

# Coupled Forecast Experiments

--p8c and p8ct and p8ctc (8 C384 cases)

# Relevant P8b Evaluation Summary ([p8c is similar](#))

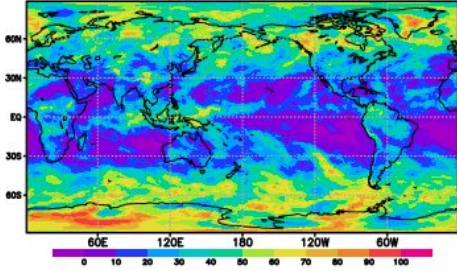
1. The model changes result in:
  - a. Reduced warm temperature bias at high latitudes of winter hemispheres
  - b. Too much clouds
  - c. Reduced surface DWS in eastern tropical Pacific/Atlantic, and further cooling of the cold SST bias already present there
  - d. Increased OLR

# Experiments (C384)

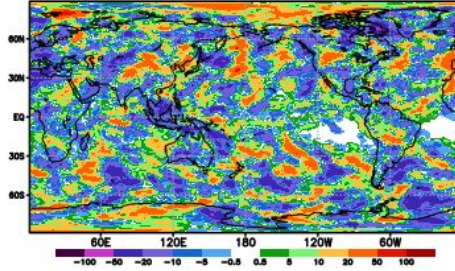
- [p8c: default coupled model configuration](#) (experiments and evaluation were completed by the coupled group.)
- **P8ct=p8c +**
  - Tuned Thompson MP to increase ice and reduce the stratus in SEP
    - $Nt\_c\_o=75$ ;  $Nt\_c\_l=100$ ; (reduce the stratus)
    - $Max\ Ni = 4999D3$  (increase ice)
    - Reduced conversion from ice to snow.
      - **if (xDi.lt. 0.25\*D0s) then no conversion**
    - Increased ice generation
      - $xnc = MIN(1000.E3, TNO*EXP(ATO*(T\_0-temp(k))))$
      - $!xnc = MIN(250.E3, TNO*EXP(ATO*(T\_0-temp(k))))$
      - **Supersaturation for ice generation is 115%**
    - Change in cloud cover calculation
      - $xrc3 = 100.$  (original value)
      - Threshold values from  $1.e-10$  ->  $1.e-8$
- **P8ctc=p8ct + convective cloud condensate in radiative flux calculation.**
- ICs: 2012010100, 2012040100, 2012070100, 2012100100, 2013010100, 2013040100, 2013070100, 2013100100 (8 cases, figures are at <https://ftp.emc.ncep.noaa.gov/gmb/sunr/p8ct/>)
- 10th day is used in the evaluation.

