

Coupled Models and Climate Change

V. Krishnamurthy, COLA	Simulations of the Monsoons in SP-CCSM
Cristiana Stan, COLA	Tropical Cyclone Simulation in SP-CCSM
Peter Blossey, U. Washington	Future plans: Sensitivity of coupled SP-CAM
Mark Branson, CSU	Paleo Simulations with SP-CAM-SOM
Charlotte DeMott, CSU	Changes to the Asian Monsoon in 4xCO2 SP-CAM-SOM

Discussion Topics

- CMIP/CFMIP plans
- Low clouds in future SP simulations
- SP clouds/sea ice interactions
- GCM/CRM resolution effects

Low Clouds in SP

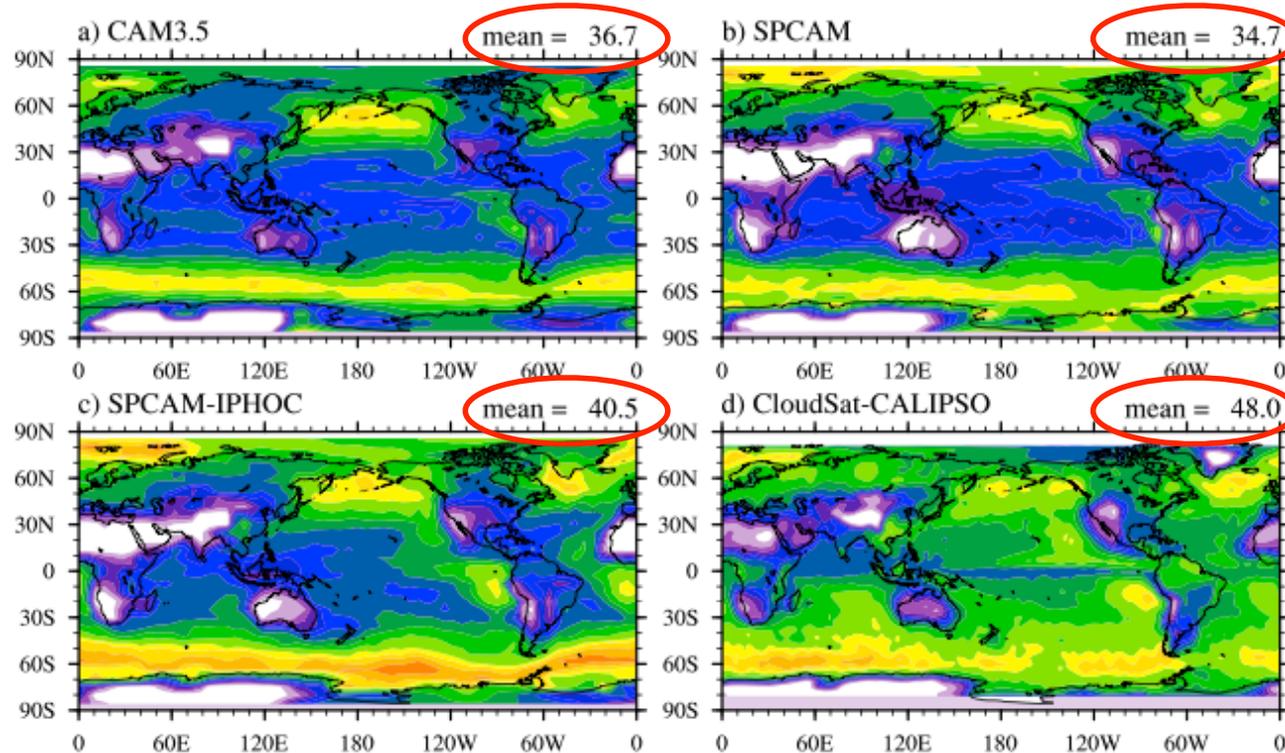


Table 1. Computational Cost for 10 Model Days in the NCAR BlueGene Supercomputer System and Time Steps Used in the Three Models

