# Mean state and global characteristics of the T85 spectral Community Atmosphere Model

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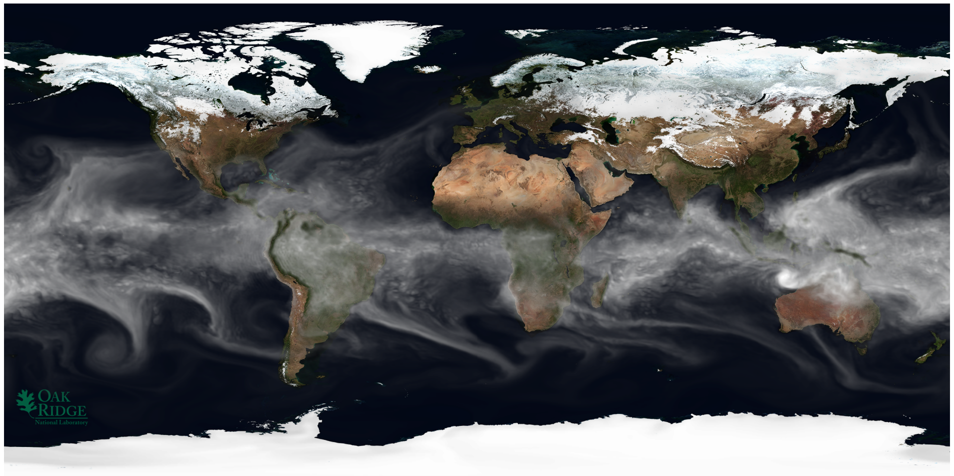
With invaluable assistance from the CESM model working groups!



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# Attributes of CAM-EUL dynamical core within the CESM using CAM4 physics:

- **Well known & understood dycore from which to develop and analyze**
- ***Can now isolate differences between physics packages and dycores***
- **With subcycled dynamics, CAM-EUL is the most efficient dycore for small processor counts**
- **Isotropic representation of the grid, polar filters not needed**
- **Does not provide explicit local conservation**

# Experimental Protocol: T85 analysis

- Create an CAM4 physics AMIP simulation to compare with FV, SE dycores
- Create a 50 year preindustrial coupled control
  - Start from yr 863 ~1$^{o}$ CCSM4 FV land
  - Start from yr 863 gx1v6 ~1$^{o}$ ocean and ice fields
- Create ensemble of 30 year coupled present day simulations covering 1975-2005
  - Start from year 1970 ocean, ice, land initial states
  - Project partners are evaluating simulations
- Archive robust output fields to evaluate T85 control, present day, and hi-res simulations

# T85 produces global energy balance similar to other CESM dycores

- **With tri-grid, land model is identical to CCSM4 FV, but there is interpolation**
- **FV1, T85 and ne30 are much closer to each other than observations (i.e. many attributes and biases and are similar)**

Global Annually Averaged Variables of Interest for AMIP runs

| Variable | ne30 | T85 | FV1 | OBS |
|---|---|---|---|---|
| FSNT | 238.9 | 237.2 | 239.1 | 240.6*(TOA) |
| FLNT | 237.6 | 236.4 | 238.1 | 239.6*(TOA) |
| TS (land) | 281.8 | 281.6 | 281.2 | 281.1 |
| CLDTOT | 47.3 | 48.4 | 47.0 | 66.8@ |
| LWCF | 25.8 | 27.0 | 25.7 | 26.5* |
| SWCF | -48.5 | -50.1 | -48.2 | -47.1* |

