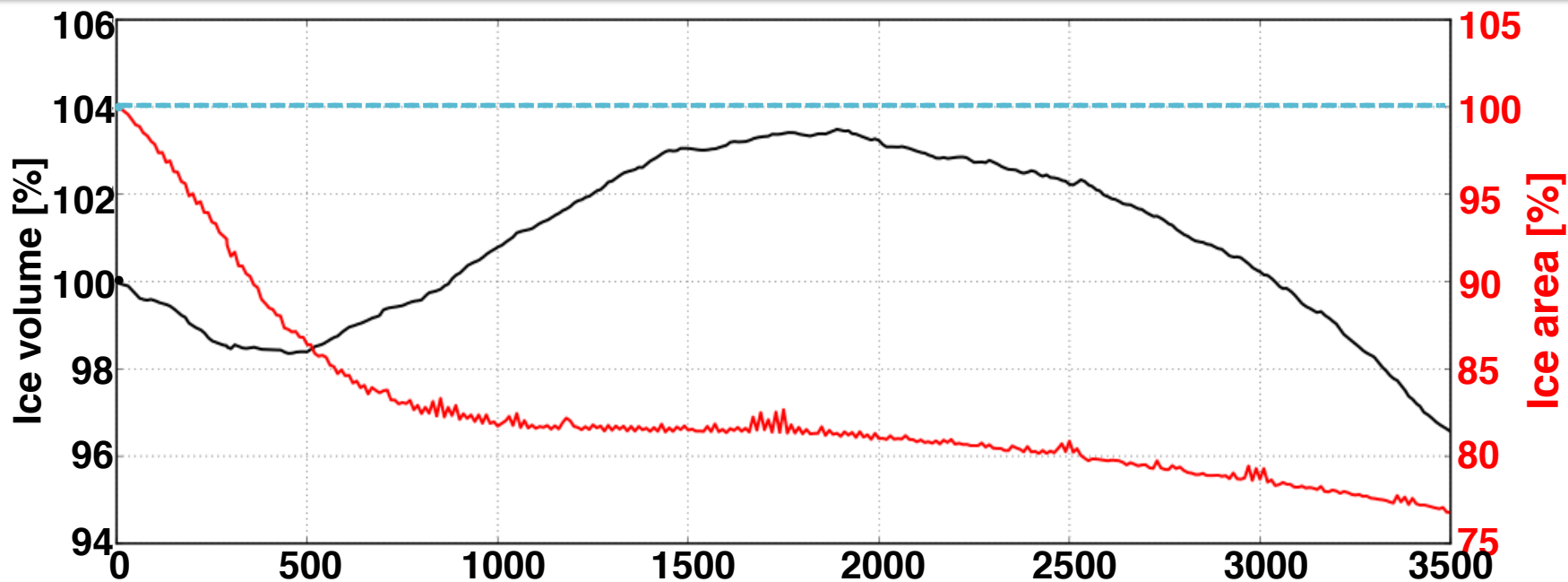
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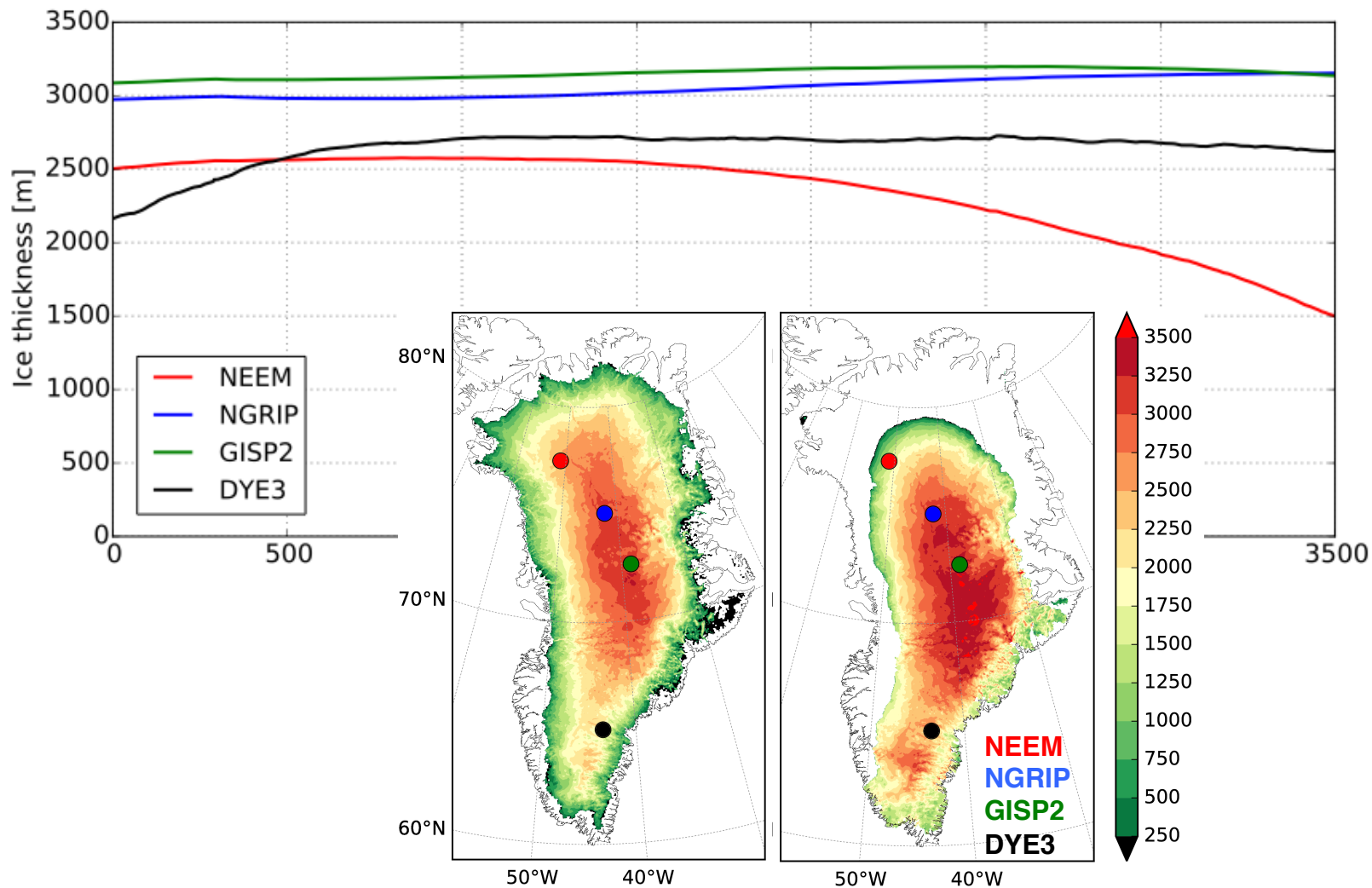
