

Update on BGCWG, Feb 2010

K. Lindsay (NCAR)

Outline

- BGC features in CCSM4
- BGC features in CESM1
- Preliminary Results from IPCC Runs with BGC in Progress

BGC features in CCSM4

- Carbon-Nitrogen Model within CLM
 - Directly impacts transpiration (water cycle), LAI (energy cycle)
 - Introduced into 1 degree Track I experiments Summer '09, modest impacts on climate
- Time-varying Land Use

BGC features in CESM1

- BEC Ecosystem Model within POP
 - Directly impacts surface Chl (SW adsorption)
 - Negligible impact on mean surface climate
 - Modest impact on variability
- Land & Ocean CO₂ fluxes used as surface boundary condition for atmospheric CO₂ constituent.

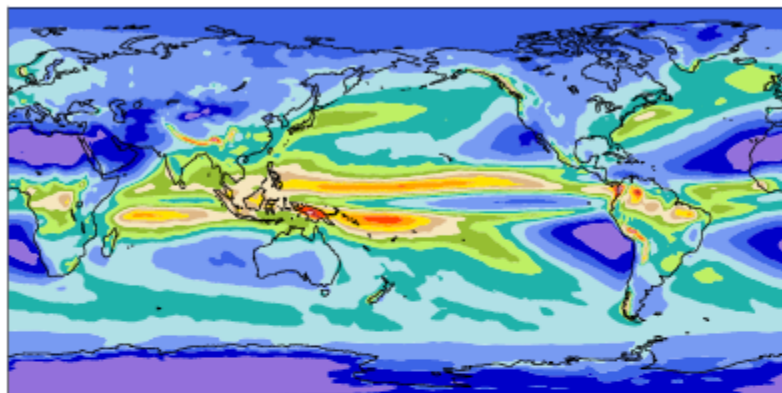
ANN

b40.1850.track1.1deg.006.ecosys (yrs 11-20)

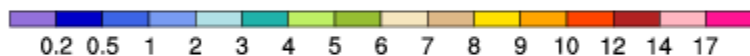
Precipitation rate

mean= 2.93

mm/day



Min = 0.05 Max = 20.08

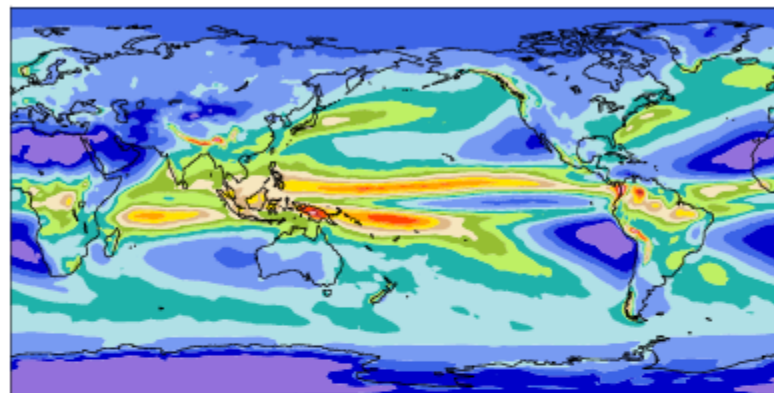


b40.1850.track1.1deg.006 (yrs 11-20)

