

Update on T31 Coupled Runs with BGC in CCSM3

Keith Lindsay, Peter Thornton
& many, many others

Presentation Outline

- Review of Model Setup
- Experiments that have been done
- Global carbon response
- Some preliminary ocean results
- Things to fix/think about before next time

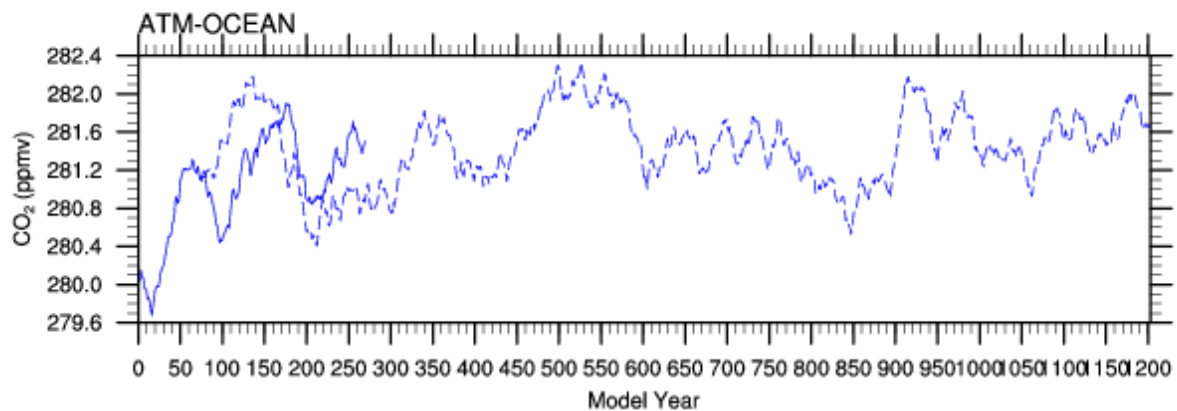
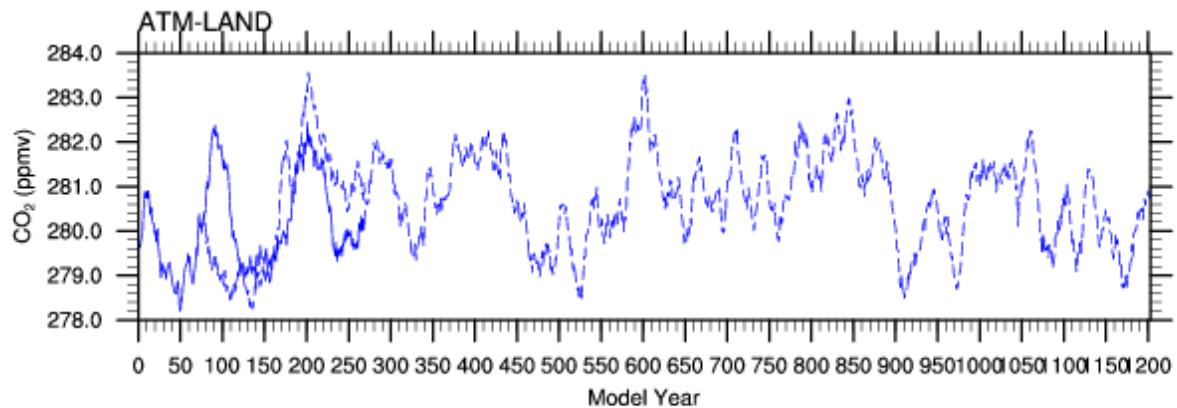
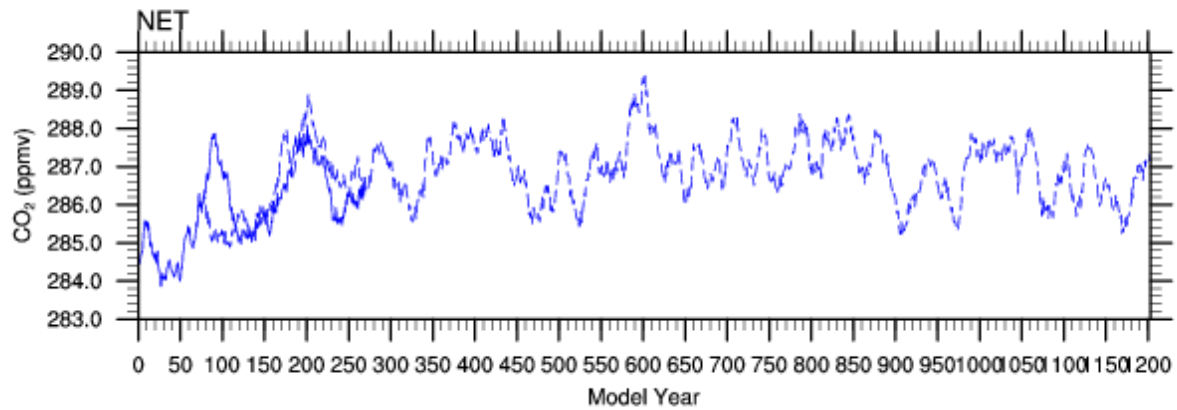
Review of Model Setup

- T31-gx3v5 resolution
- CCSM3.0 physics, except
 - Interim hydrological cycle mods
 - revised land cover
 - Prognostic LAI/FPSN from CN
 - Prognostic Chl in POP from BEC model
 - 20 min CAM/CLM timestep (not 30 min)

Experiments **Done** & To Do(?)

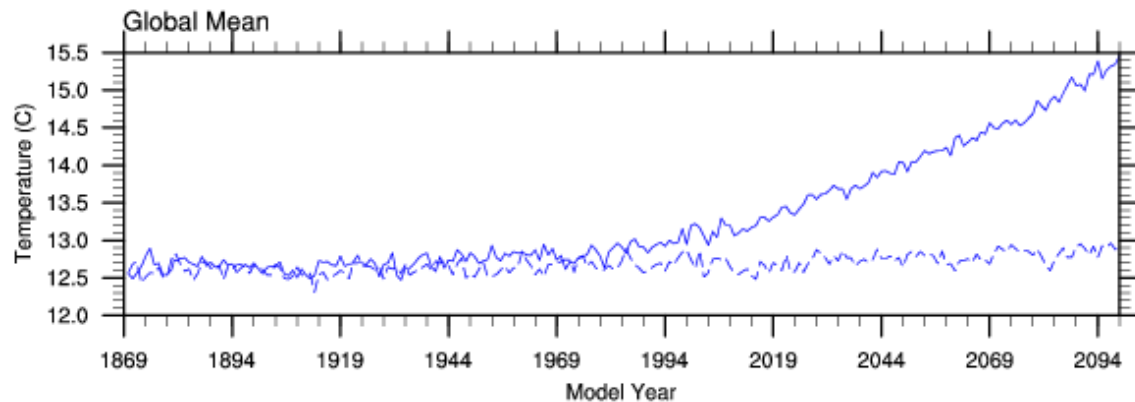
- Preindustrial Control, no anthro forcings
- Transients, Historical + SRES A2 emissions
 - FF, rad coup & uncoup
 - FF+Ndep, rad coup & uncoup
 - FF+Ndep+Land Use Change, rad coup & uncoup
 - FF+Land Use Change, rad uncoup
- Prescribed CO₂, control & transient
- Ensembles for FF, rad coup (in progress)
- N-dep into ocean (perturbation)
- Prognostic/Time-varying dust/Fe dep into ocean

b30.061l, b30.061m Annual Global CO₂ Concentration [Feb 23 2007]



