Climate Change and Coupled Modeling

•Cristiana Stan: Present day and 4xCO2 simulations with SP-CCSM4

•Charlotte DeMott: The role of ocean-atmosphere coupling in simulations of the Asian summer monsoon

•Melissa Burt: Clouds, water vapor, and sea ice in a 4xCO2 Arctic

•Mark Branson: Paleoclimate simulations with CESM.

•Discussion: Catalog of existing SP simulations and plans for future research

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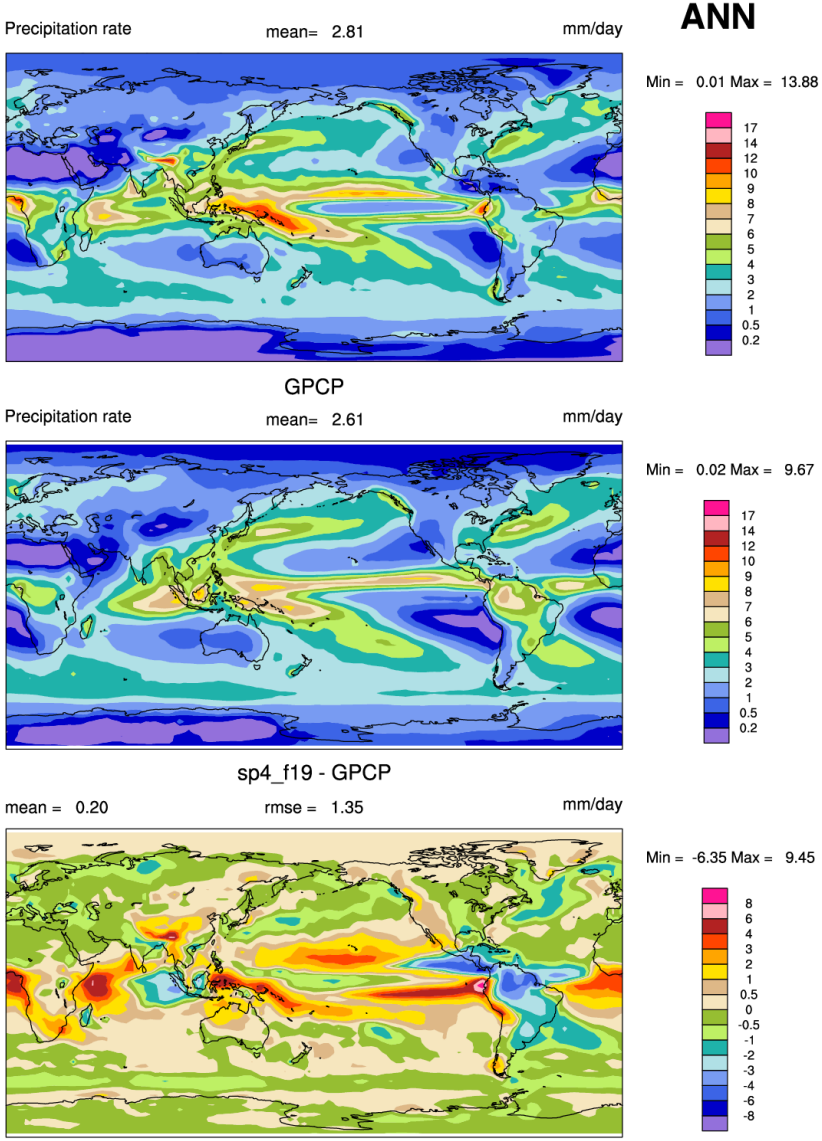
Experiments

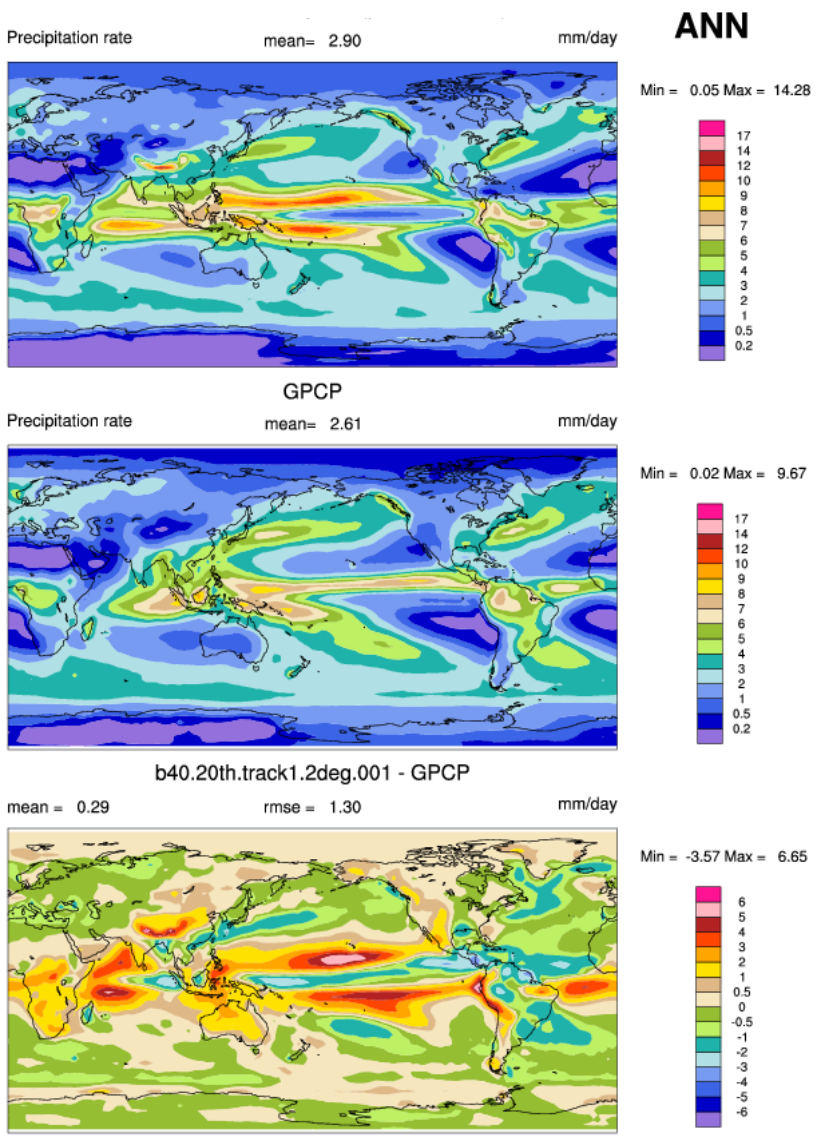
	Control (2005-2033)	4xCO2 (2005-2042)
ATM/LND resol.	fv1.9x2.5°/30levs	fv1.9x2.5°/30levs
OCN/ICE resol	1°	1°
CO2 concentration	368.9ppmv	1475.6ppmv
Initial Conditions	CCSM4 2° 20th Century/ b40.20th.track1.2deg 001.2005-01-01-00000	CCSM4 2° 20th Century/ b40.20th.track1.2deg. 001.2005-01-01-00000
CRM resol.	4km	4km
CRM microphysics	SAM1MOM	SAM1MOM