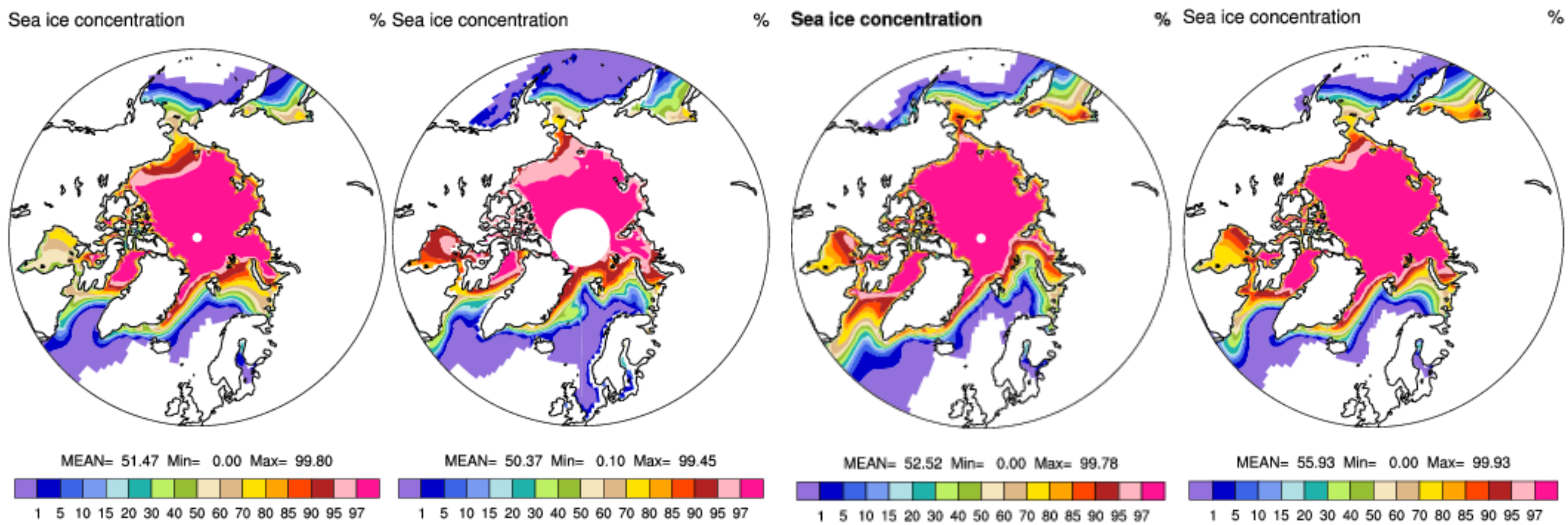
* CERES-EBAF, **NCEP, @ISCCP

TS=Surface Temperature, TOA= Top of Atmosphere

# Highlights of T85 CCSM4 1976-2005 simulations: A benchmark for higher resolution

- **For almost all relevant measures, T85 is similar to FV, compared to observations**
- **Better representations of several important dynamical fields, e.g. polar winter fields**
- **Problems with precipitation persist, e.g. over monsoon regions in the tropics**
  - **Strong biases over the Tropical Pacific, Indian Oceans**
  - **Double ITCZ persists**

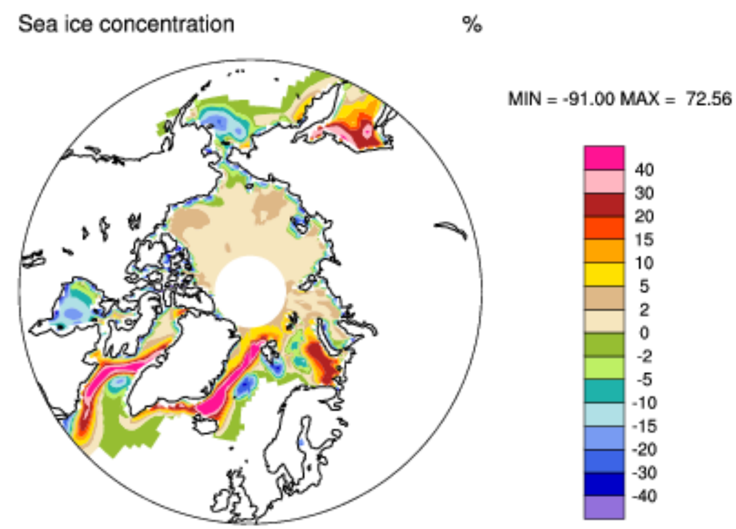
# Coupled present day simulation: Northern Hemisphere Winter (DJF) Sea Ice Concentration