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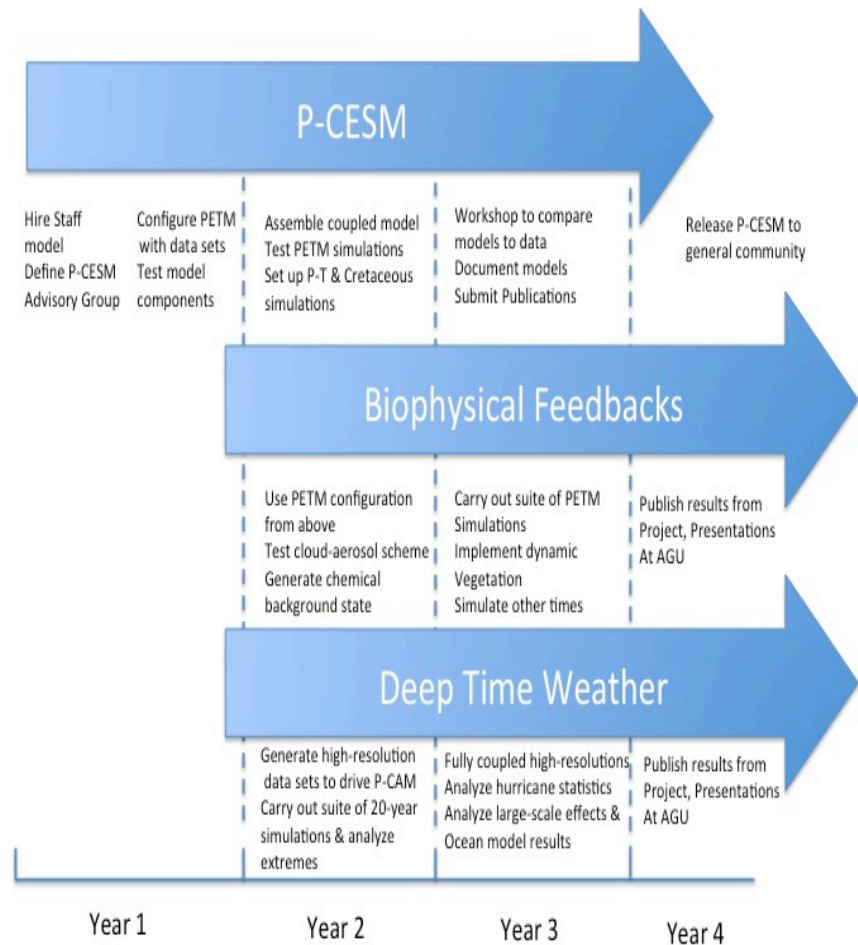
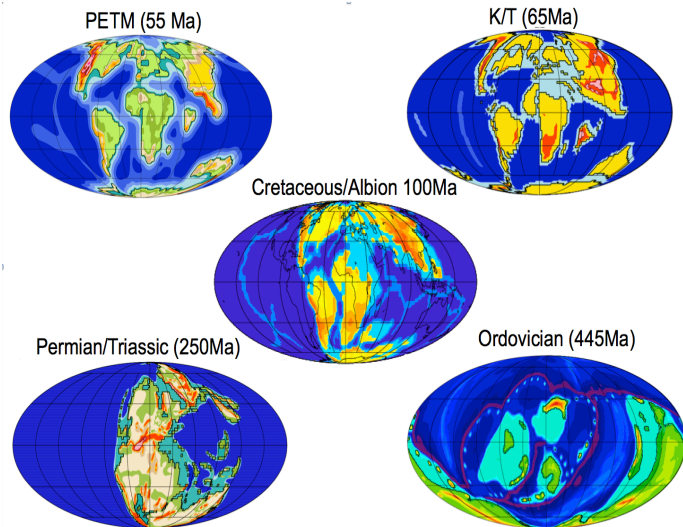