Precipitation rate

mean= 2.95

mm/day



Min = 0.04 Max = 20.14

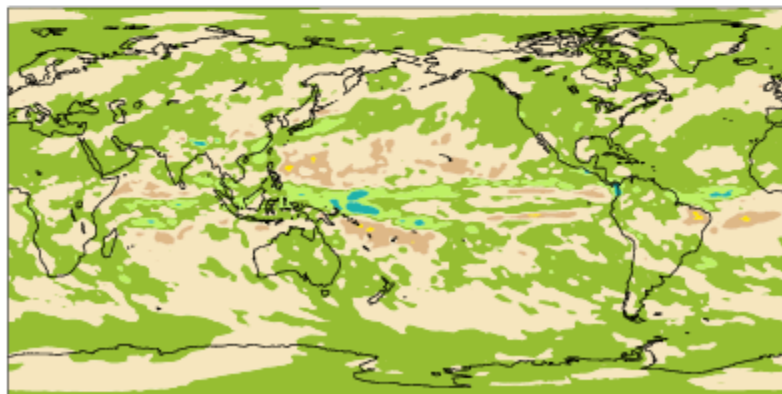


.1850.track1.1deg.006.ecosys - b40.1850.track1.1deg.006

mean = -0.01

rmse = 0.26

mm/day

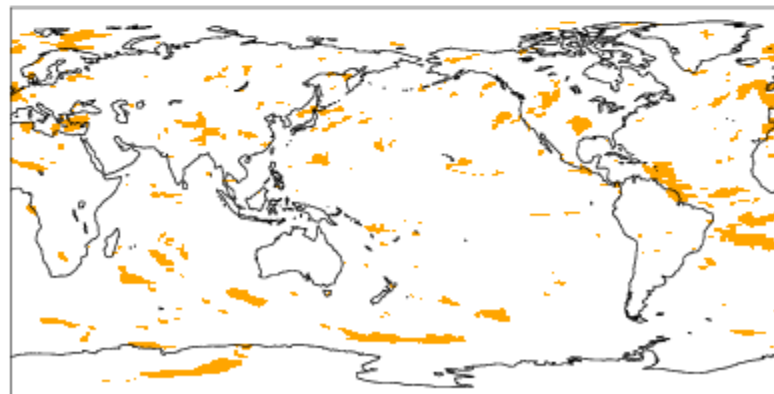


Min = -1.91 Max = 1.29



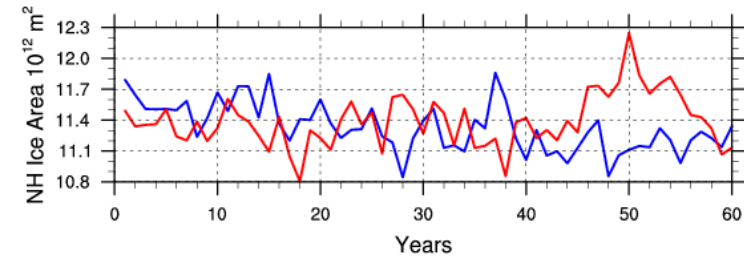
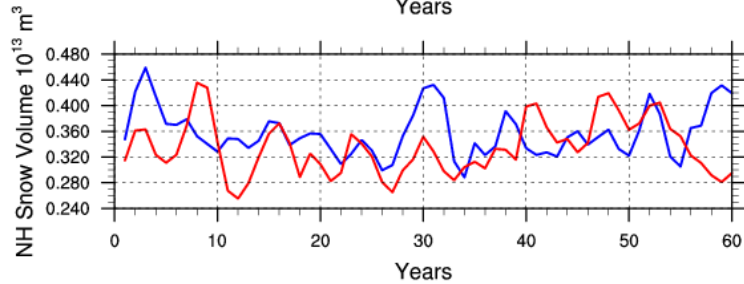
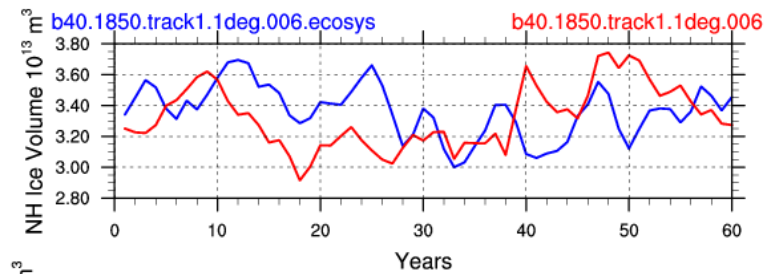
T-test of the two means at each grid point