# Middle and High Clouds

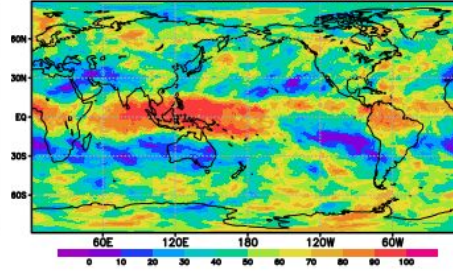
p8c MDCavemcll (27.98,17.14) mean



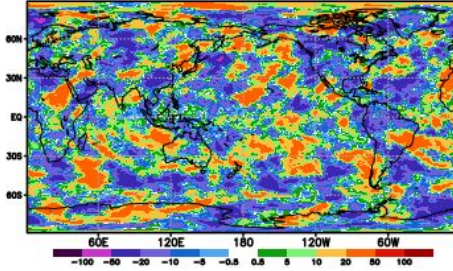
p8ctc-p8c (-0.27,-0.35) 10thday



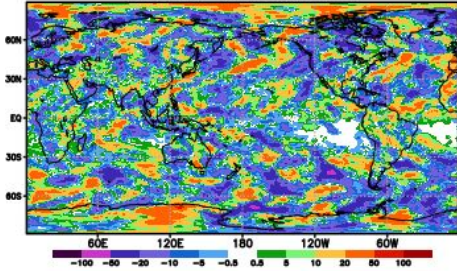
p8c HCDcavemcll (50.46,52.72) mean



p8ctc-p8c (-0.07,0.716) 10thday

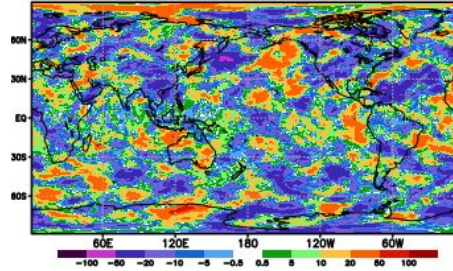


p8ct-p8c (-0.82,0.166) 10thday



MIDDLE

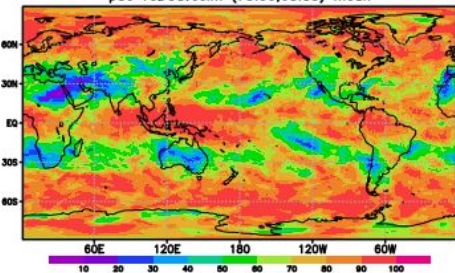
p8ct-p8c (-0.62,0.899) 10thday



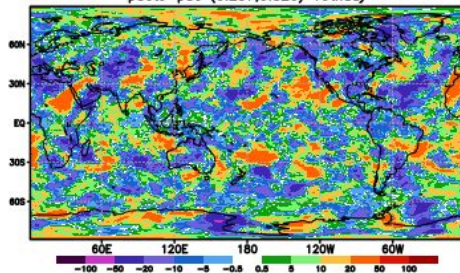
HIGH

# Total and Low Clouds

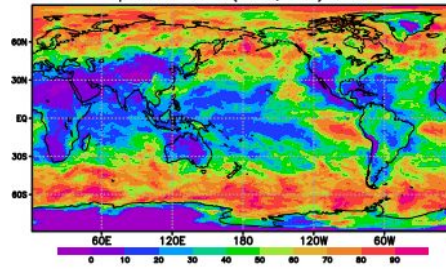
p8c TCDCaveclm (73.00,68.85) mean



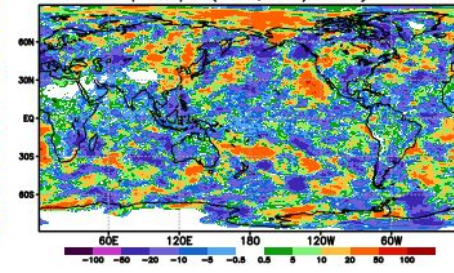
p8ctc-p8c (0.257,0.820) 10thday



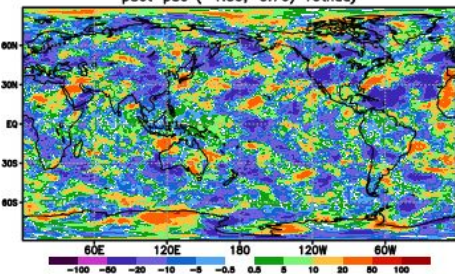
p8c LCDCavecll (41.08,28.43) mean



p8ctc-p8c (-0.39,-0.79) 10thday