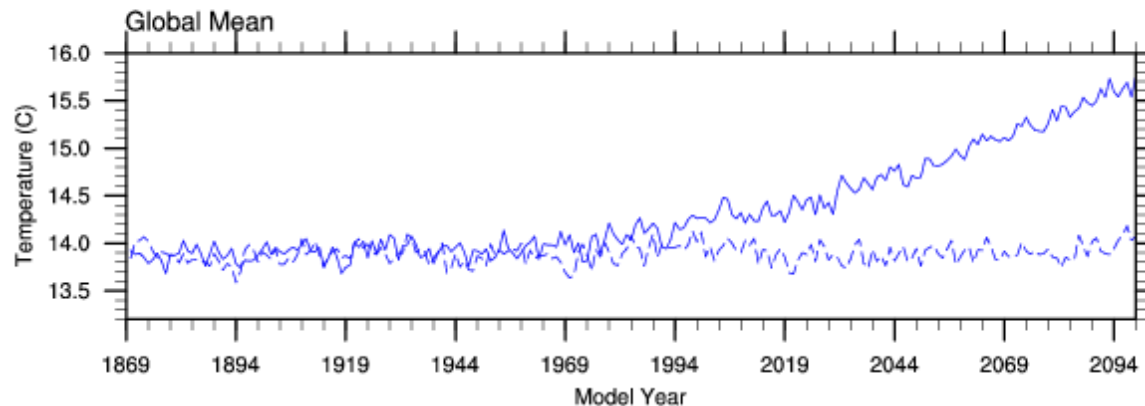
Surface Temperature Response

b30.061n, b30.061o Annual Surface Temperature [Feb 25 2007]



$\Delta \sim 2.55 \text{ C}$

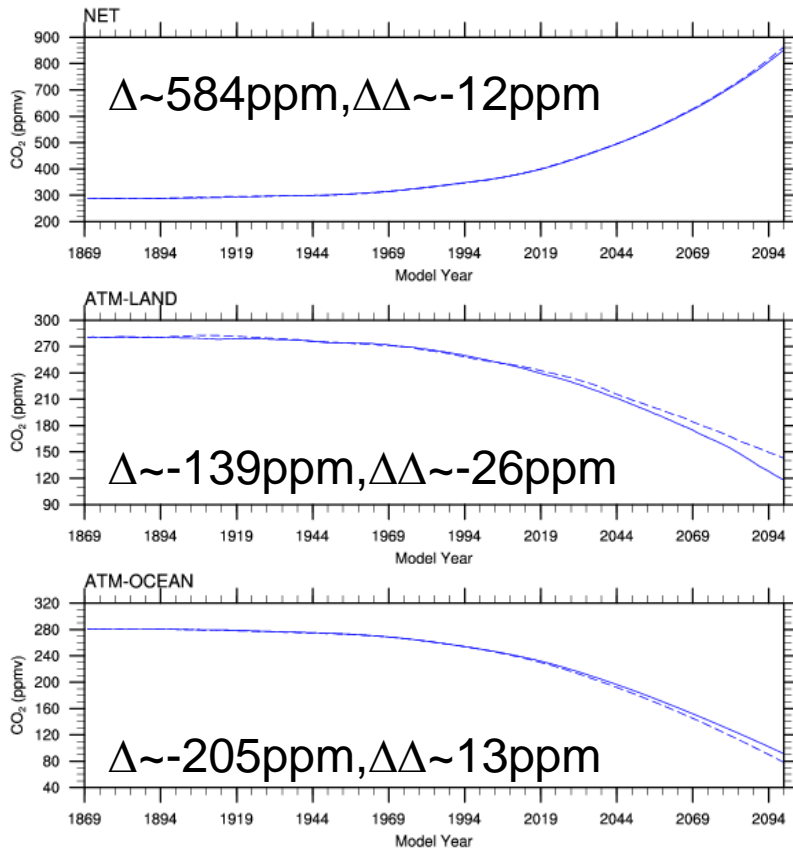
C4b.24b, C4b.25b Annual Surface Temperature [Feb 25 2007]



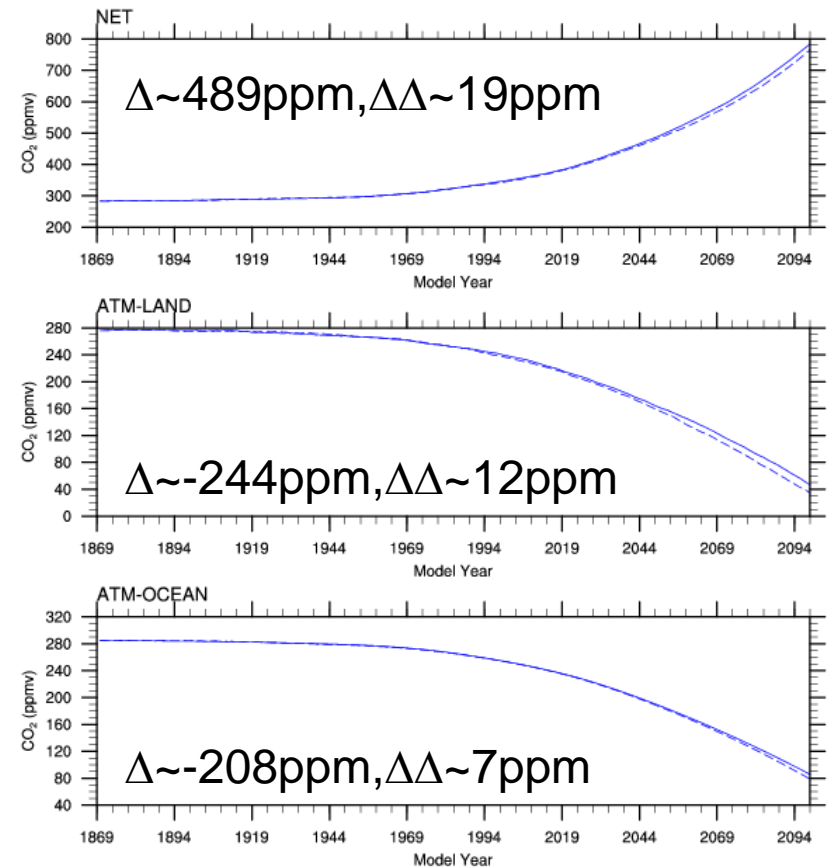
$\Delta \sim 1.67 \text{ C}$

Global Carbon Response to FF

b30.061n, b30.061o Annual Global CO₂ Concentration [Feb 25 2007]

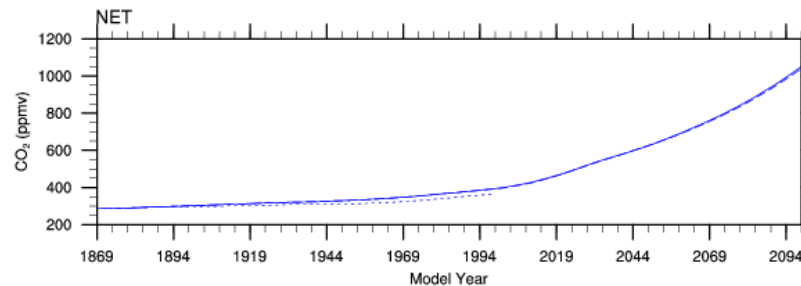


C4b.24b, C4b.25b Annual Global CO₂ Concentration [Feb 25 2007]