Colored cells are significant at the 0.05 level

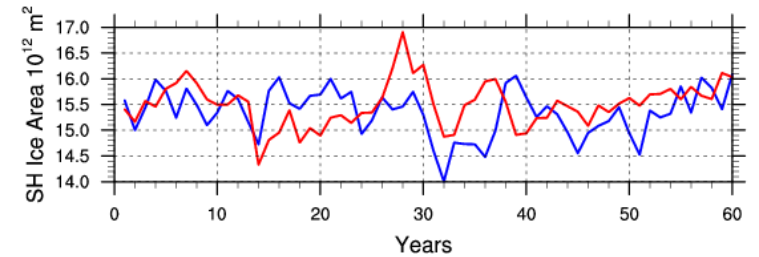
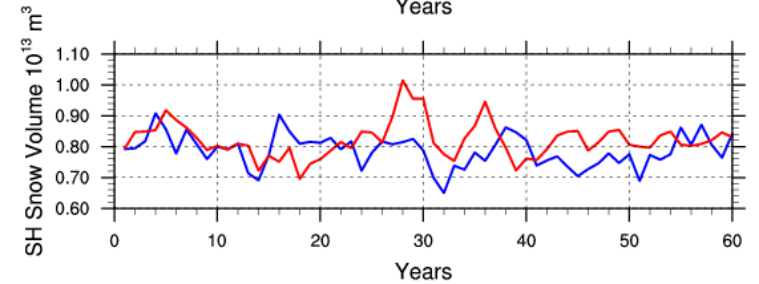
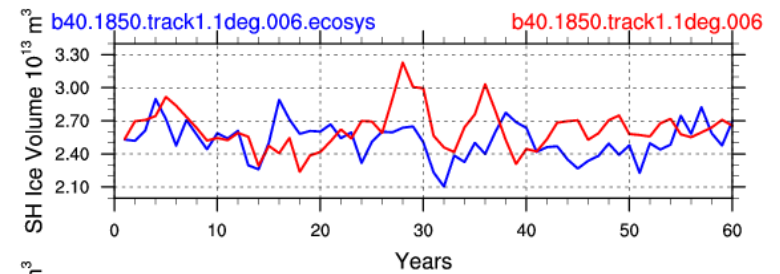


CICE Annual Timeseries

ANN Mean b40.1850.track1.1deg.006.ecosys-b40.1850.track1.1deg.006



ANN Mean b40.1850.track1.1deg.006.ecosys-b40.1850.track1.1deg.006



Status of Runs in Progress

2010-02-09

- BGC Runs have only been run w/ Track I
- 1850 Control Prognostic CO₂ : ~~192~~ 134 years
- 1850 Control Prescribed CO₂ : ~~74~~ 0 years

- 'non-BGC' runs have CN within CLM
 - 1850 Control : 1300 years (complete)
 - Multiple 1850-2005 transients complete

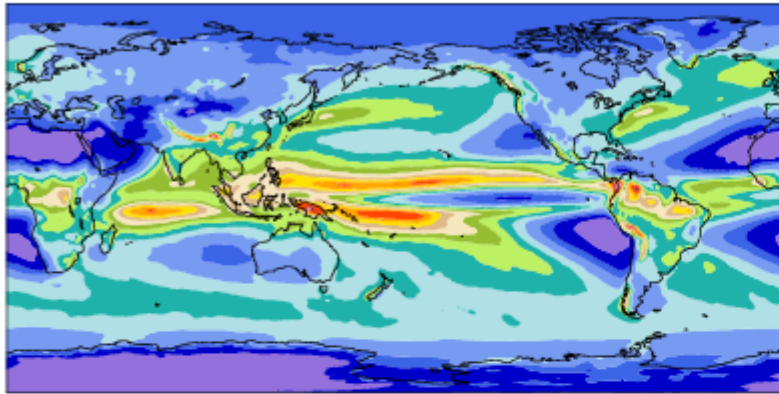
ANN

b40.coup_carb.004 (yrs 41-60)

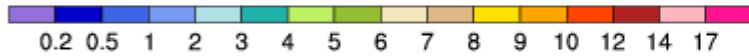
Precipitation rate

mean= 2.93

mm/day



Min = 0.05 Max = 19.13

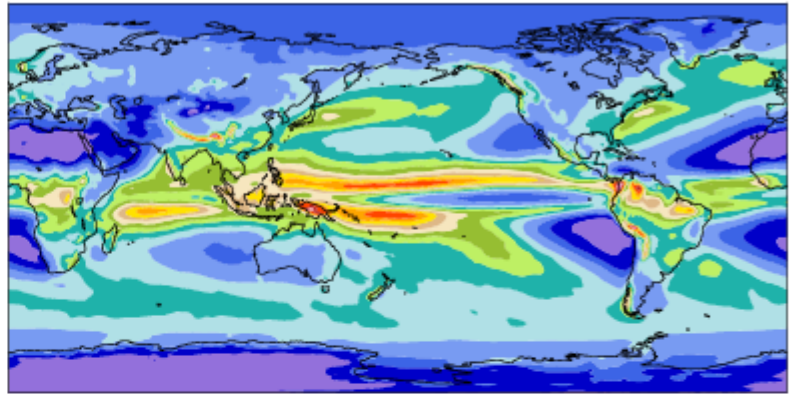


b40.1850.track1.1deg.006 (yrs 91-110)