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Deep-time Paleo-CESM Project

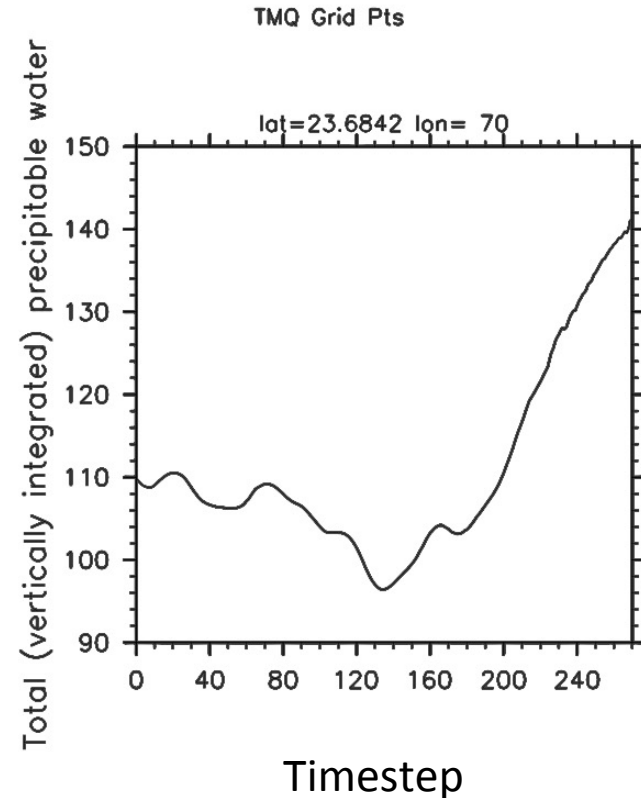
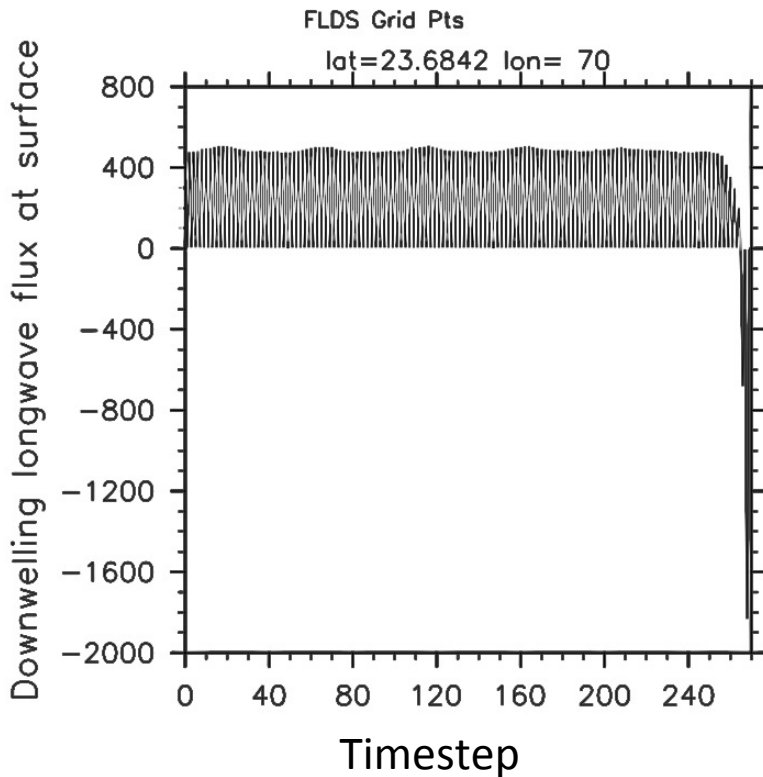
- Create a flexible, robust, user-friendly version of CESM for the community that is applicable to **deep time paleoclimates**.
- Heising-Simons foundation funding.