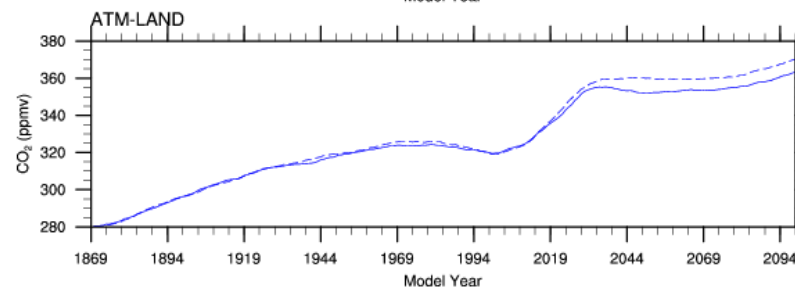


Global Carbon Response FF+Land Use Change

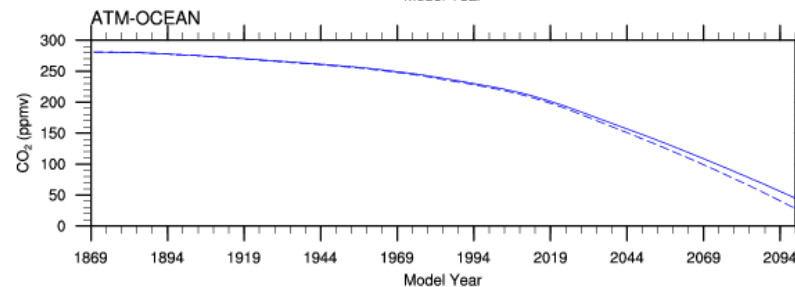
b30.061s, b30.061t Annual Global CO₂ Concentration [May 30 2007]



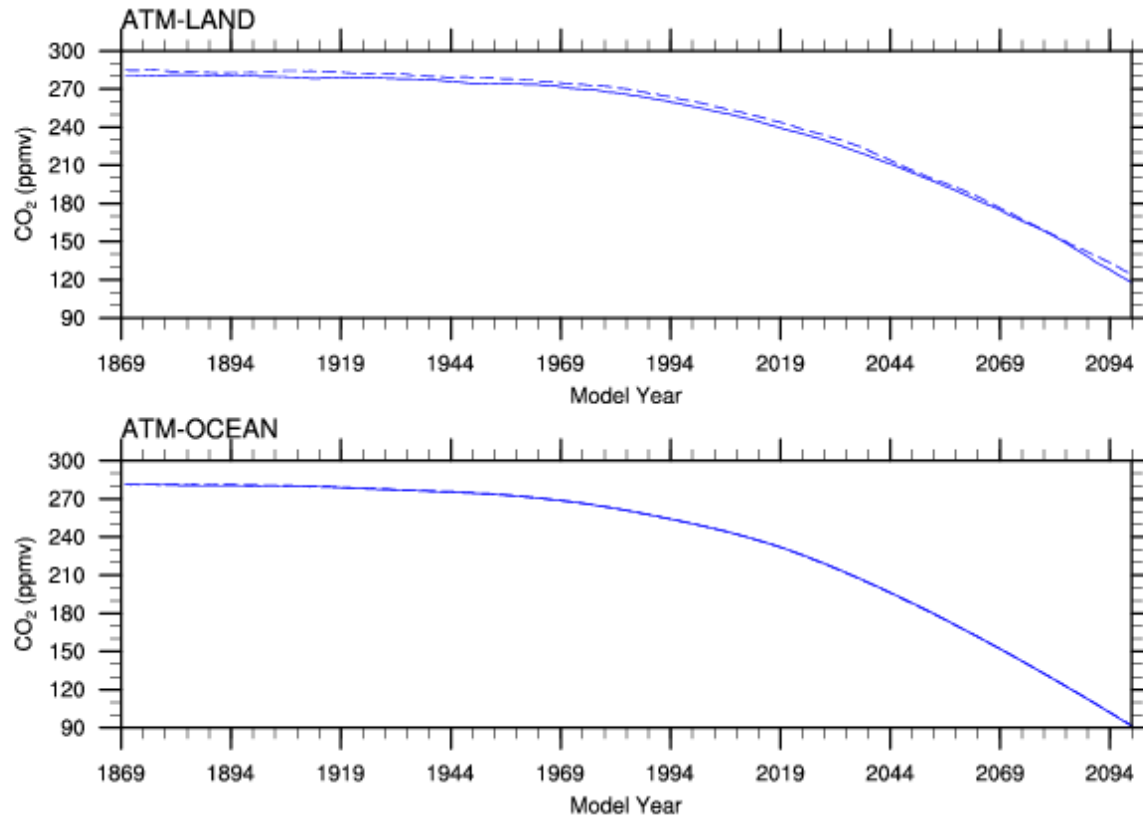
$\Delta \sim 758 \text{ ppm}$



$\Delta \Delta \sim -7 \text{ ppm}$

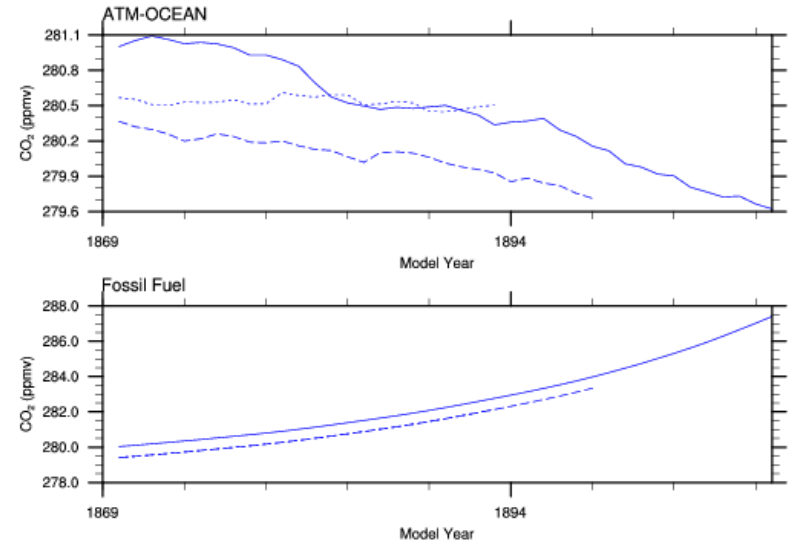
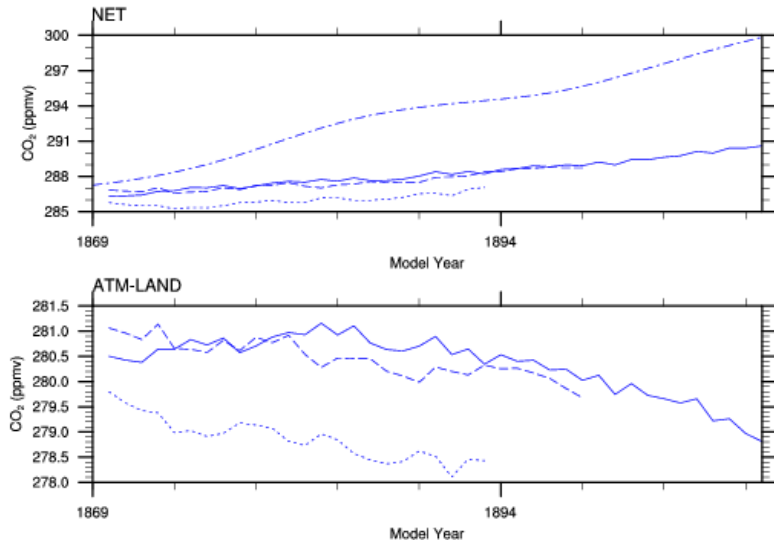