Precipitation, ANN

SP-CCSM4

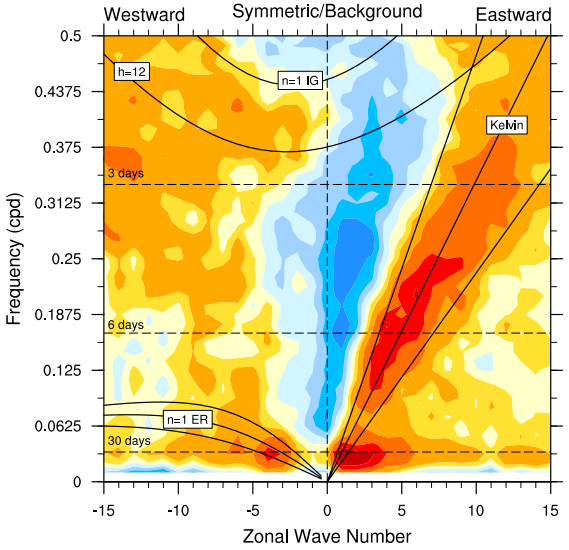


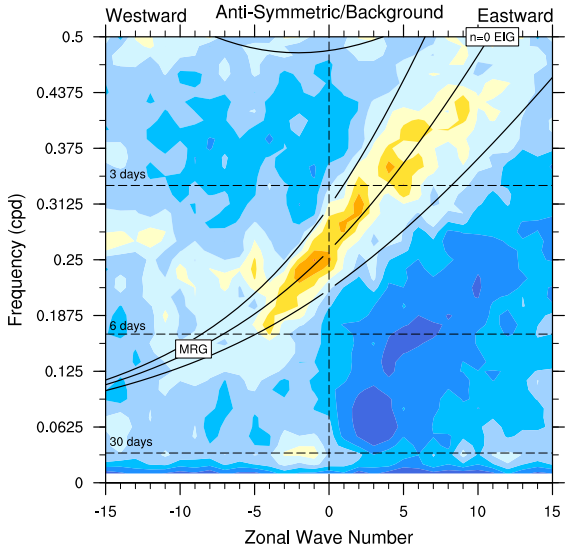
CCSM4



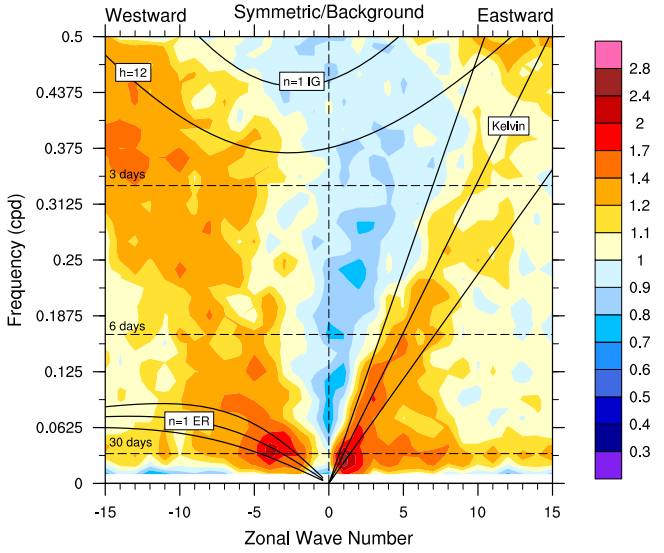
Wave-frequency Spectra

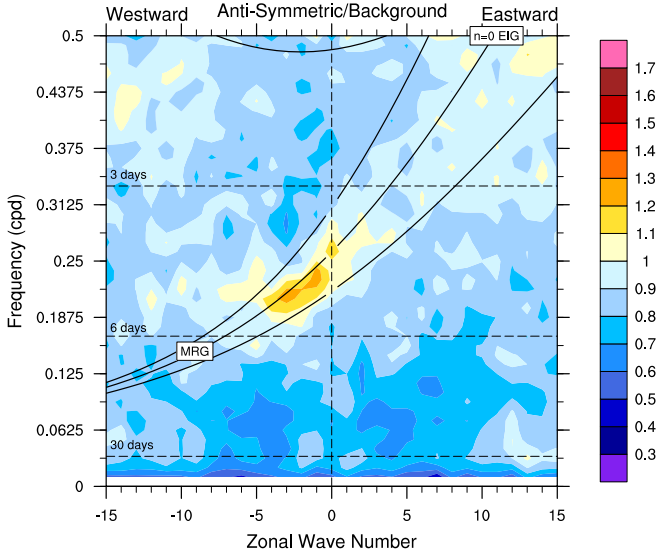
OBS



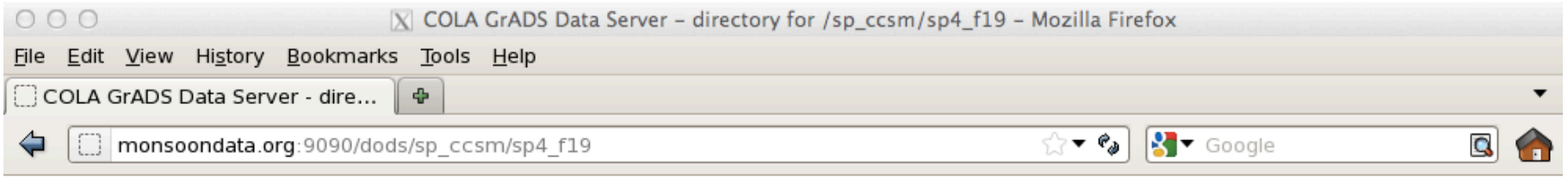


SP-CCSM4





GDS/OPeNDAP



COLA GrADS Data Server - top level - sp_ccsm - sp4_f19

COLA GrADS Data Server - directory for /sp_ccsm/sp4_f19 : 3 entries

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1: atm.daily.h1: SPCCSM4 daily mean present day (2D vars); initial_file