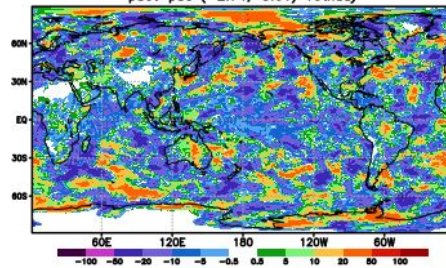


p8ct-p8c (-1.39,-0.76) 10thday



TOTAL

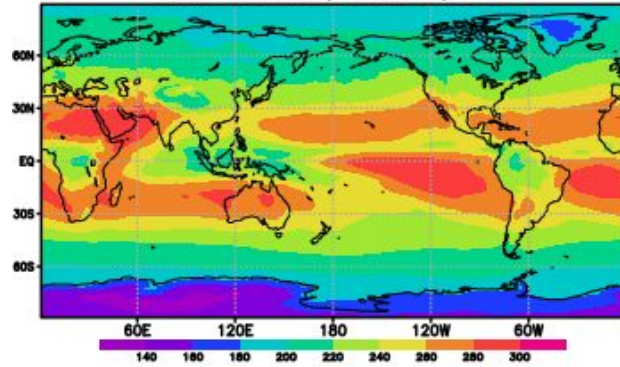
p8ct-p8c (-2.74,-3.61) 10thday



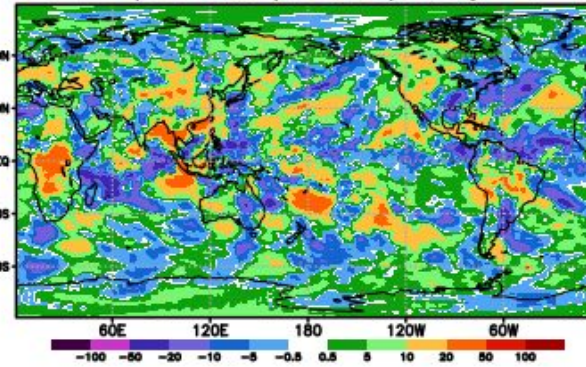
LOW

# OLR

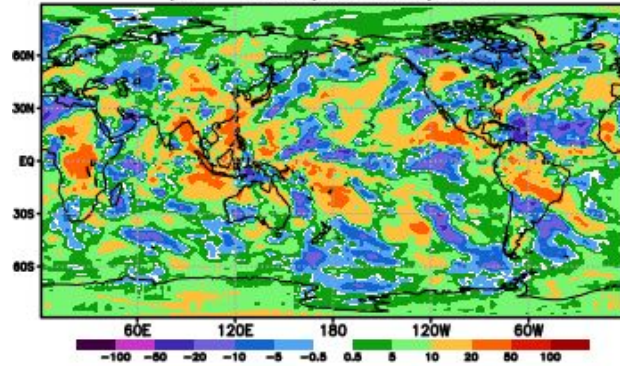
CERES ULWRFtoa (239.9,259.6) mean



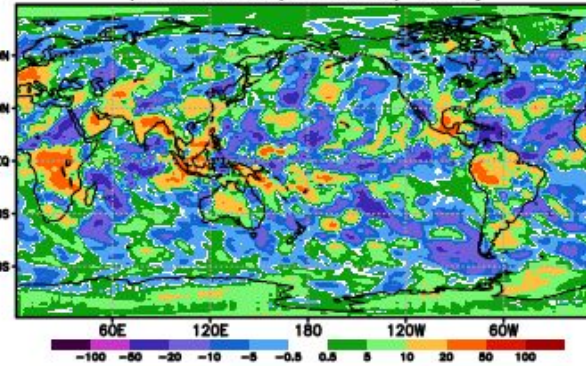
pBct- CERES (1.713,1.726) 10thday



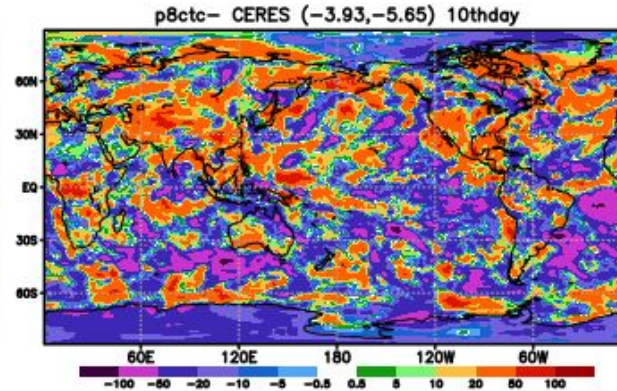
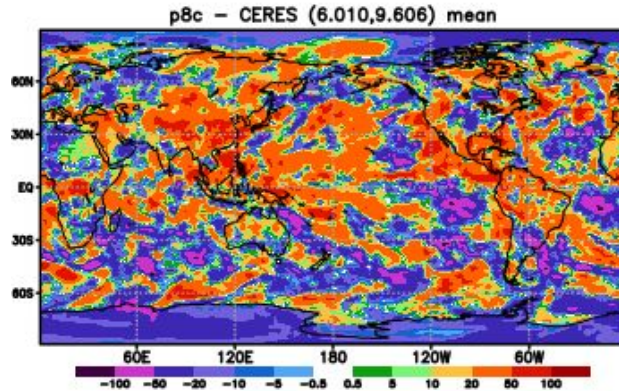
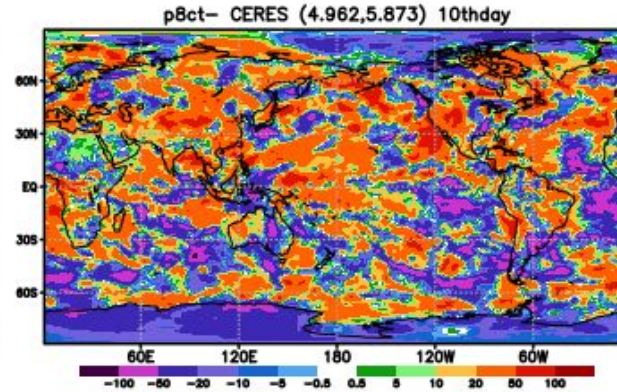
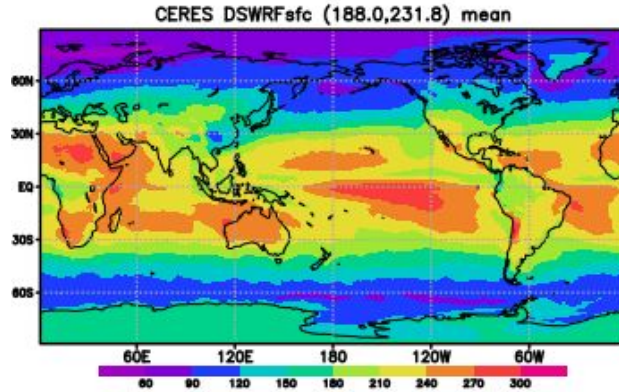
p8c - CERES (4.835,6.153) mean



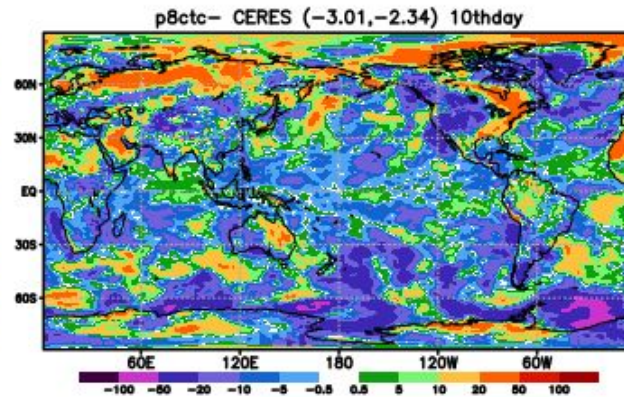
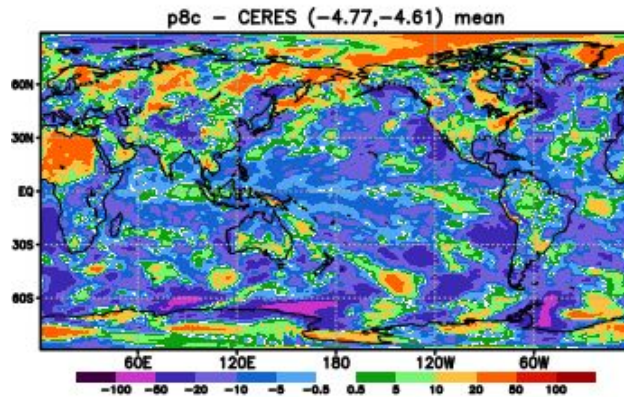
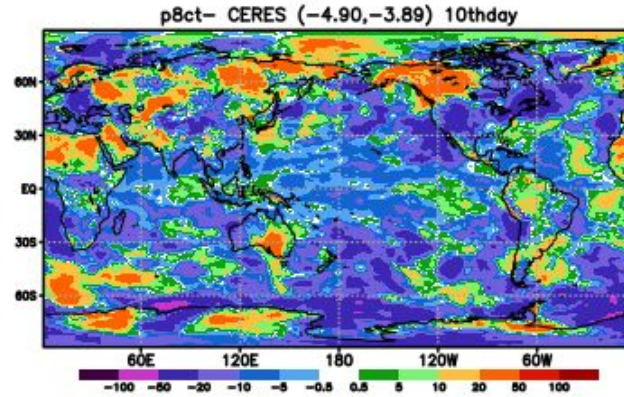
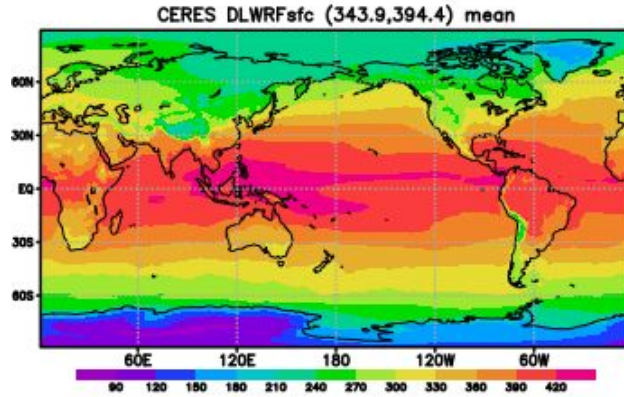
p8ctc- CERES (0.214,0.702) 10thday