Prescribed CO₂ Transient

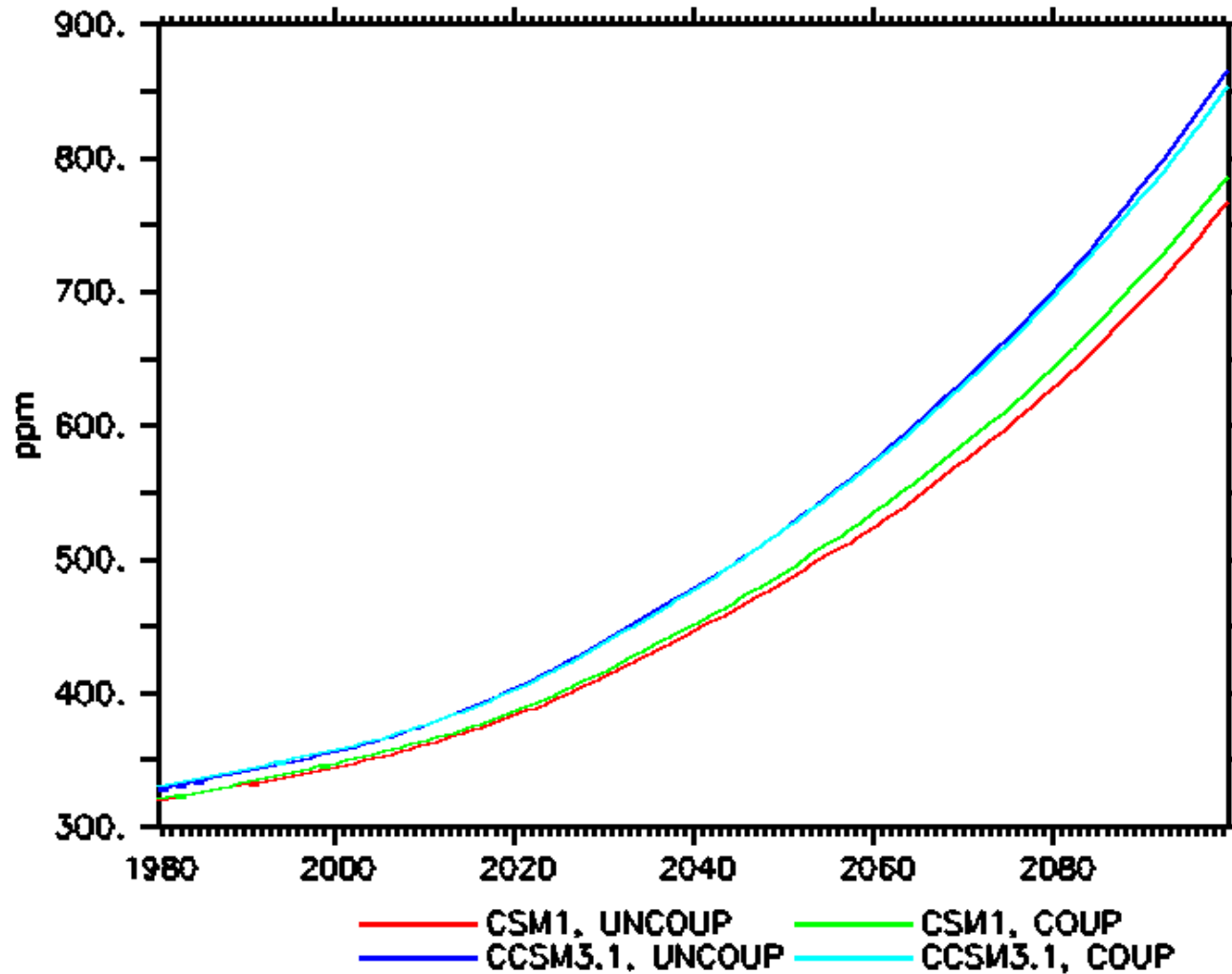


Ensembles for FF, rad coup

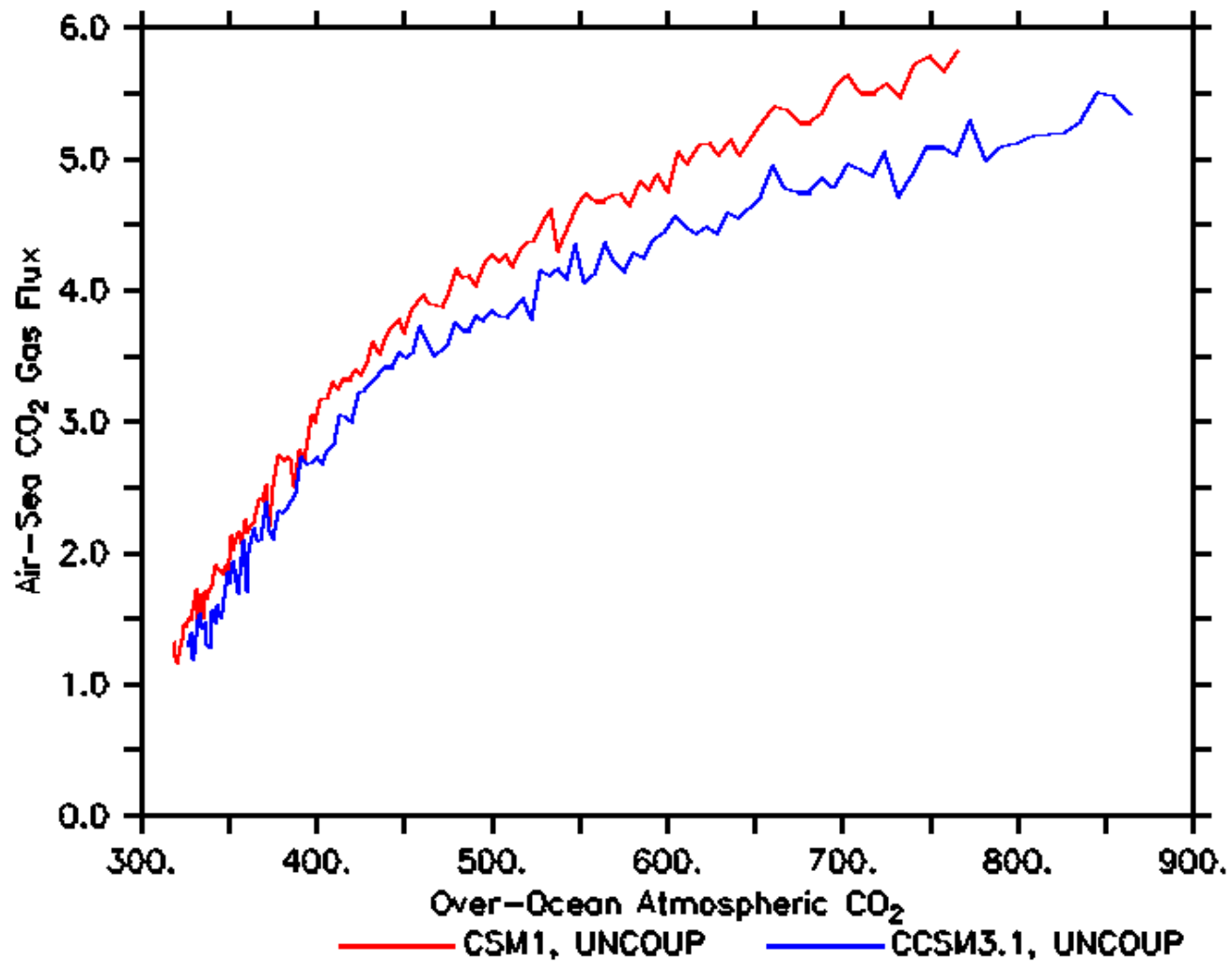
b30.061n, b30.061n2, b30.061n3 Annual Global CO₂ Concentration [Jun 20 2007]