b40.20th.track1.2deg.001.cam2.i.2006-01-01-00000_30.nc info dds das

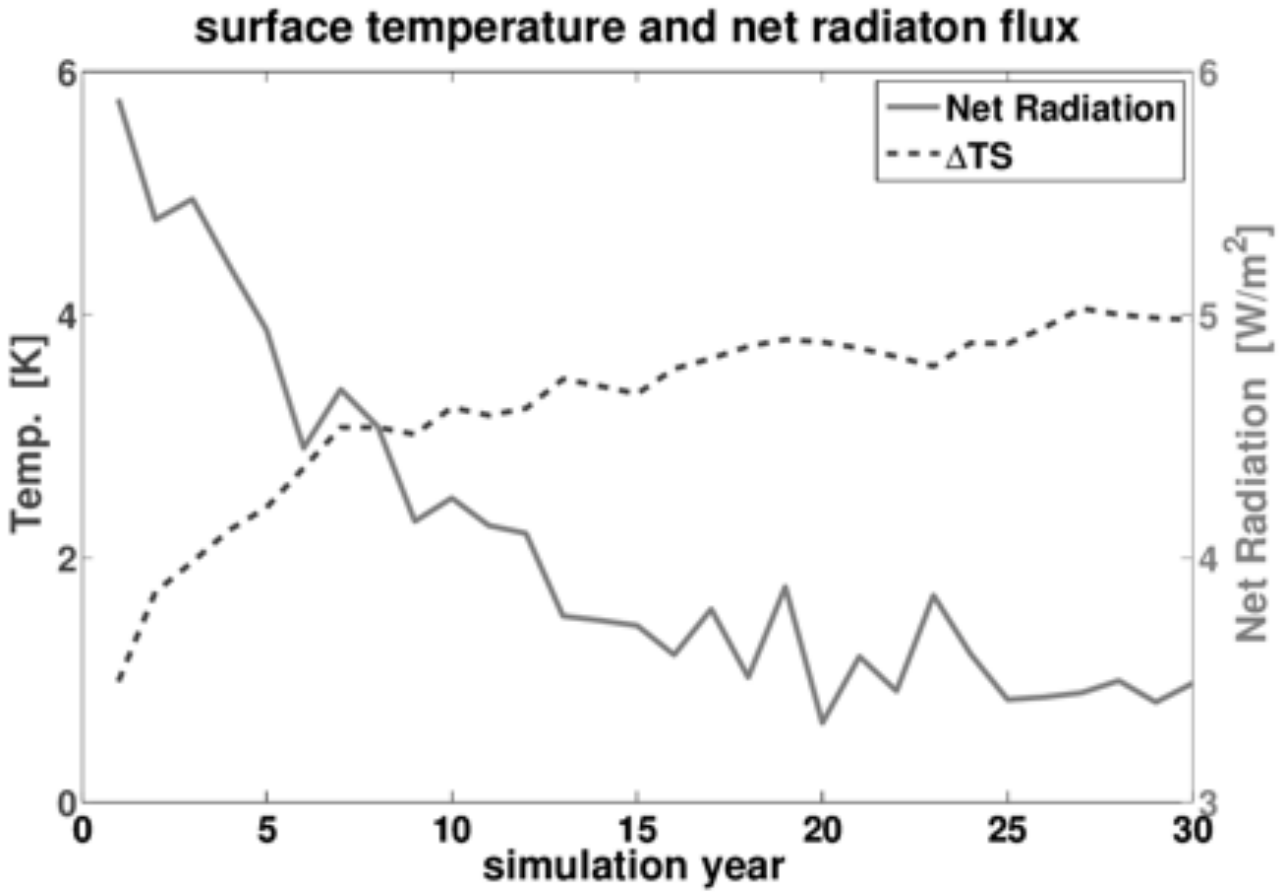
2: atm.daily.h2: SPCCSM4 daily mean present day (pressure level and sfc vars); initial_file
b40.20th.track1.2deg.001.cam2.i.2006-01-01-00000_30.nc info dds das

3: atm.monthly: SPCCSM4 monthly mean present day; initial file
b40.20th.track1.2deg.001.cam2.i.2006-01-01-00000_30.nc info dds das

back to parent directory

GrADS Data Server 2.0 (help using this server) . This page last updated 03Z 06 Aug 2012.