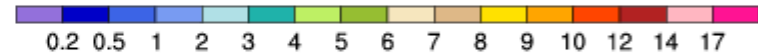
Precipitation rate

mean= 2.94

mm/day



Min = 0.05 Max = 19.82

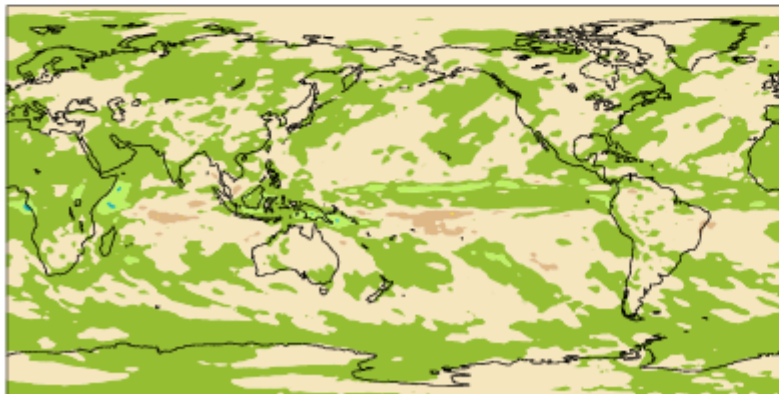


b40.coup_carb.004 - b40.1850.track1.1deg.006

mean = -0.01

rmse = 0.19

mm/day

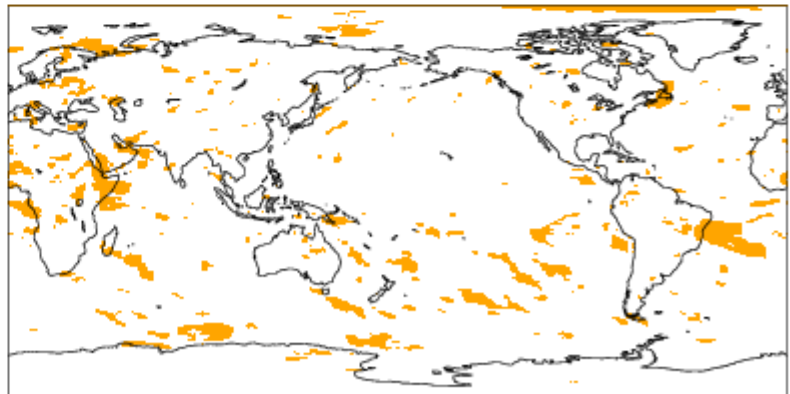


Min = -1.30 Max = 1.05



T-test of the two means at each grid point

Colored cells are significant at the 0.05 level

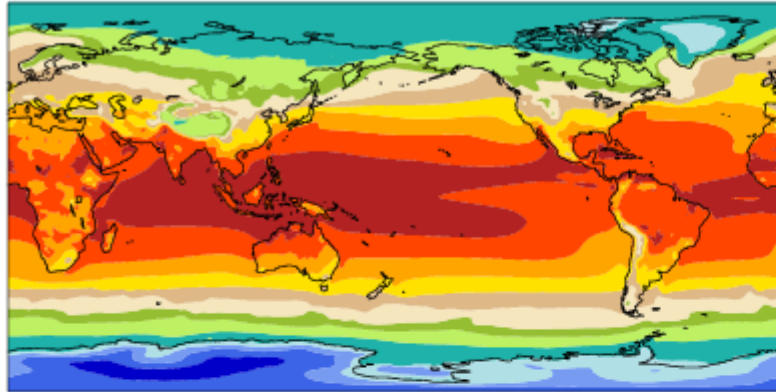


ANN

b40.coup_carb.004 (yrs 41-60)