Over-Ocean Atmospheric CO₂

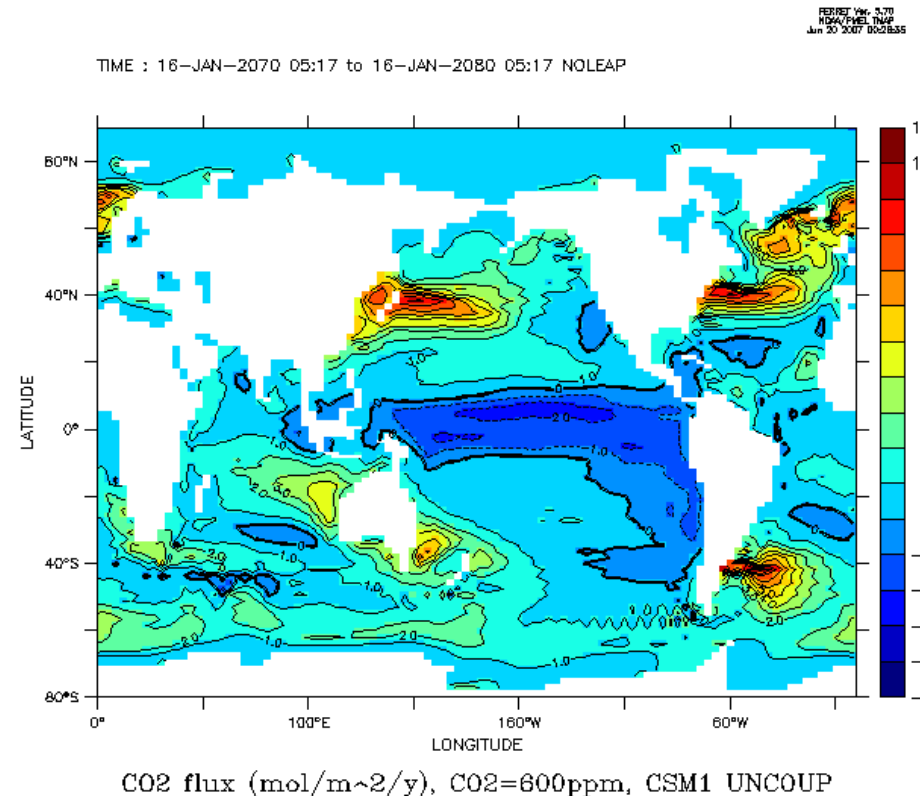
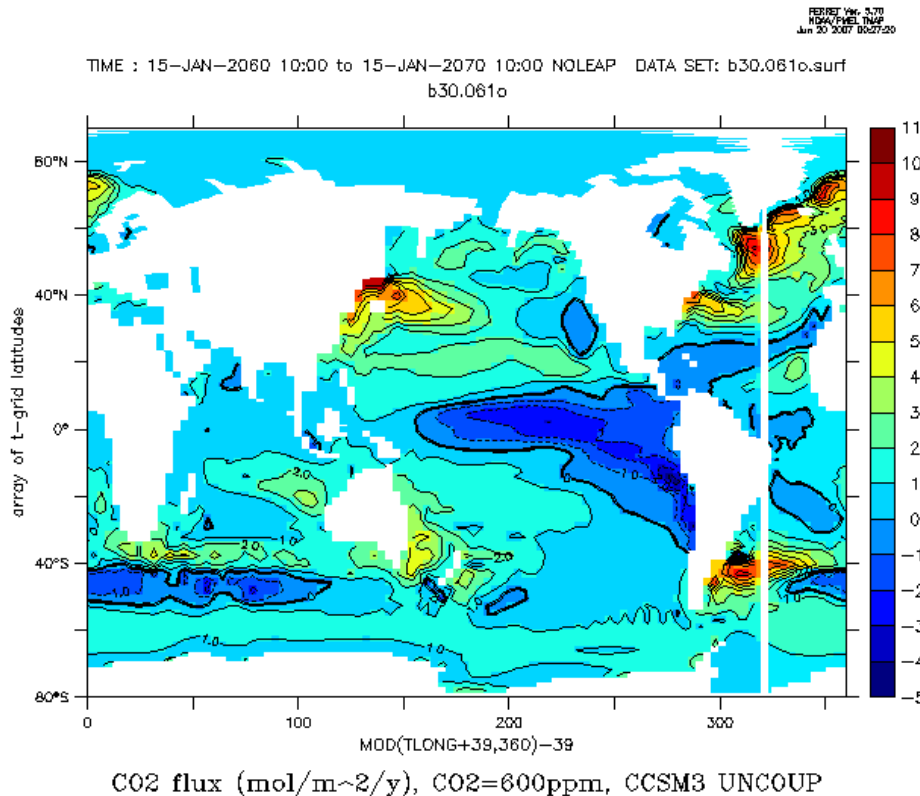