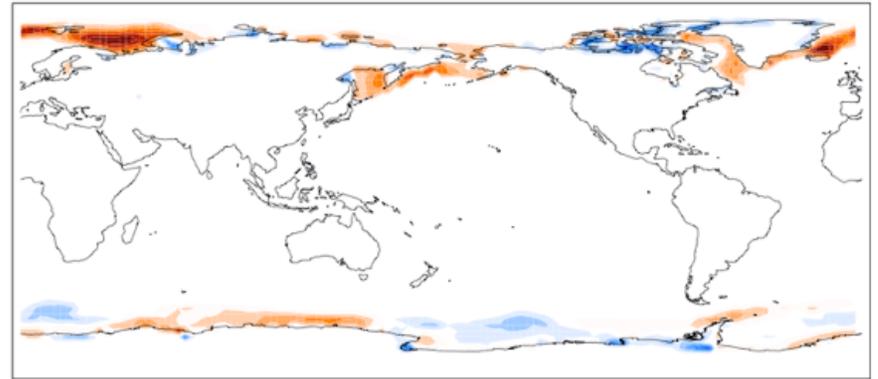
	Total Wallclock (s)	Time Step for Dynamic Core (s)	Time Step for CRM (s)	Time Step for IPHOC (s)
CAM3.5	155	3600	N/A	N/A
SPCAM	3833	900	10	N/A
SPCAM-IPHOC	7674	900	10	10