Surf Temp (radiative)

mean= 287.33



Min = 214.18 Max = 304.32

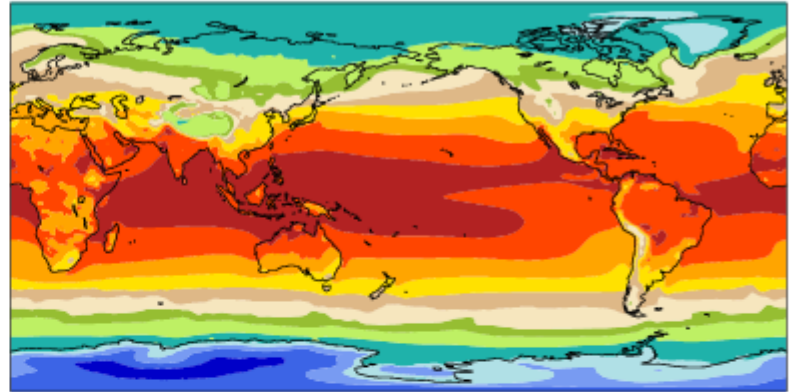


b40.1850.track1.1deg.006 (yrs 91-110)

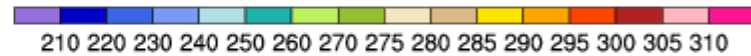
K Surf Temp (radiative)