# Downward SW at Surface

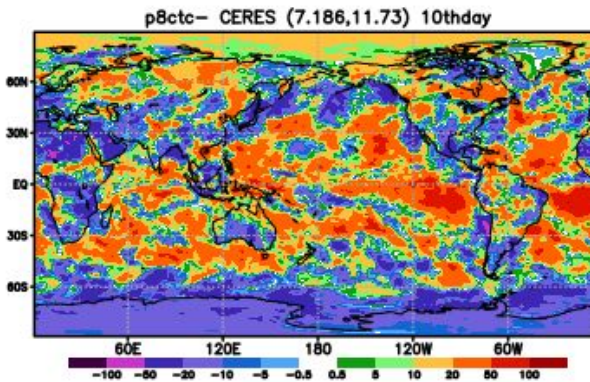
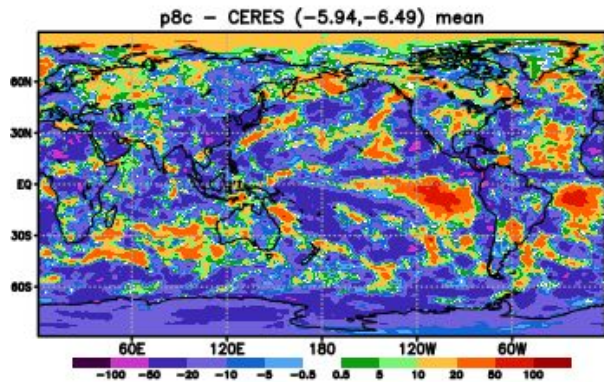
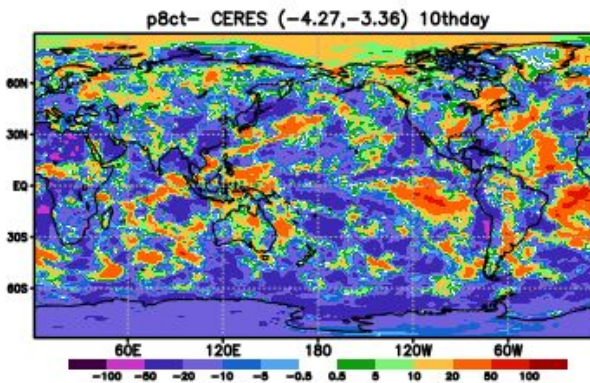
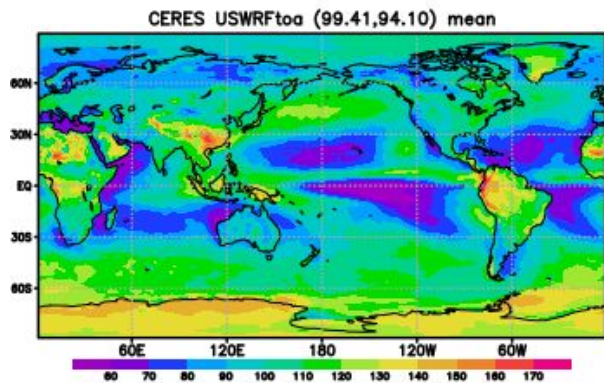


# Downward LW at Surface

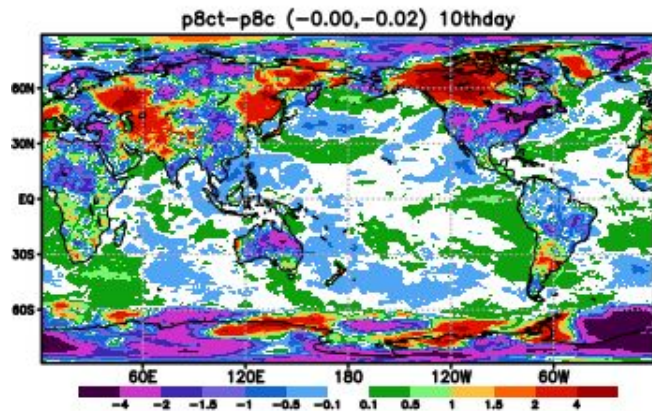
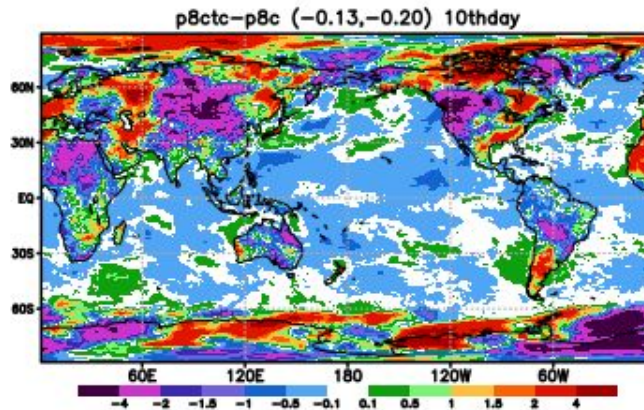
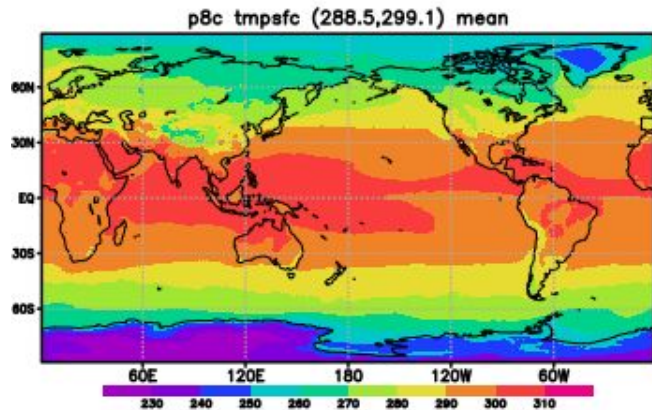