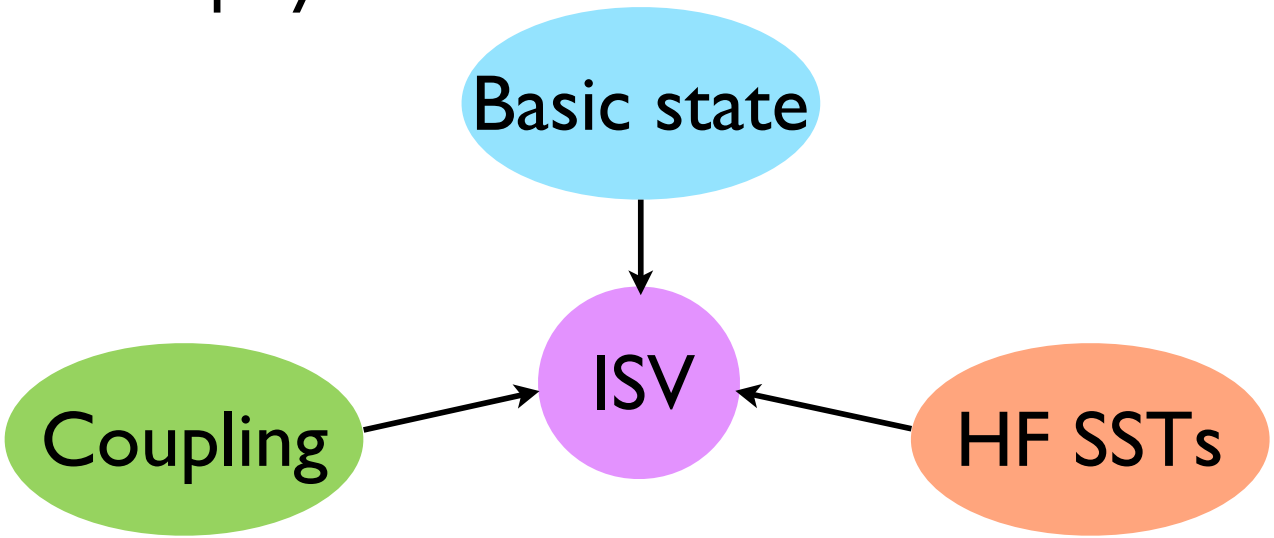
Global Surface Temperature
TOA Radiation Flux



Courtesy of Li Xu

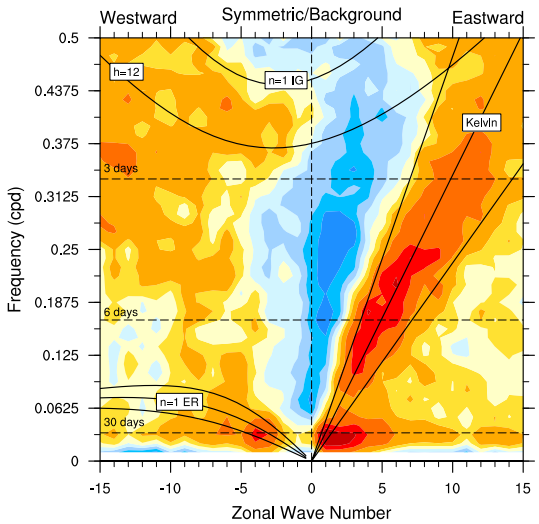
Charlotte DeMott: The role of ocean-atmosphere coupling in simulations of the Asian summer monsoon

- Are ocean-atmosphere feedbacks responsible for improved ISV?
- Is high-frequency SST variability responsible for improved ISV?
- What role does the mean state of the coupled model play in ISV?