NCAR Deep-time Paleo-CESM team: Jeff Kiehl, Christine Shields, Mat Rothstein

CAM5 Warm Earth problem

Why did the model crash for high CO₂ and other warm world scenarios?



- Upgrades/Bug fixes to RTTMG had not been applied to CESM1 yet....
- Code was missing diffusivity angle specification for certain longwave bands and affected profiles with >> 80 mm precipitable water.

CAM5 Warm Earth fix

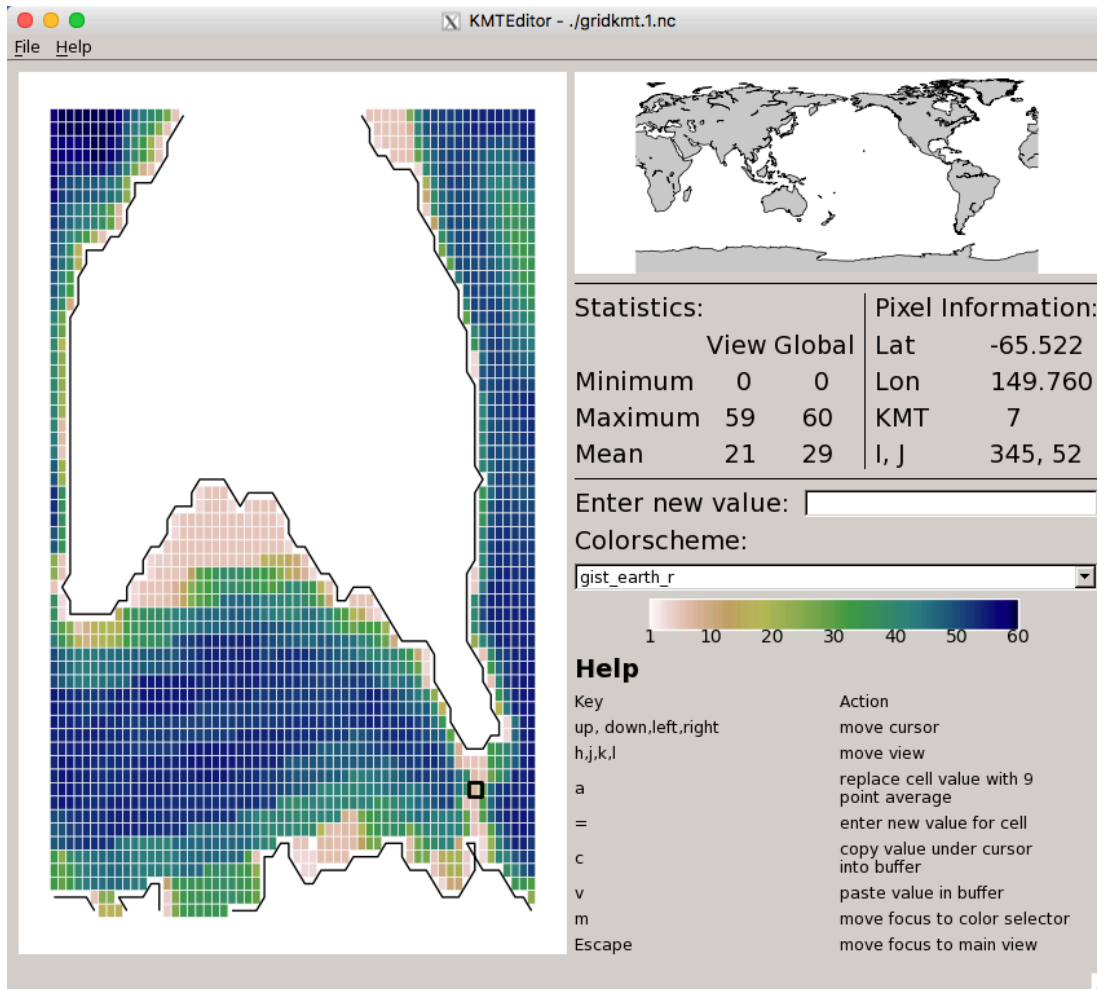
Why did the model crash for high CO₂ and other warm world scenarios?