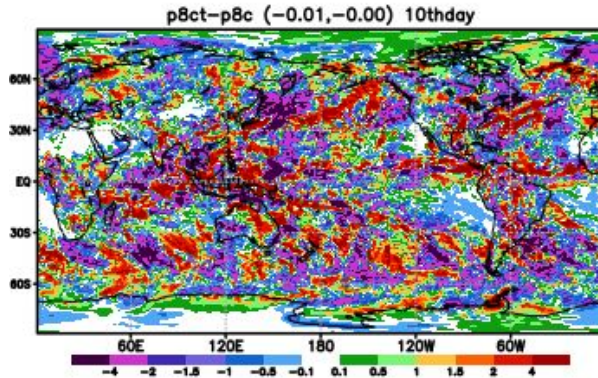
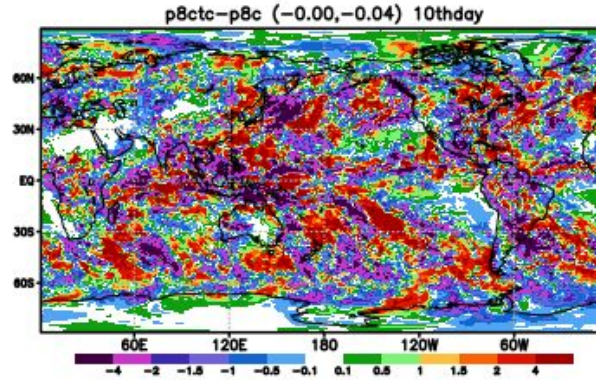
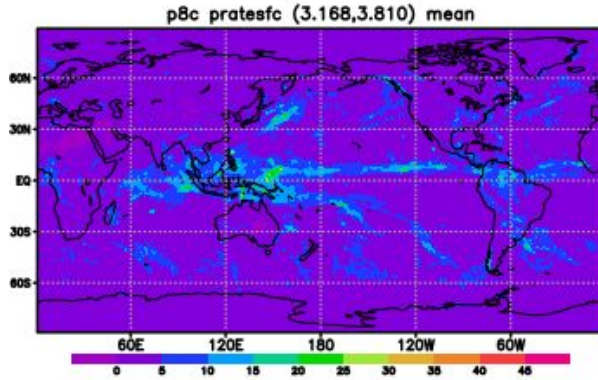
# Outgoing SW at TOA



# Temperature at Surface



# Precipitation rate at Surface



# Evaluation Summary

1. Convective cloud condensate:
  - a. Significantly reduced the downward SW at the surface
  - b. Significantly increased the outgoing SW at the TOA
  - c. Reduced OLR bias
  - d. Reduced surface temperature (in tropical region)

Atmosphere only C768

Forecast Experiments

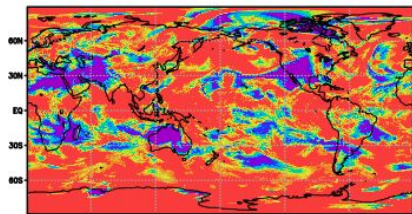
--p8b control and experiments

# Experiments (C768)

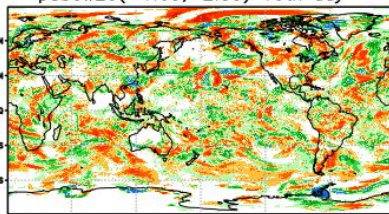
- [p8bctl: default coupled model configuration](#)
- **P8bcw20=p8bctl +**
  - Tuned Thompson MP to increase ice and reduce the stratus in SEP
    - $Nt\_c\_o=75$ ;  $Nt\_c\_l=100$ ; (reduce the stratus)
    - Max Ni = 4999D3 (increase ice)
    - Reduced conversion from ice to snow.
      - **if (xDi.lt. 0.25\*D0s) then no conversion**
    - Increased ice generation
      - $xnc = \text{MIN}(1000.E3, TNO*EXP(ATO*(T\_0-temp(k))))$
      - $!xnc = \text{MIN}(250.E3, TNO*EXP(ATO*(T\_0-temp(k))))$
      - **Supersaturation for ice generation is 115%**
    - Change in cloud cover calculation
      - $xrc3 = 100$ . (original value)
      - Threshold values from  $1.e-10 \rightarrow 1.e-8$
    - Use cnvw in the radiative flux calculations
      - The cnvw is partitioned into liquid and ice using [-20C – 0C]
- P8bcw30= p8bcw20 and different temperature range [-30,0]
- P8bcw38= p8bcw20 and different temperature range [-38,0]
- ICs: 2012060100
- 10th day is used in the evaluation.