BGC Working Group Meeting
Jun 2007

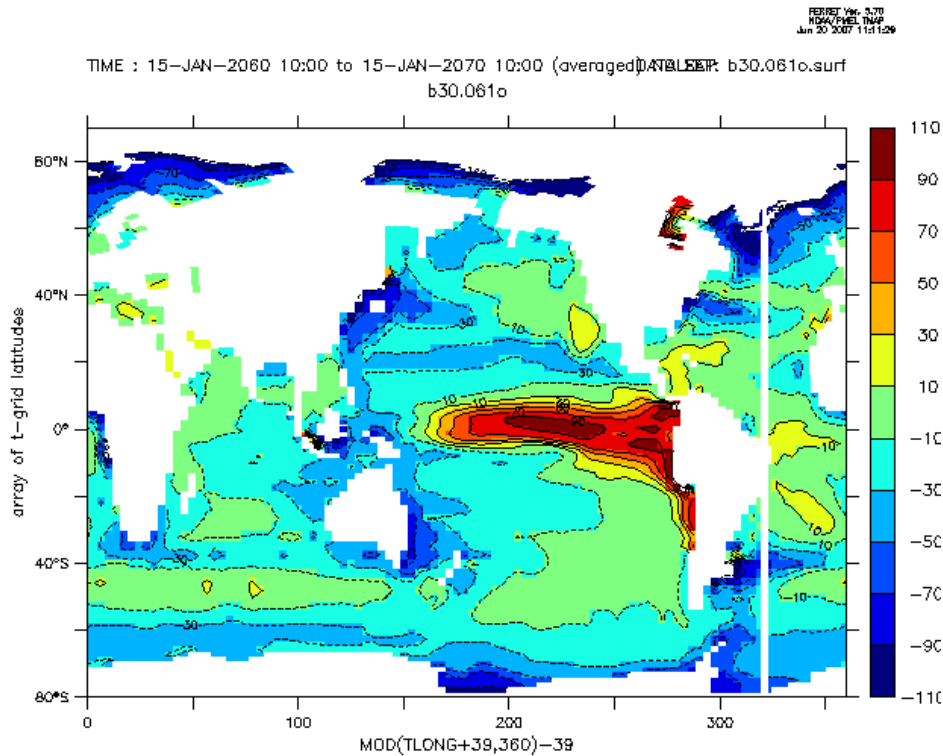


BGC Working Group Meeting
Jun 2007

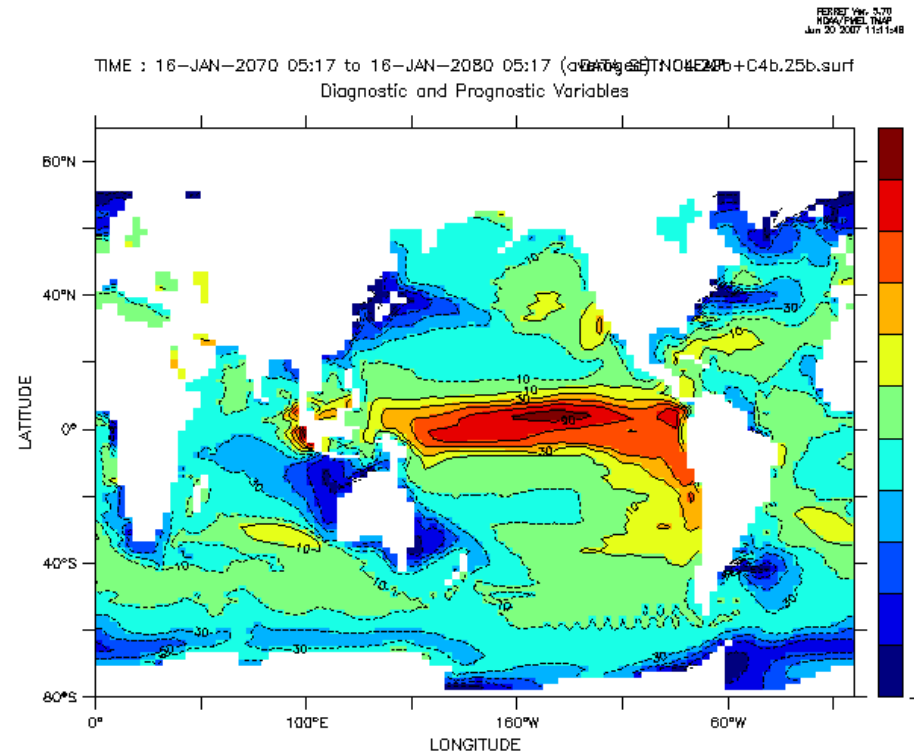
Air-Sea Flux at 600ppm



$\Delta p\text{CO}_2$ at 600ppm

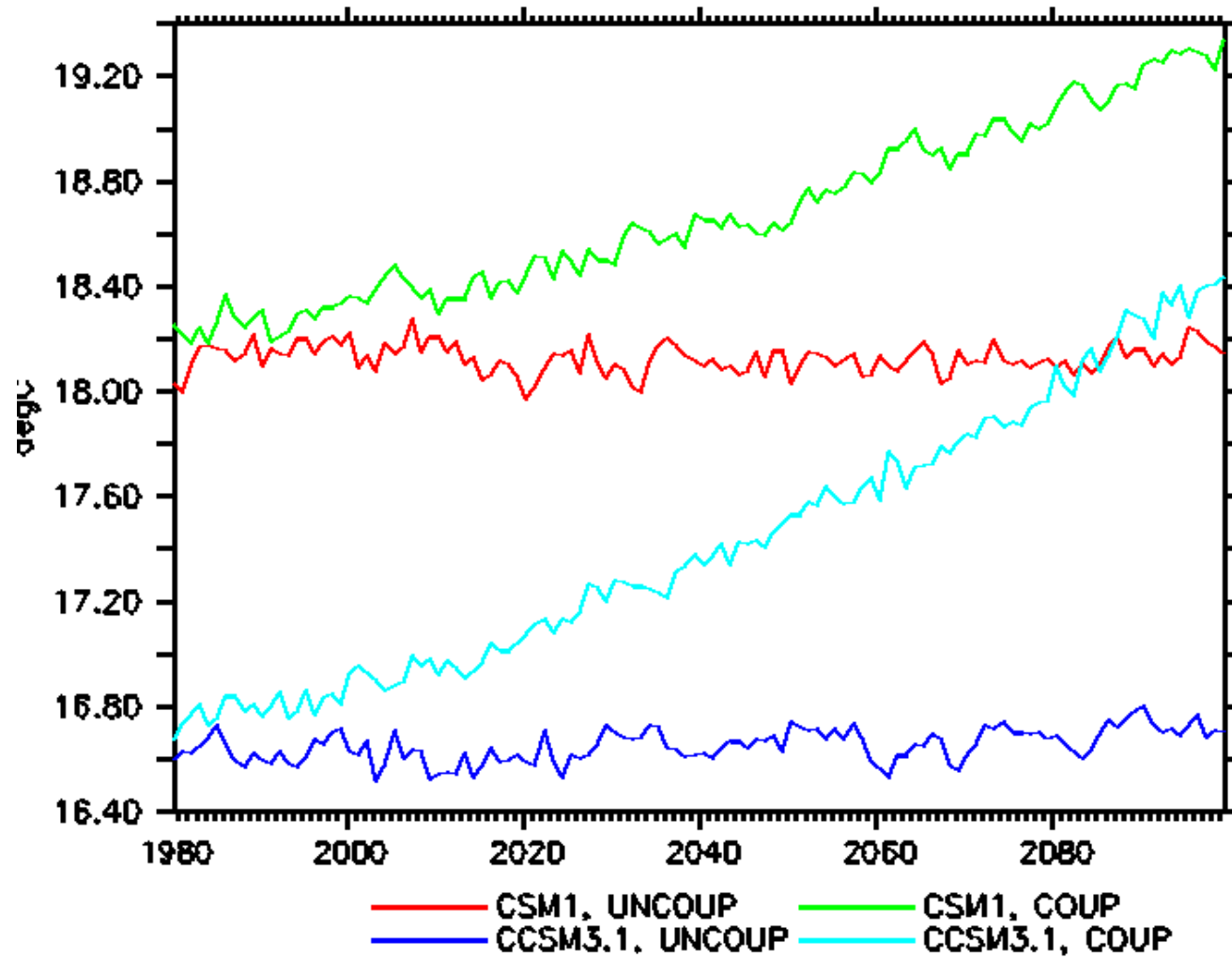


del pCO2, CO2=600ppm, CCSM3 UNCOUP



del pCO2, CO2=600ppm, CSM1 UNCOUP

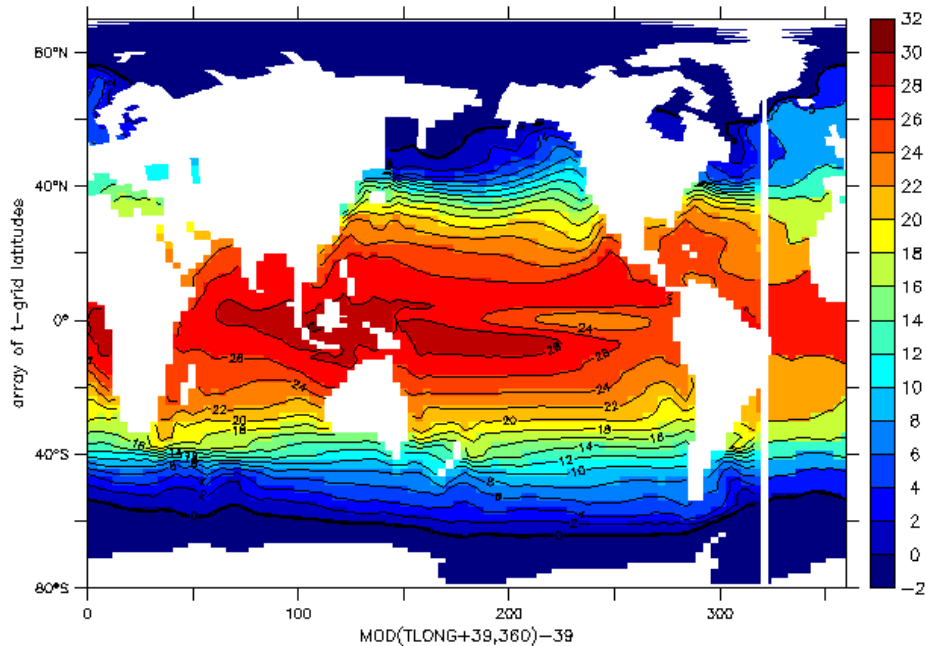
Globally Averaged SST



BGC Working Group Meeting
Jun 2007

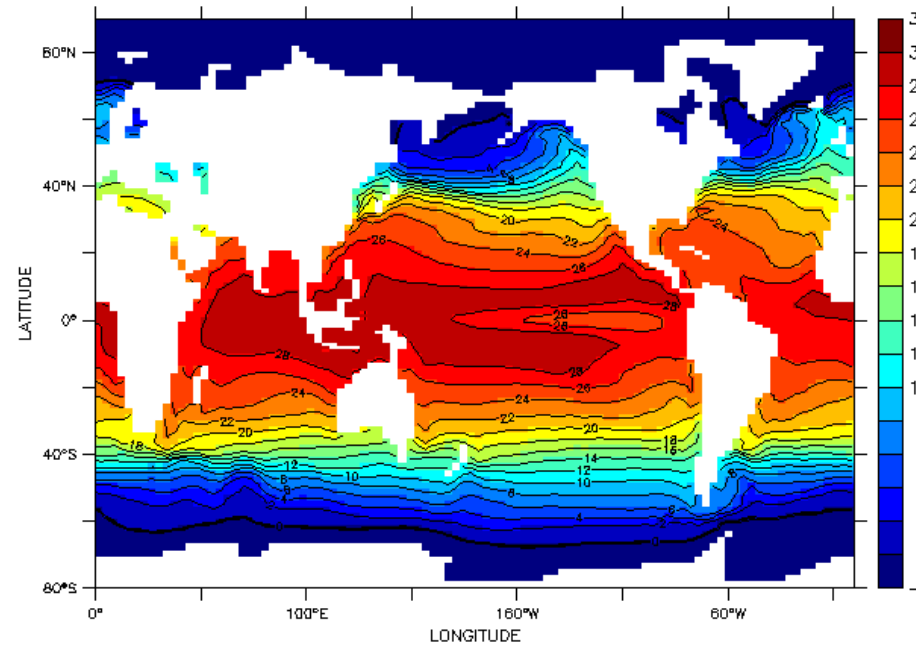