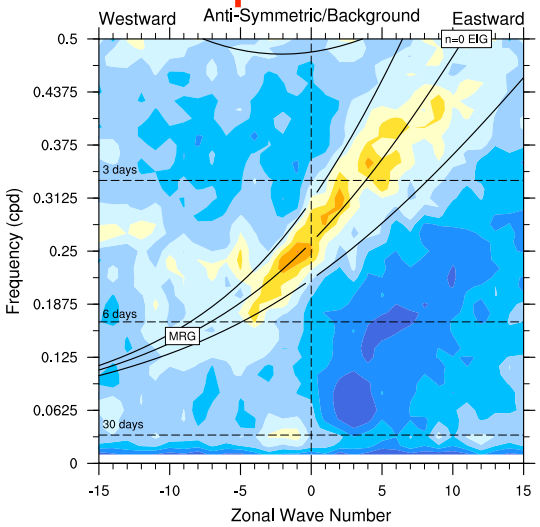


OLR spectra

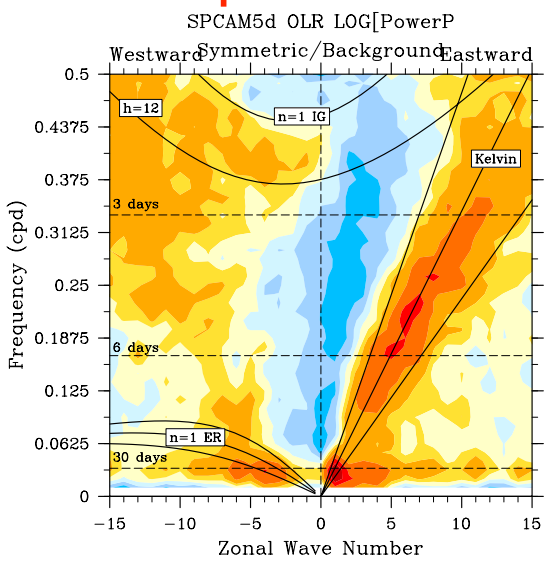
SpCCSM



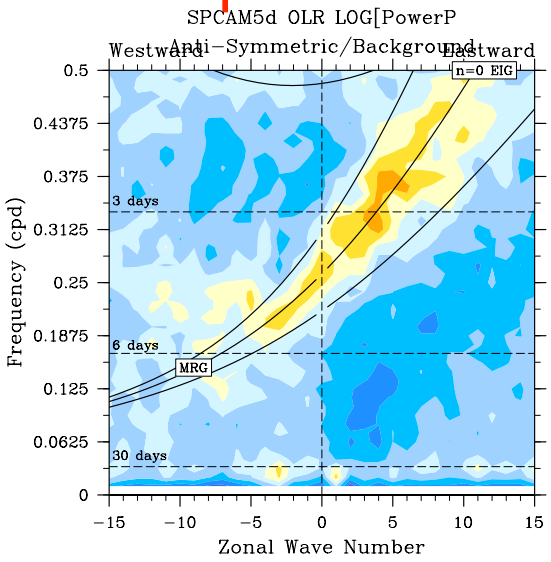
SpCCSM



SpCAM5d

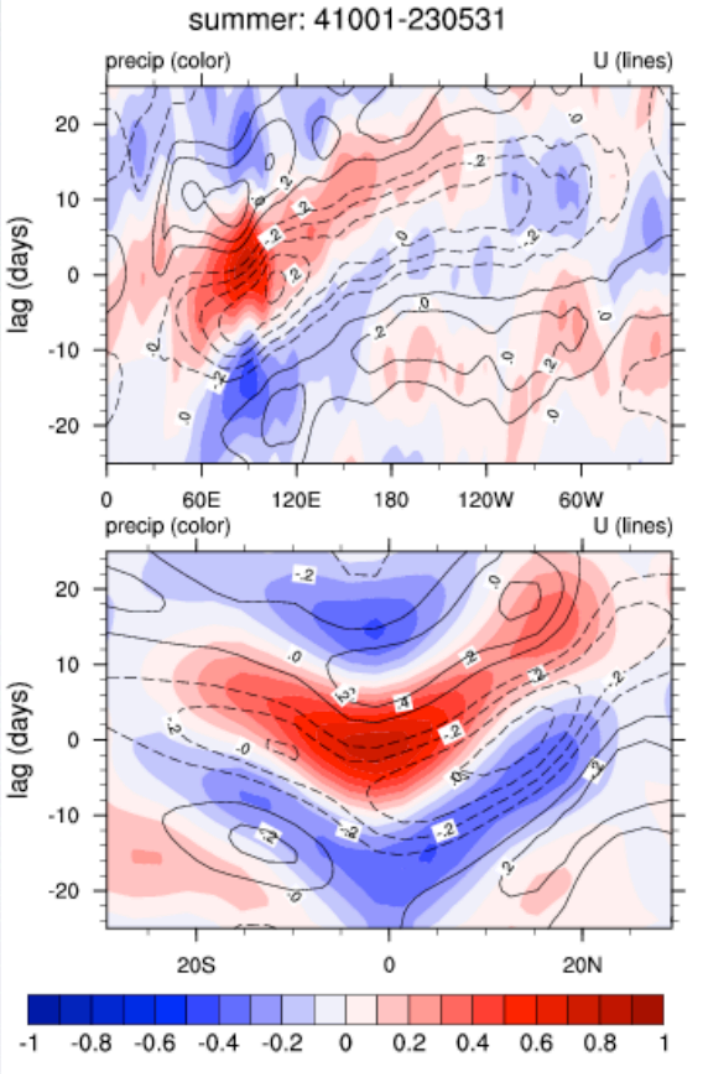


SpCAM5d

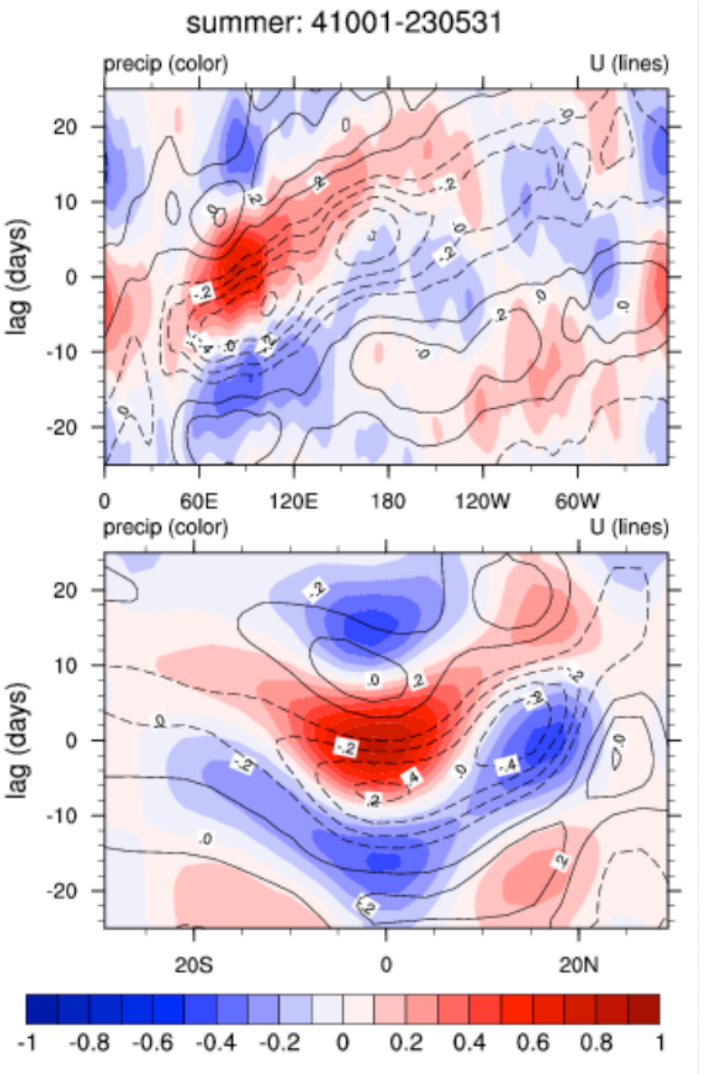


SP-CCSM vs SP-CAM5d

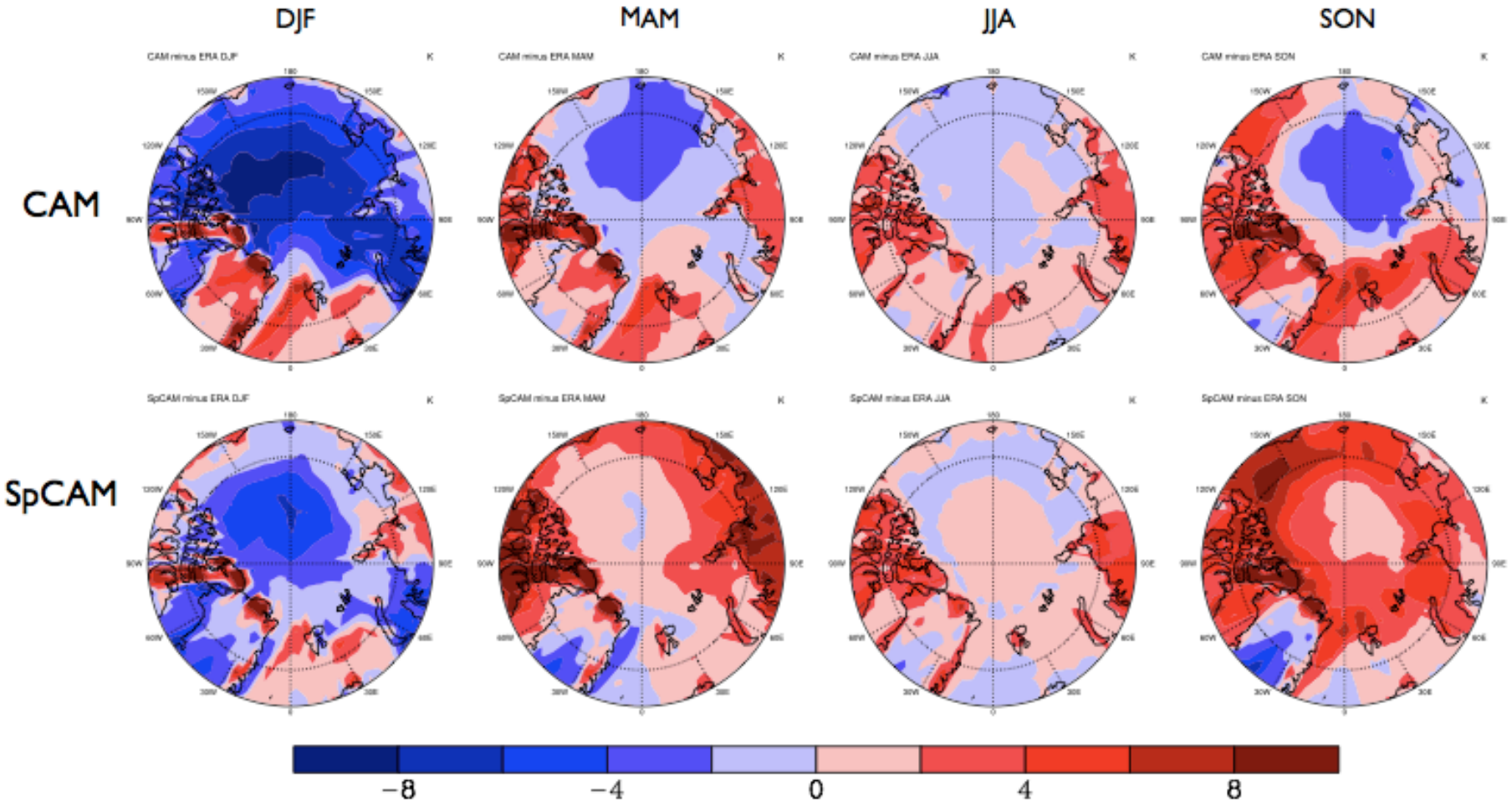
SP-CCSM



SP-CAM5d



Surface Air Temperature Bias



Biases are largest in winter months compared to summer

Possibly due to temps over ice oscillating around freezing during summer

Melissa Burt: Clouds, water vapor, and sea ice in a 4xCO2 Arctic