# Total and High Clouds

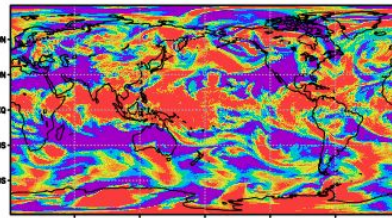
p8bctl TCDCcIm(70.47,66.16) 10th c



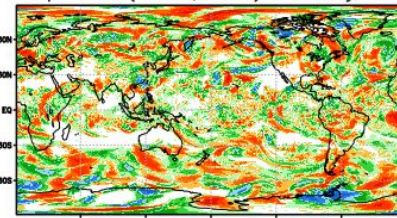
p8bcw20(-1.69,-2.39) 10th day



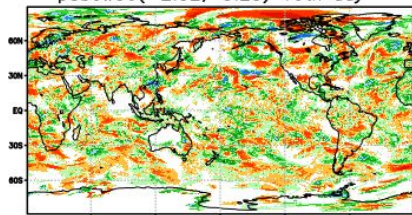
p8bctl HCDChcIl(51.49,54.19) 10th c



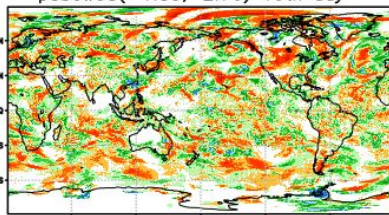
p8bcw20(-3.60,-3.01) 10th day



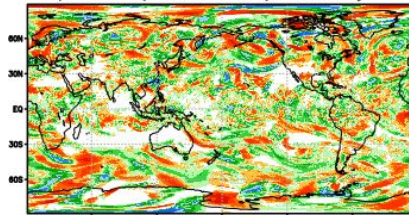
p8bcw30(-2.32,-3.23) 10th day



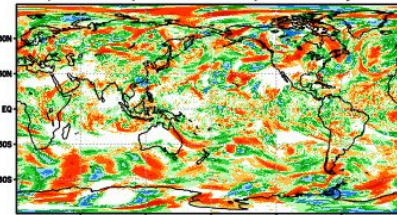
p8bcw38(-1.83,-2.76) 10th day



p8bcw30(-3.90,-3.59) 10th day



p8bcw38(-3.82,-3.67) 10th day

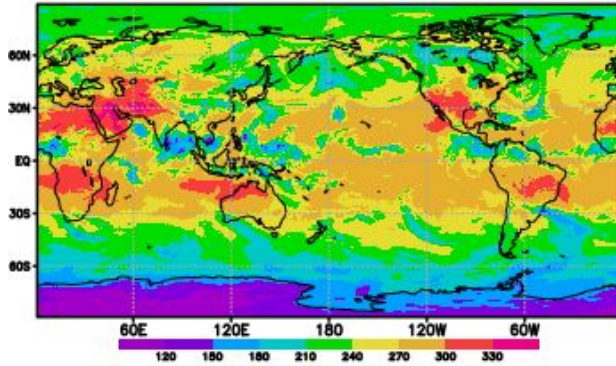


Total

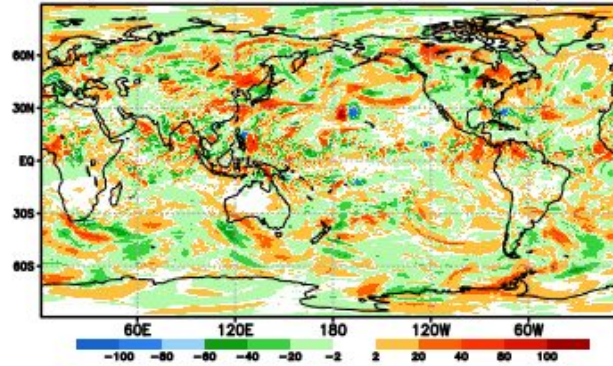
High

# OLR

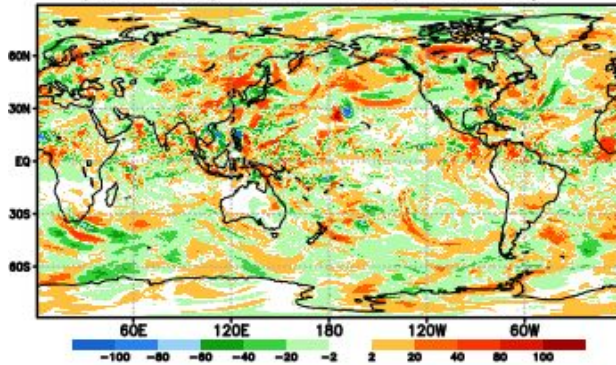