SST at 600ppm

FERRET Ver. 5.70
 HDAA/PANEL.TMAP
 Jun 20 2007 06:35:29
 Z (centimeters) . 400
 TIME : 15-JAN-2060 10:00 to 15-JAN-2070 10:00 (averaged) DATA FILE: b30.061o.surf
 b30.061o



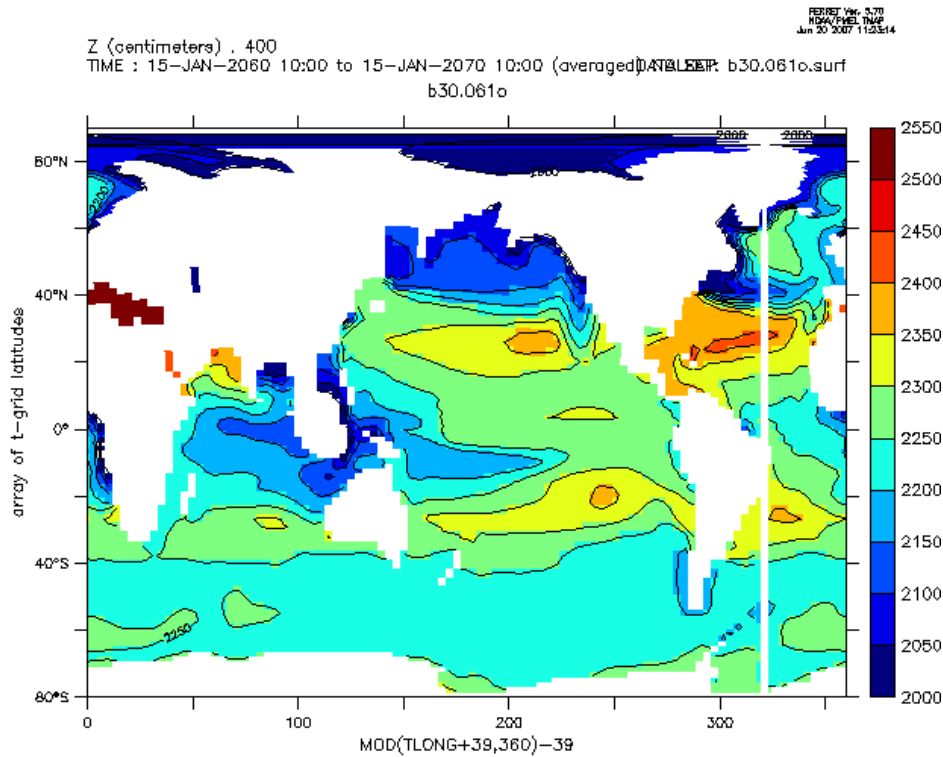
SST, CO2=600ppm, CCSM3 UNCOUP

FERRET Ver. 5.70
 HDAA/PANEL.TMAP
 Jun 20 2007 06:35:34
 Z (centimeters) . 600
 TIME : 16-JAN-2070 05:17 to 16-JAN-2080 05:17 (averaged) DATA FILE: C4b.25b.surf
 C4b.25b.surf
 Diagnostic and Prognostic Variables