from Cheng and Xu, 2001

Annual Sea Ice Fraction bias

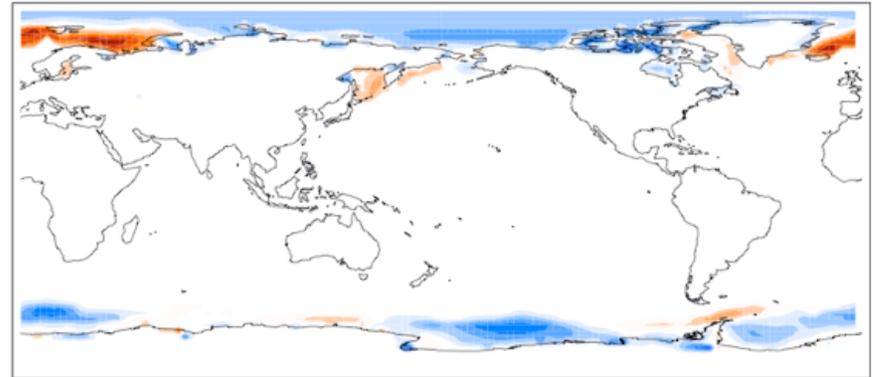
CCSM

CCAM-OBS IceFrac ANN



SpCCSM

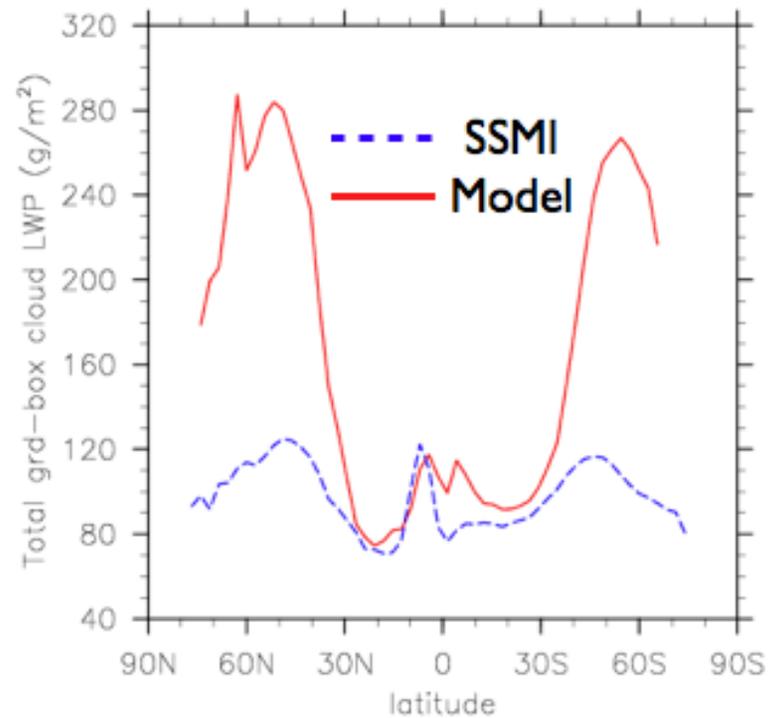
CMMF-OBS IceFrac ANN



Liquid Water Path

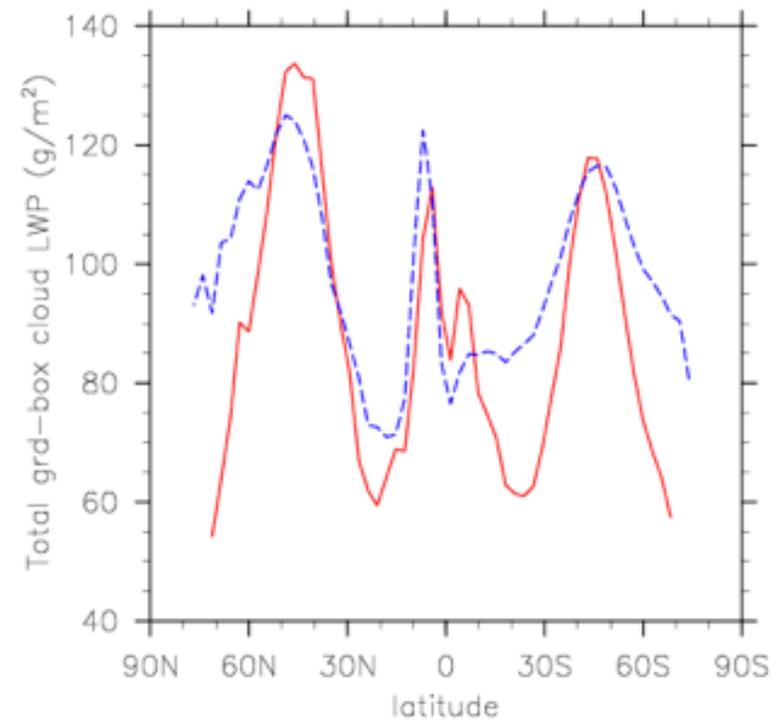
CCSM

ANN



SpCCSM

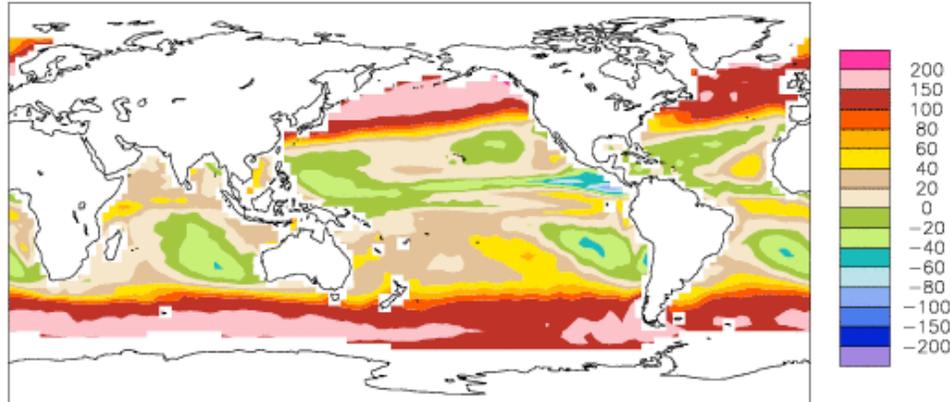
ANN



Cloud liquid water path biases

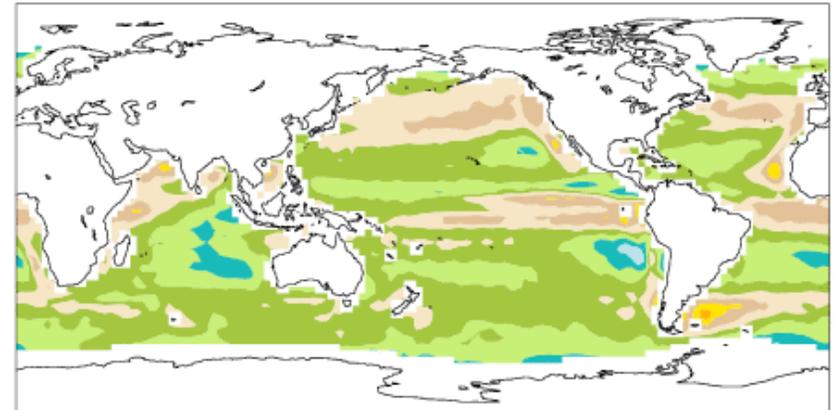
CCSMT42sld1 - SSM/I

mean = 46.89 rmse = 76.84 g/m²



SpCCSMT423 - SSM/I

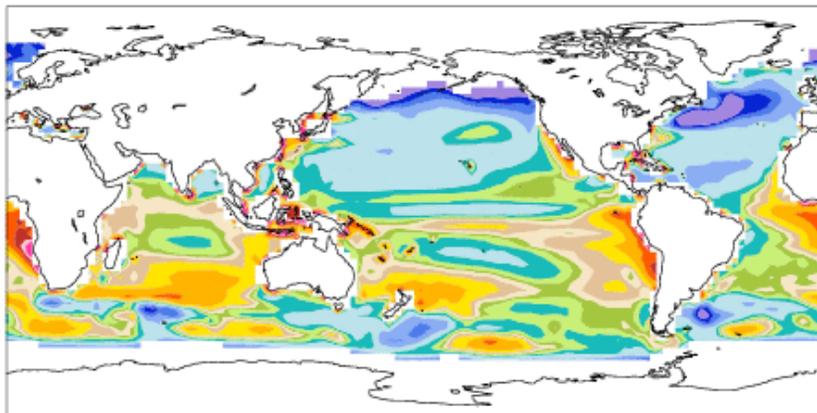