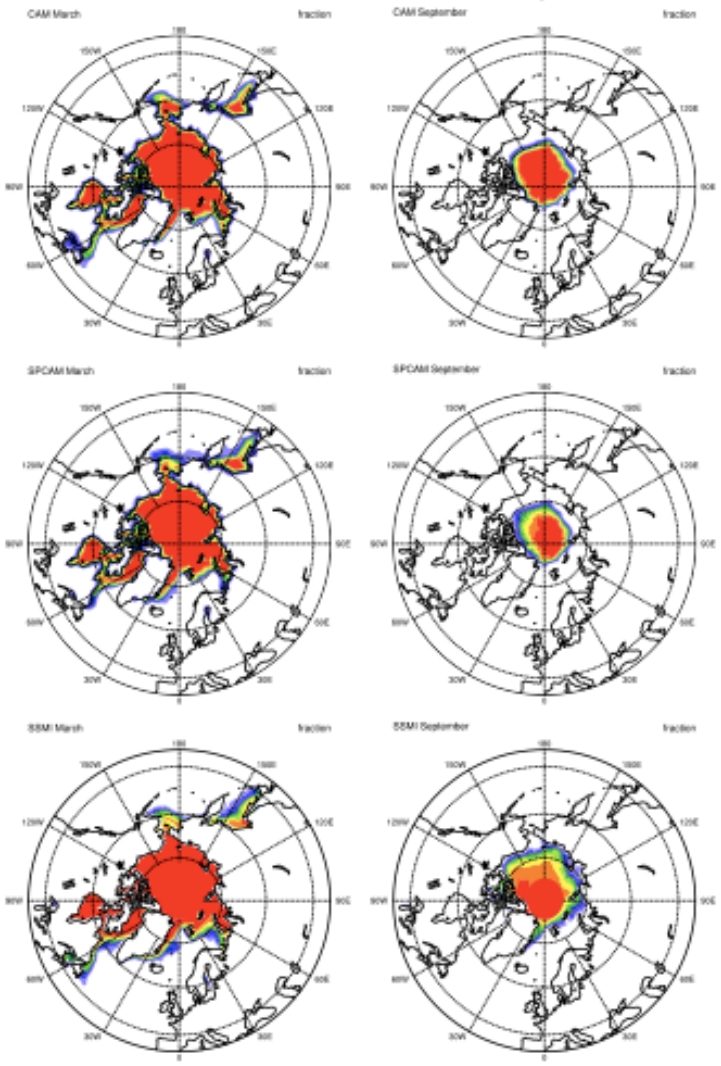
Present Day

March Sept

CAM

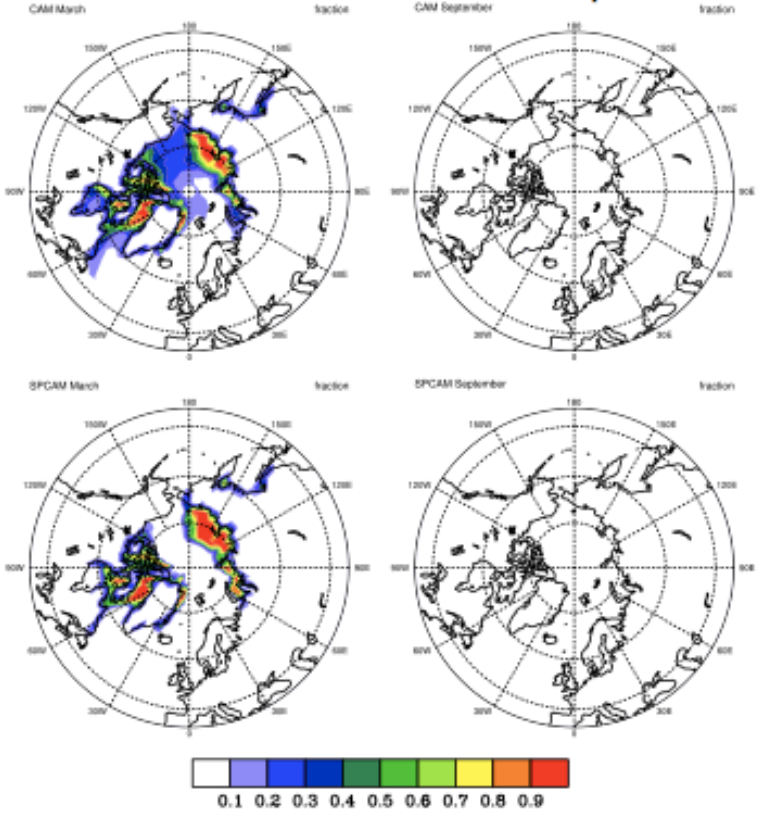
SpCAM

SSMI



4xCO$_2$

March Sept



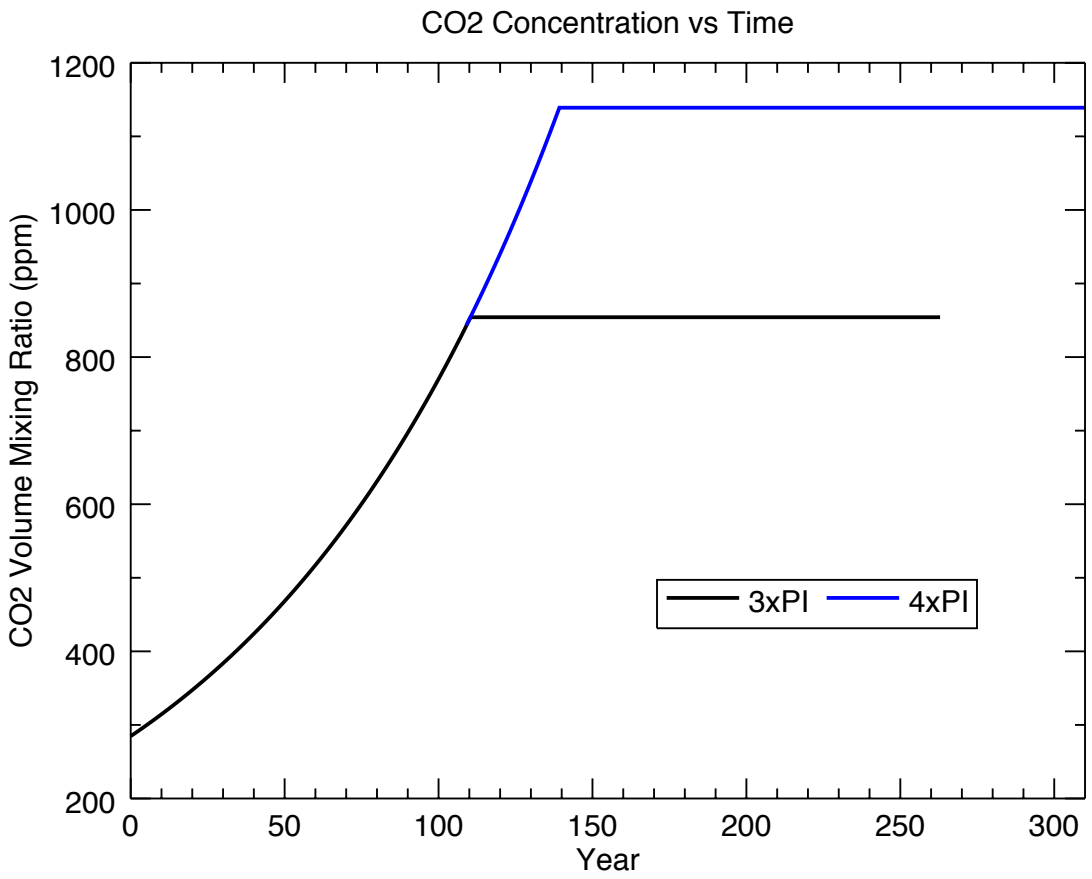
Sea Ice Fraction

Significant decline in Sea Ice

sea ice tends to hug the continents

CESM Simulation

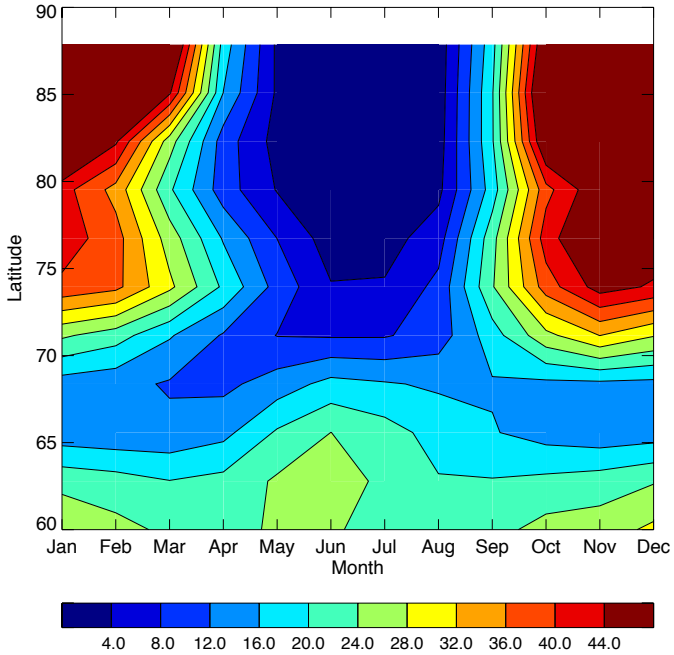
- Branch the simulation at the 3xPI point, allow branch to reach 4xPI



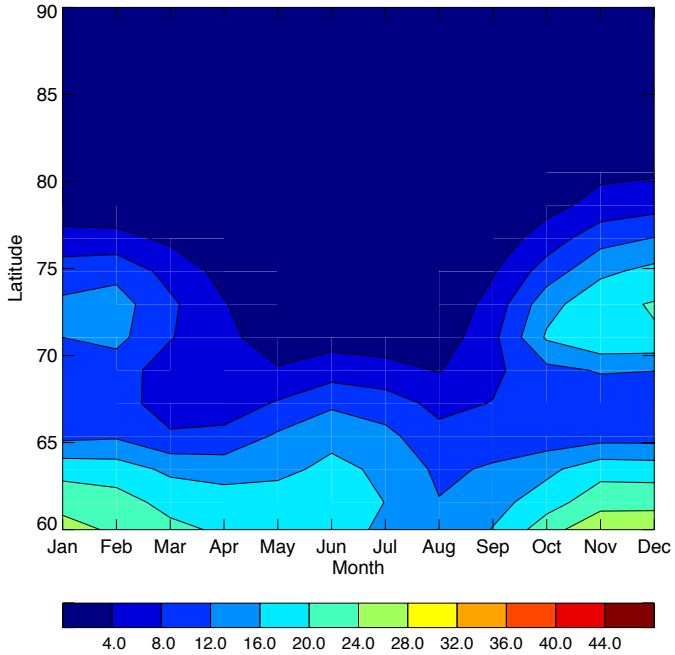
Convective mass flux (hPa/day)

Convection seems much weaker in CESM (CAM4) versus CAM3 results

CAM3.5,x4CO2



CESM, years 300-310



max value in column