p8bctl ulwrftoa(247.9,267.5) 10th d



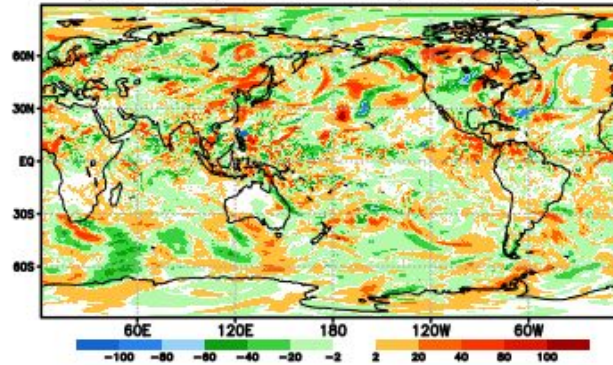
p8bcw20(-1.14,-1.07) 10th day



p8bcw30(-1.11,-1.20) 10th day



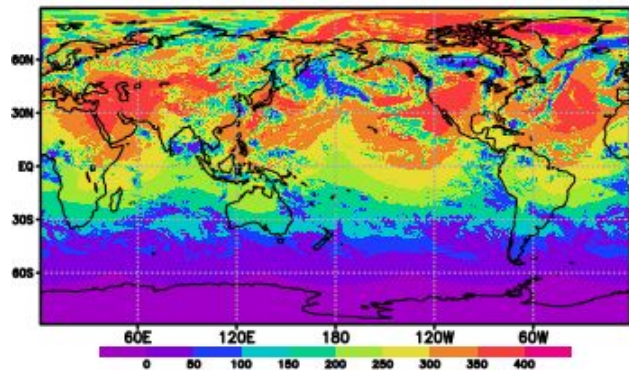
p8bcw38(-1.26,-1.16) 10th day



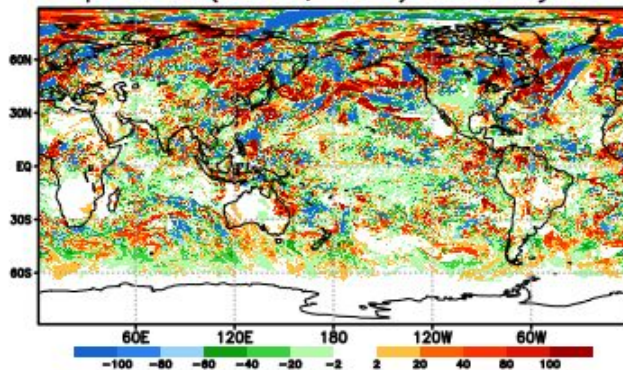


# DSWRFsfc

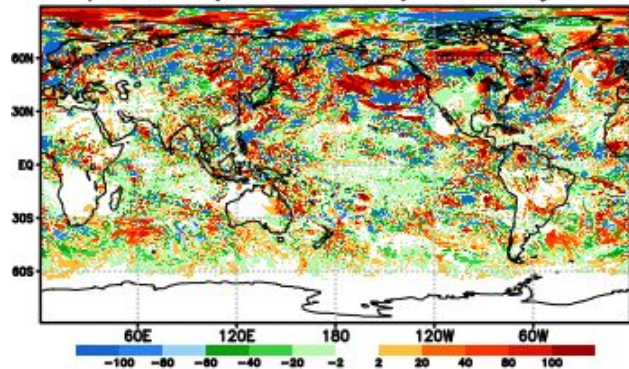
p8bctl DSWRFsfc(193.0,230.6) 10th



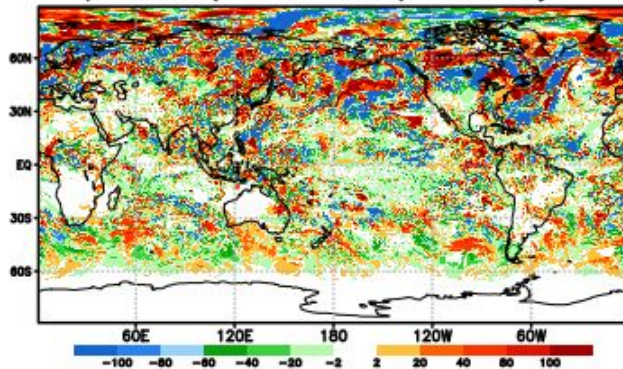
p8bcw20(-6.69,-9.17) 10th day



p8bcw30(-6.57,-9.40) 10th day

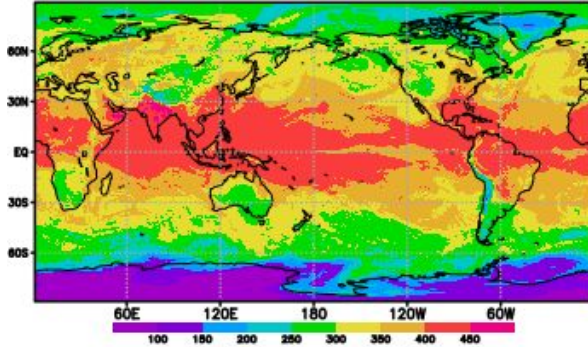


p8bcw38(-7.76,-10.0) 10th day

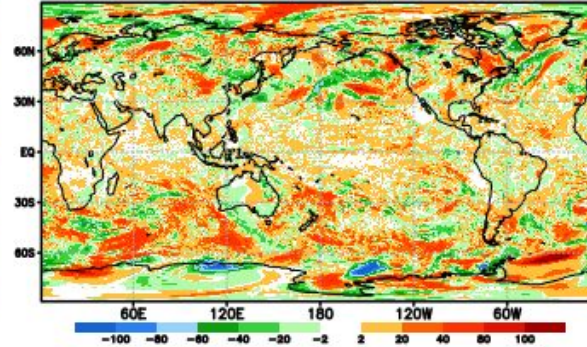


# DLWRFsfc

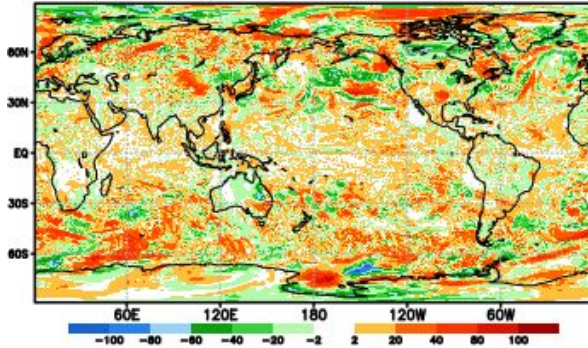
p8bctl DLWRFsfc(345.5,393.6) 10th



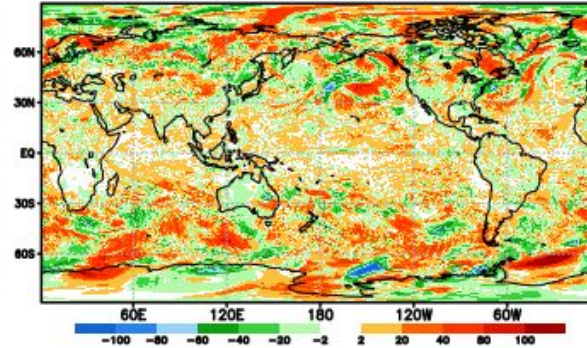