Thanks to Andrew Conley and to the many others who helped solve this problem! (CESM team, Mike Iacono/AER group)

- Code fix: `rrtmg_lw_rtrnmr.f90`
`rrtmg_lw_rtrnmc.90`
- P-CESM research experimental tag has been created which consists of CESM1.2.2 release plus bug fixes to RRTMG and deep convection scheme; allows warm world simulations to work without crashing.

KMT Editor

Courtesy of Deepak Chandan, University of Toronto



- GUI – based tool
- Eases the process of ocean grid editing
- Takes NetCDF input containing KMT info
- Saves changes to NetCDF output file
- Download directly from GitHub repository

<https://github.com/dchandan/cesmGUITools>

- Also staged on Yellowstone

contact mvrothst@ucsc.edu

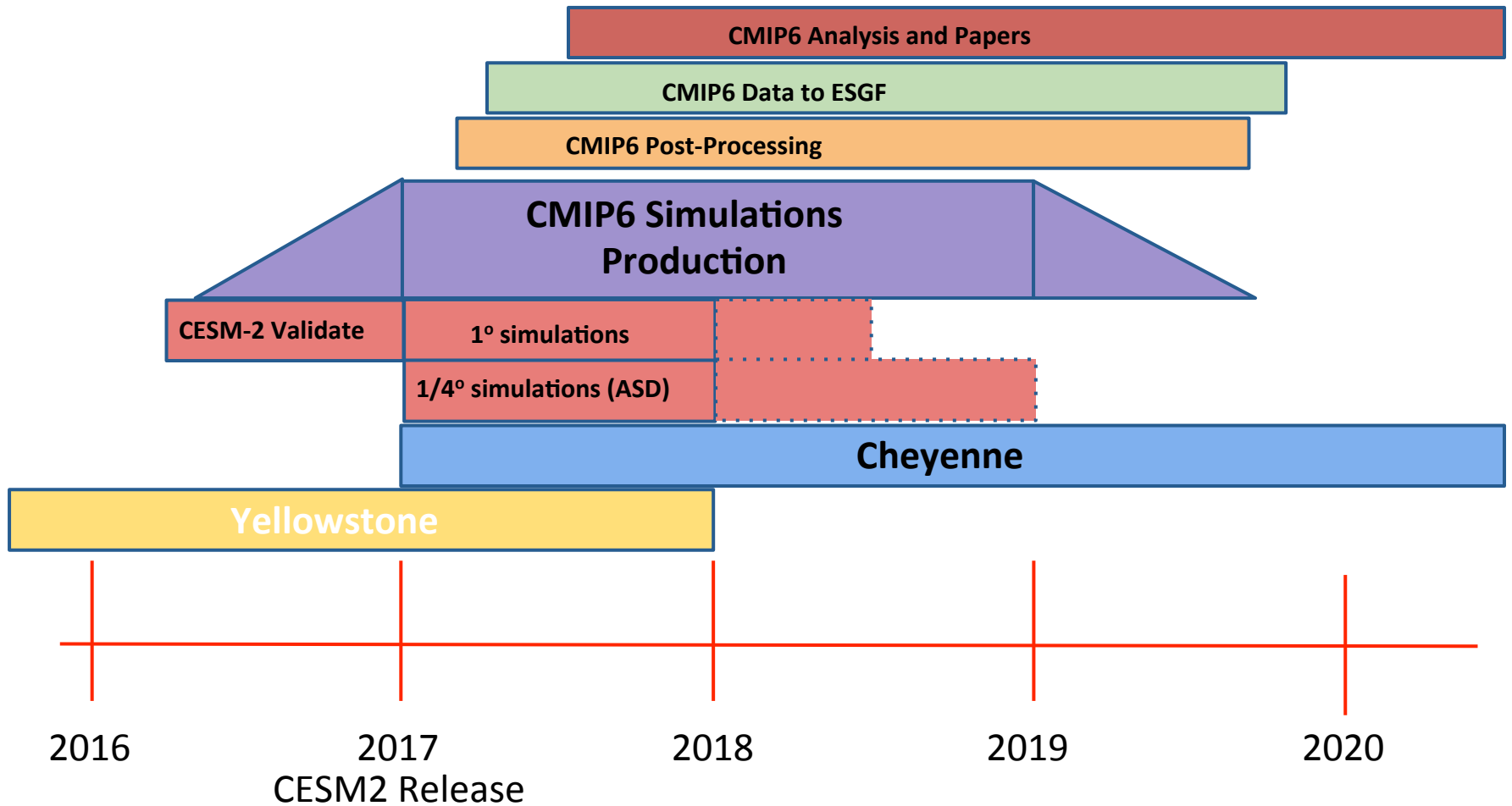
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CMIP6 MIPs