mean= 287.40

K



Min = 214.95 Max = 304.42

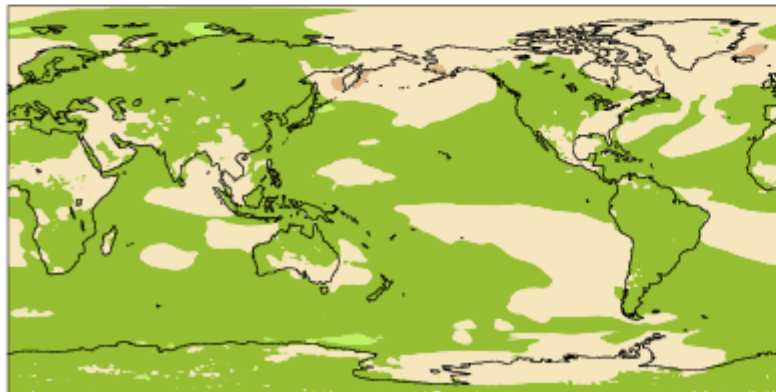


b40.coup_carb.004 - b40.1850.track1.1deg.006

mean = -0.08

rmse = 0.26

K

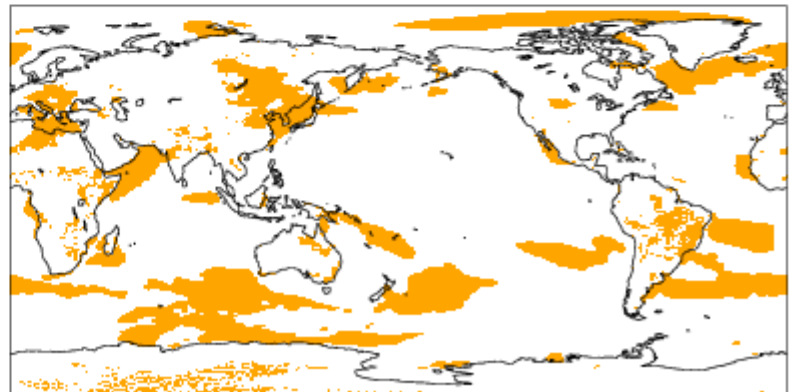


Min = -1.71 Max = 1.47

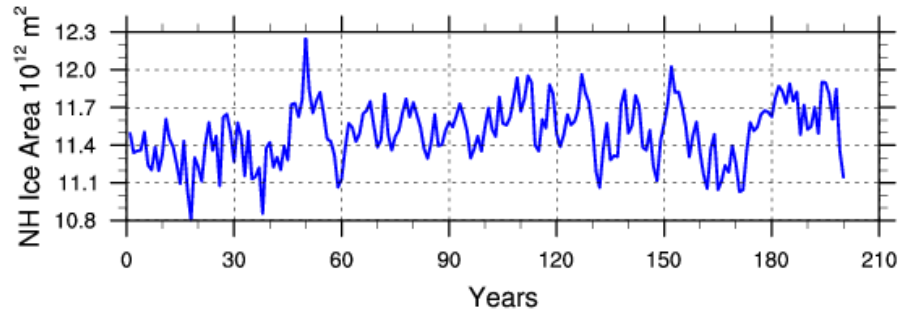


T-test of the two means at each grid point

Colored cells are significant at the 0.05 level