p8bcw20(2.118,1.780) 10th day



p8bcw30(1.840,1.460) 10th day

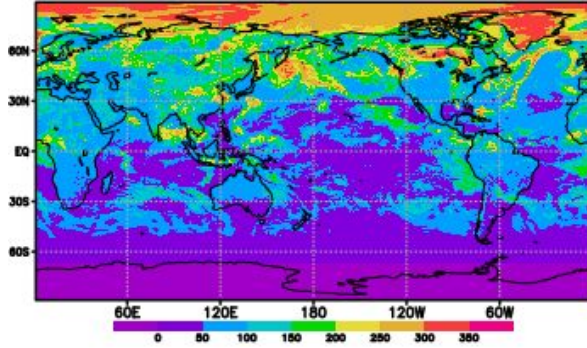


p8bcw38(1.974,1.676) 10th day

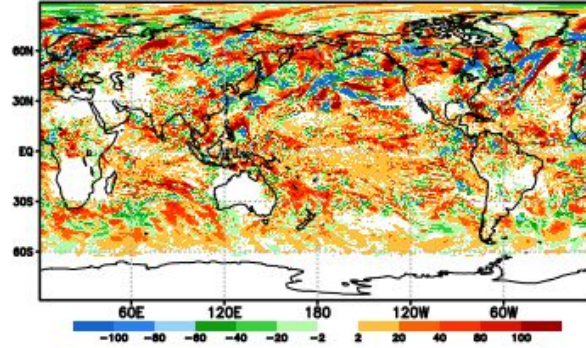


# USWRFtoa

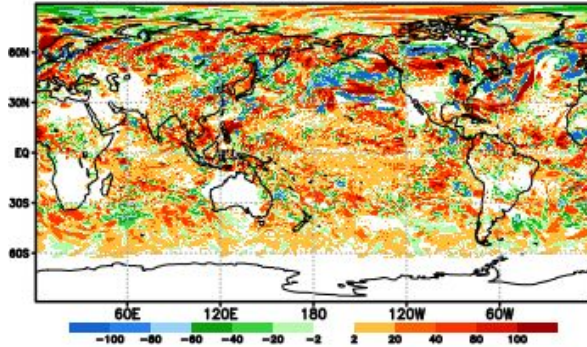
p8bctl USWRFtoa(83.67,75.93) 10th



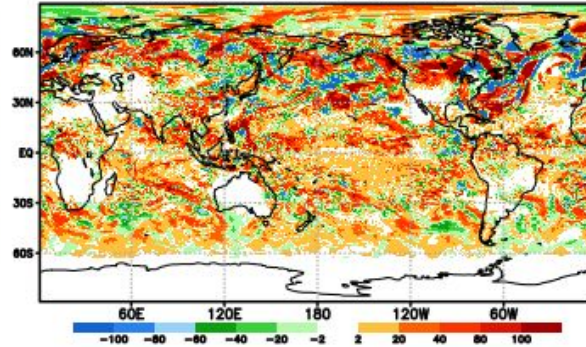
p8bcw20(5.939,8.532) 10th day



p8bcw30(5.763,8.268) 10th day

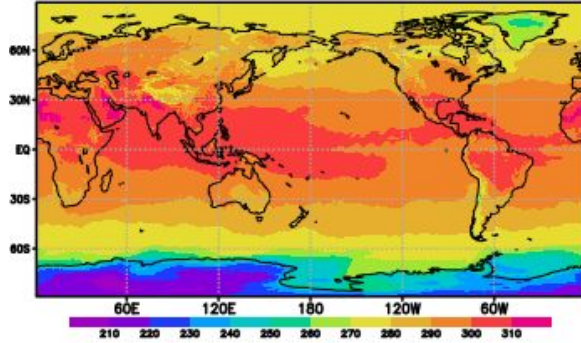


p8bcw38(6.948,9.191) 10th day

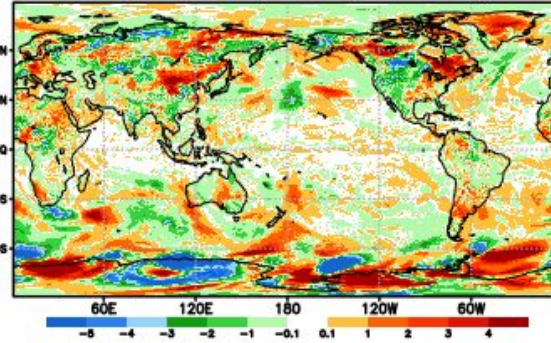


# Surface 2M Temperature

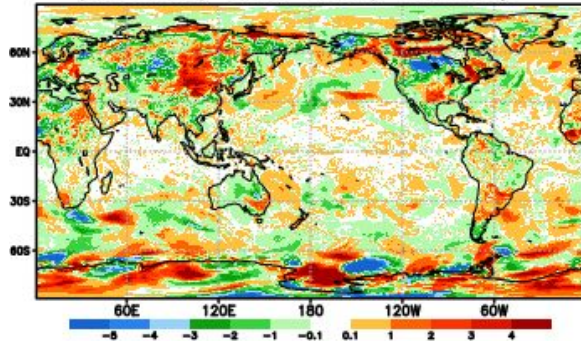
p8bctl tmp2m(289.5,298.9) 10th dc



p8bcw20(-0.02,-0.04) 10th day



p8bcw30(-0.03,-0.04) 10th day



p8bcw38(-0.05,-0.06) 10th day