AerChemMIP	Aerosols and Chemistry Model Intercomparison Project	H	Lamarque/Emmons
C4MIP	Coupled Climate Carbon Cycle Model Intercomparison Project	H	Lindsay
CFMIP	Cloud Feedback Model Intercomparison Project	H	Medeiros/Kay (CU)/Klein (LLNL)
DAMIP	Detection and Attribution Model Intercomparison Project	H	Tebaldi/Arblaster
DCPP	Decadal Climate Prediction Project	H	Danabasoglu/Meehl
GeoMIP	Geoengineering Model Intercomparison Project	H	Tilmes/Mills
GMMIP	Global Monsoons Model Intercomparison Project	M	Fasullo
HighResMIP*	High Resolution Model Intercomparison Project	M	Neale/Bacmeister
ISMIP6	Ice Sheet Model Intercomparison Project for CMIP6 ***	H	Lipscomb (LANL)/Otto-Bliesner
LS3MIP	Land Surface, Snow and Soil Moisture	H	D. Lawrence
LUMIP	Land-Use Model Intercomparison Project	H	D. Lawrence/P. Lawrence
OMIP/OCMIP	Ocean Model Intercomparison Project	H	Danabasoglu
PMIP	Palaeoclimate Modelling Intercomparison Project ***	H	Otto-Bliesner
RFMIP	Radiative Forcing Model Intercomparison Project	H	Gettelman/Neale
ScenarioMIP	Scenario Model Intercomparison Project	H	Meehl/O'Neill/P. Lawrence
VolMIP	Volcanic Forcings Model Intercomparison Project ***	H	Mills/Otto-Bliesner
CORDEX	Coordinated Regional Climate Downscaling Experiment	M	Mearns/Gutowski
DynVar	Dynamics and Variability of the Stratosphere-Troposphere System	H	Marsh
SIMIP	Sea-Ice Model Intercomparison Project	H	Bailey/Holland/Jahn (CU)/Hunke (LANL)
VIAAB	VIA Advisory Board for CMIP6	H	Mearns/O'Neill
FAFMIP	Flux-Anomaly-Forced Model Intercomparison Project	M	
NonlinMIP	Nonlinear climate responses to CO2		
ENSOMIP	ENSO Model Intercomparison Project	H	Deser
PDRMIP	Precipitation Driver and Response Model Intercomparison Project	M	Lamarque
GDDEX	Global Dynamical Downscaling Experiment		

Planning for CMIP6 simulations @ NCAR



Planning in collaboration with CISL

Upcoming CESM events

- This is a reminder that the application process for this year's **CESM Tutorial (14-18 August)** will close on **Friday, 3 March 2017**. Here is the URL to apply if you are interested: <http://www.cesm.ucar.edu/events/tutorials/2017/>
- **22nd Annual CESM Workshop** being held from **19 - 22 June 2017**.