mean = -8.27 rmse = 21.54 g/m²



SST biases

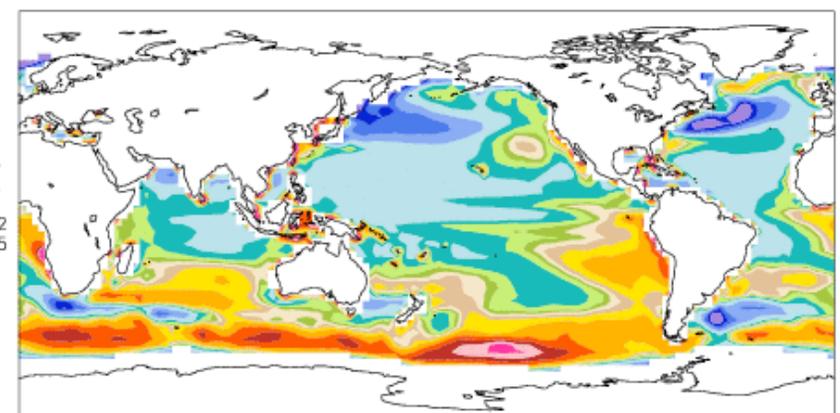
CCSMT42sld1 - HadISST

mean = -0.27 rmse = 2.20 C

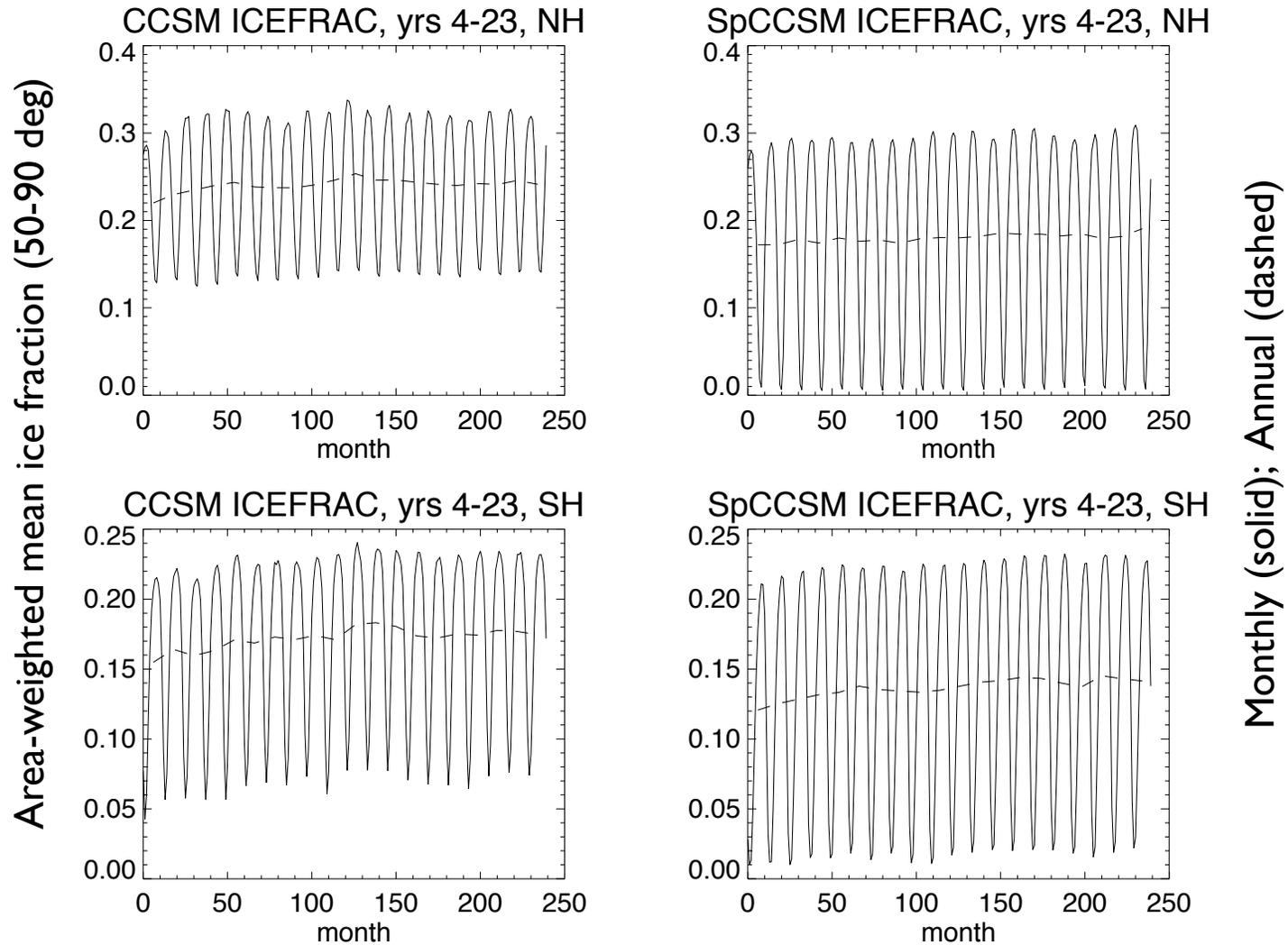


SpCCSMT423 - HadISST

mean = -0.15 rmse = 2.11 C



Sea Ice Time Series



CMIP/CFMIP Plans

- Cristiana Stan: RCP4.5 simulation (CMIP5), what about RCP8.5? AMIP-type control runs? 0.1 deg ocean, 0.5 deg atm.
- Peter Blossey, Chris Bretherton: coupled model run pair (Stan-like simulation w/ and w/o increased CO₂, maybe interpolated to higher resolution). Ocean resolution: full or slab, not sure about resolution. ~Nov start time.
- Marat: need to tune TOA balance w/ short simulations.
- Mark and Eli: fully-coupled CESM simulation (B_1850_2000_CN). Includes FV dyn. core w/ 1%/yr to 3xCO₂, then SP-CAM.
- cloud simulator (Marat, Peter, Tom)



Low Clouds in SP

- Cheng and Xu, 2011: IPHOC w/ finer vertical resolution
- Marat: mini LES
- Ackerman: adaptive grid

SP clouds/sea ice interactions