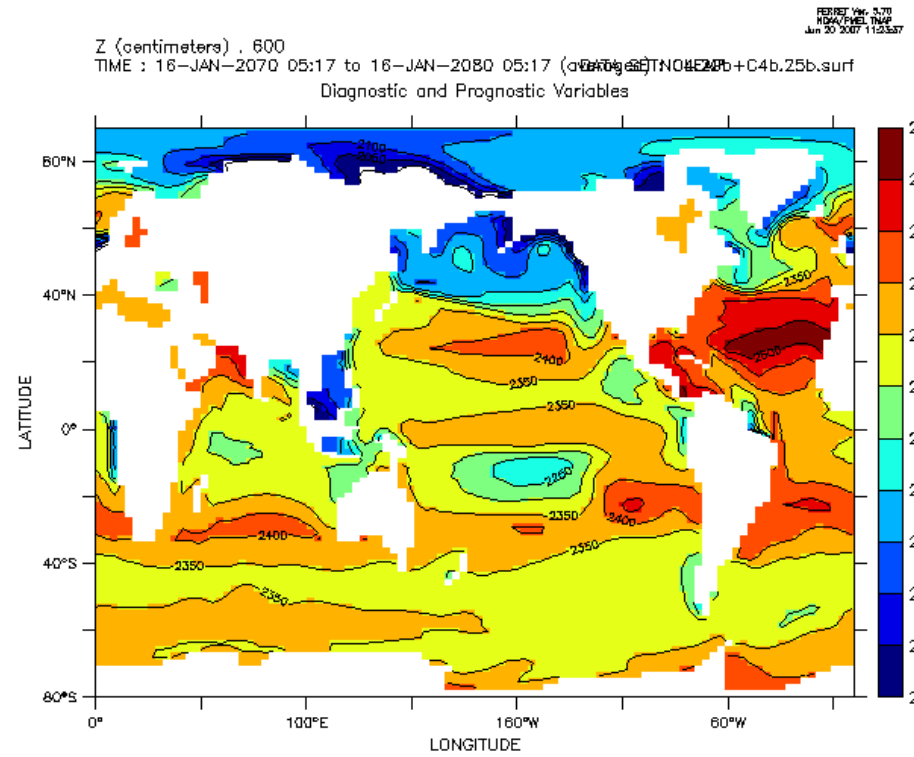


SST, CO2=600ppm, CSM1 UNCOUP

Surface Alkalinity at 600ppm

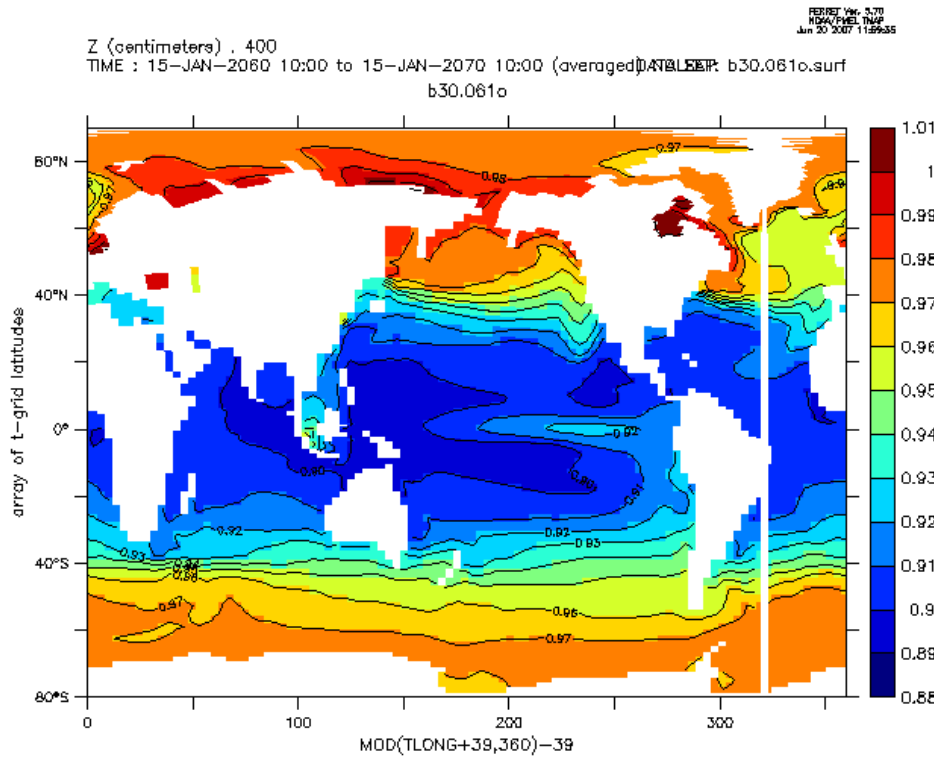


Alkalinity, CO2=600ppm, CCSM3 UNCOUP

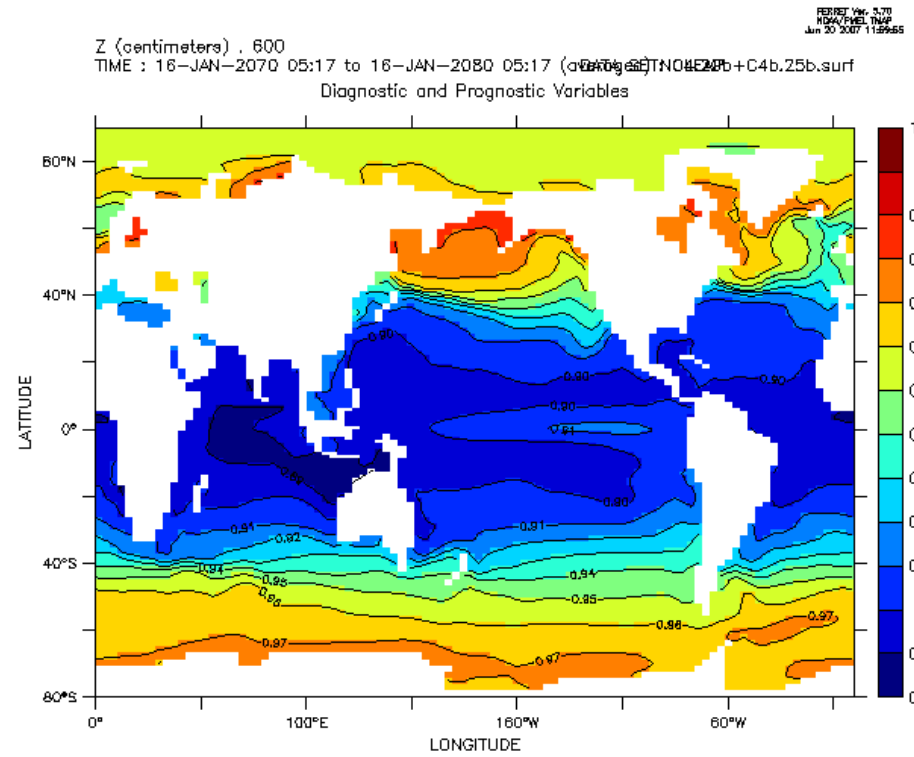


Alkalinity, CO2=600ppm, CSM1 UNCOUP

Surface DIC/Alkalinity at 600ppm



DIC/ALK, CO2=600ppm, CCSM3 UNCOUP



DIC/ALK, CO2=600ppm, CSM1 UNCOUP

Things to fix/think about before next time

- Do we need to start transients before 1870 to avoid land use change transient?