Existing SP simulations

- SP-CAM3.0 (M. Kharioutdinov; 20 years)
- SP-CAM3.0 (M. Pritchard; 20 years, with MJO Diabatic heating diagnostics)
- SP-CAM3.0 (M. Pritchard; forecast runs)
- SP-CAM3.0 1xCO2 & 4xCO2 (Wyant et al. 2012; 2-3 years)

- SP-CAM3.0, 3.5 (" ; short-duration, diurnally resolved)
- SP-CAM3.5 aqua planet simulations (E. Maloney & M. Branson; 1.5-5 years, some CRM-scale output)
- SP-CAM3.5 (R. Marchand; CRM output)
- SP-CAM3.5 (K. Xu; 3 years & 10 years w/ IPHOC

- SP-CCSM3 (C. Stan; ~27 years)
- SP-CCSM3 (R. McCrary; 1 summer, hourly output)
- SP-CAM5d (C. Stan; 23 years, uses 5-day filtered SPCCSM3 SSTs boundary condition)

- SP-CCSM4 (C. Stan; ~30 years)
- SP-CCSM4 4xCO2 (C. Stan; ~35 years)

- PNNL-MMF-PD (M. Wang; 6 years, present-day aerosols)
- PNNL-MMF-PI (M. Wang; 6 years, pre-industrial aerosols & emissions)
- PNNL-MMF (H. Morrison; 5 months MACM version)
- PNNL-MMF (M. Pritchard; 5 years)

Future simulations

- SP-CCSM4 (C. Stan; ~100 years)
- SP-CCSM4 4xCO2 (C. Stan; ~100 years)

- SP-CAM5 (NCAR, PNNL, CSU; development and test ongoing)

- SP-CAM5 w/ distributed land (I. Baker & M. Branson)

- SAM6.9.5 giga LES (D. Dazlich; 1 land w/ Sib3, 1 w/ ocean)