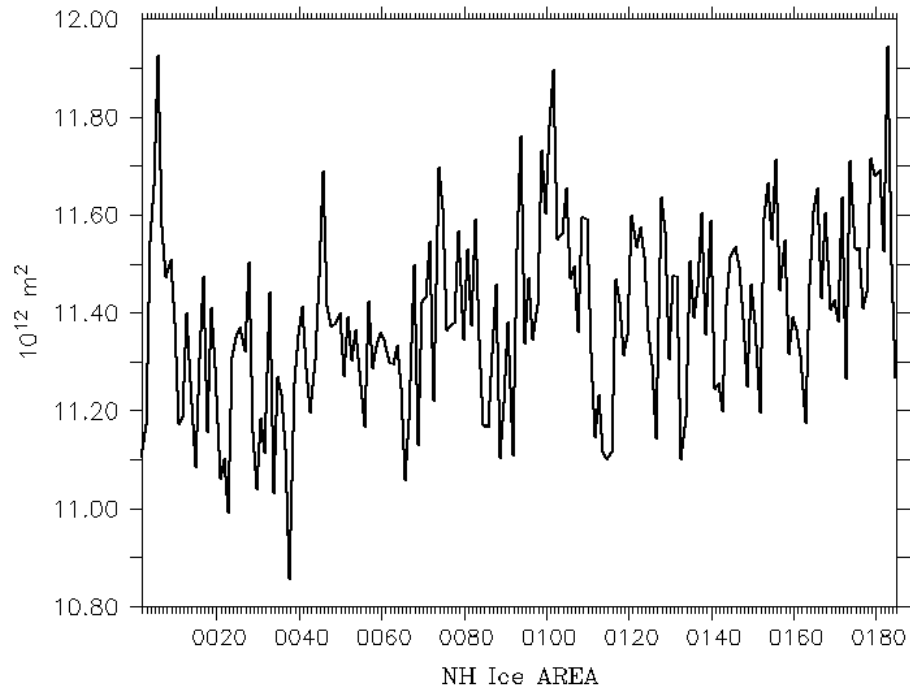


CICE Annual Area Timeseries

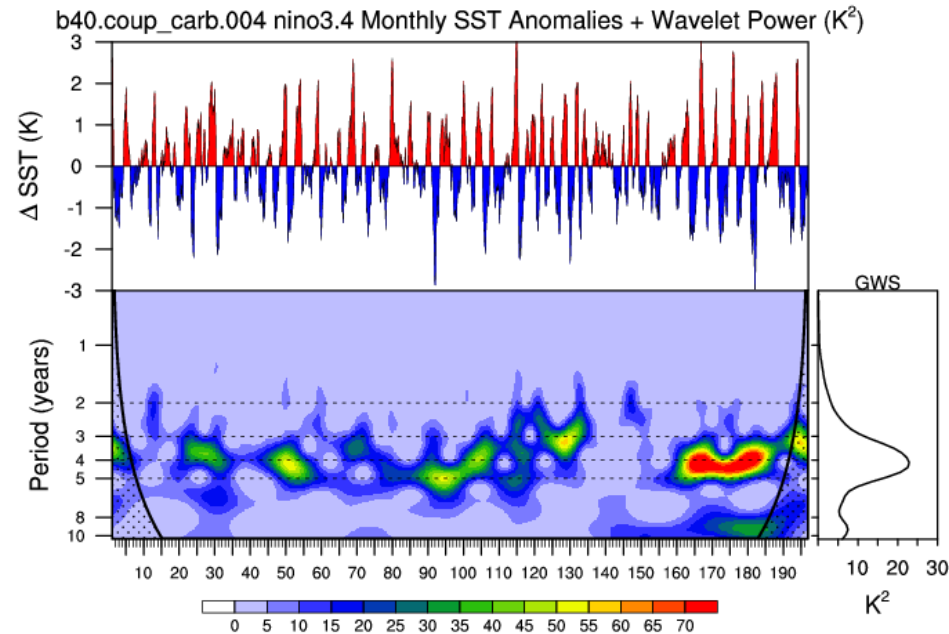
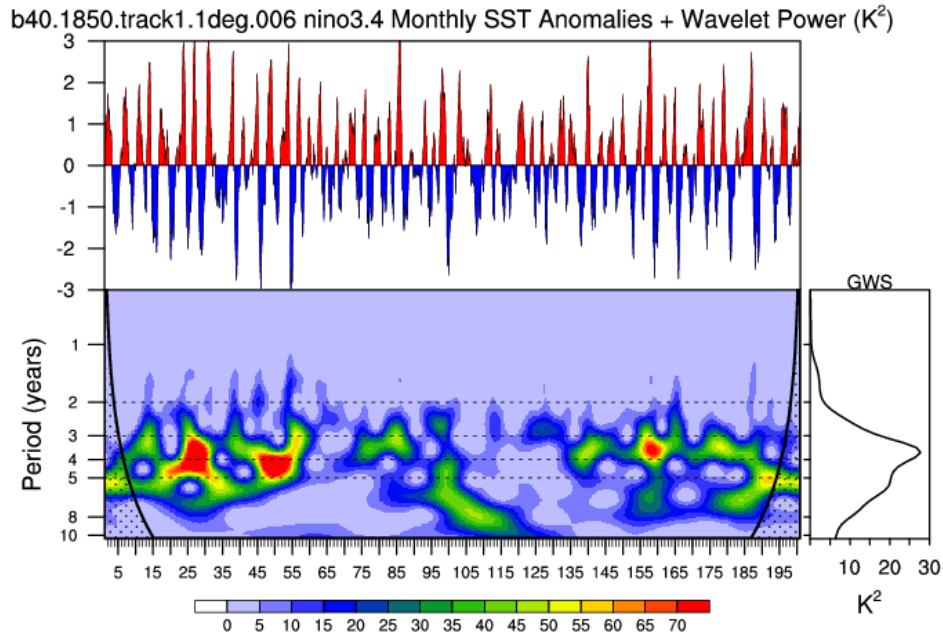


LATITUDE : 0 to 90N
CALENDAR: NOLEAP

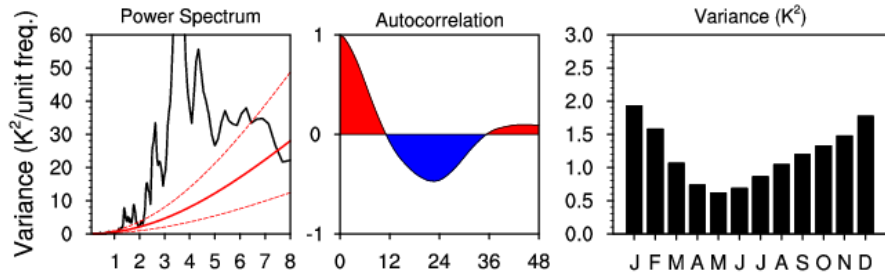
DATA SET: ICEFRAC



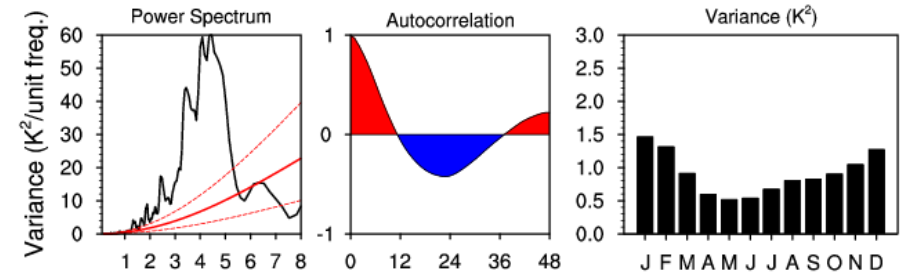
Nino 3.4 Variability



Averaged over years 1 to 200:



Averaged over years 1 to 196:

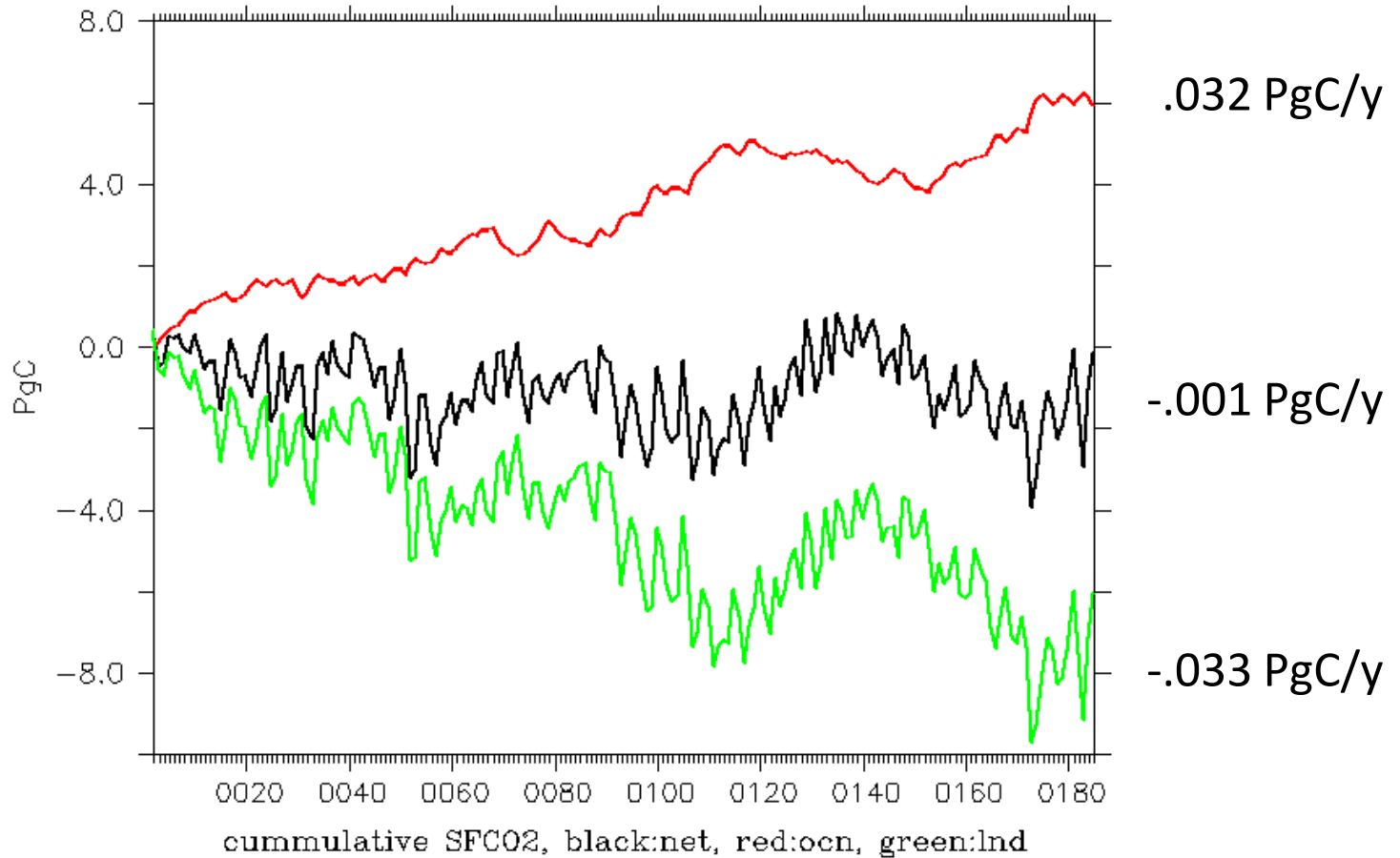


Cumulative CO₂ Fluxes w/ Prognostic CO₂

LONGITUDE : 0.6W(-0.6) to 0.6W
LATITUDE : 90.5S to 90.5N
CALENDAR: NOLEAP

FERRET Ver. 8.1
NOAA/PHEL THAP
Feb 11 2010 16:23:51

DATA SET: SFCO2



What's Next

- Analysis, analysis, analysis, ...
- Transient Runs
 - 20th Century
 - 21st Century RPCs
 - Various Sensitivity Studies
- Incorporate transfer of dust and Iron from CICE to ocean model