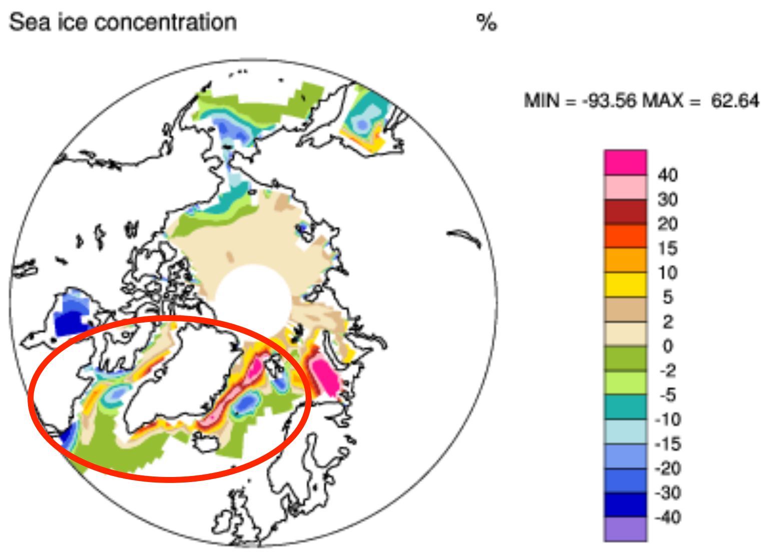



T85 CCSM4 | SSM/I | T85 CCSM3 | FV CCSM4

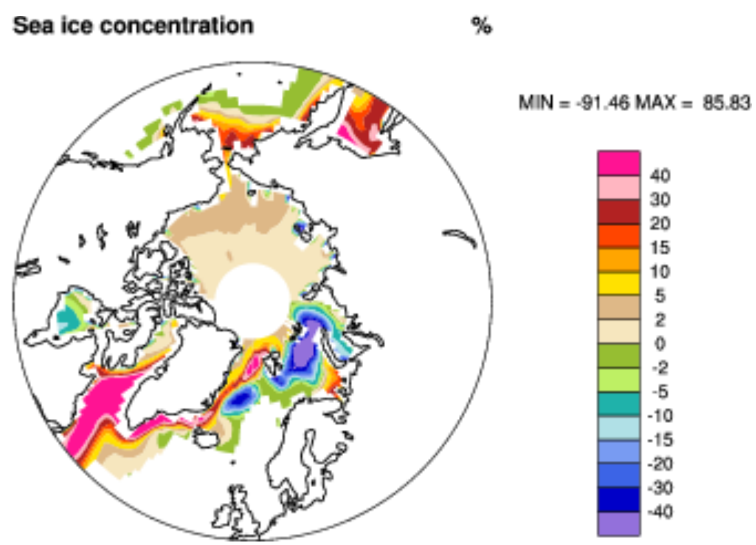
# Northern Hemisphere Sea Ice Concentration

FV CCSM4-SSM/I



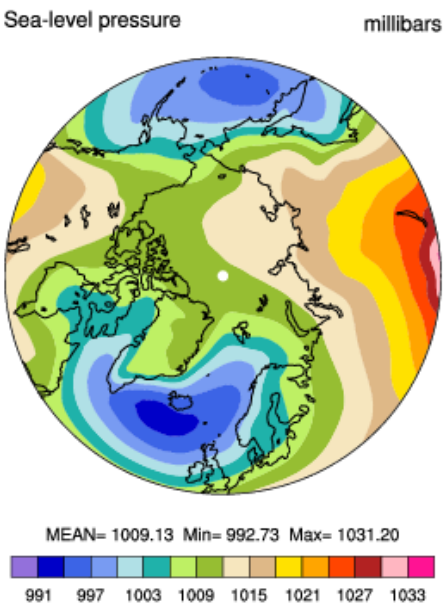




T85 CCSM4-SSM/I

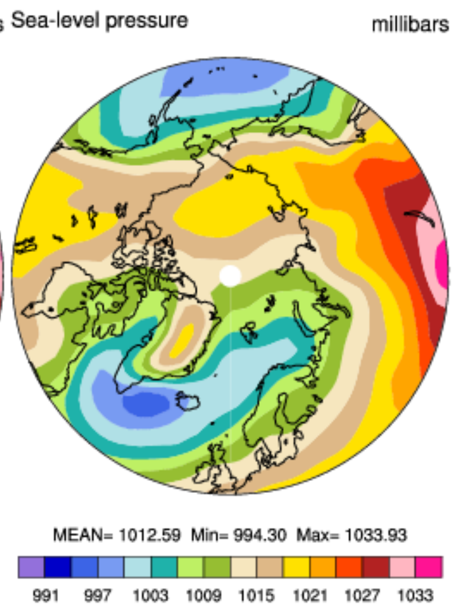



T85 CCSM3-SSM/

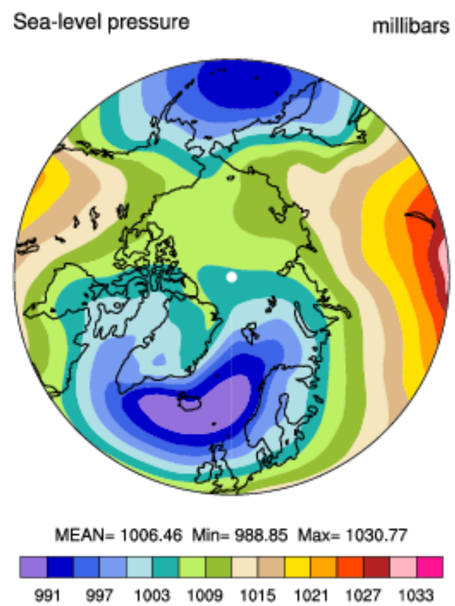
# Northern Hemisphere Winter (DJF) Sea Level Pressure



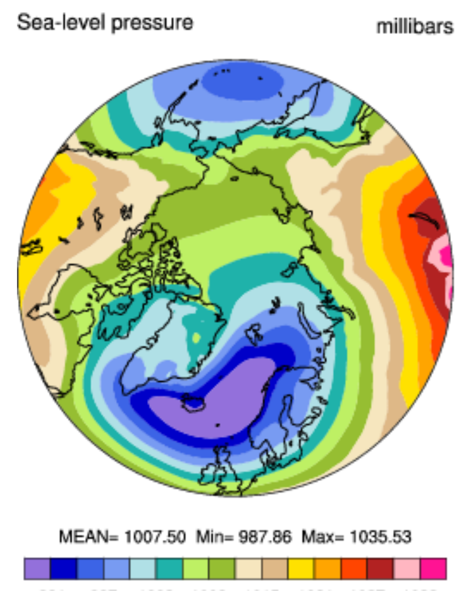

T85 CCSM4




NCEP




T85 CCSM3

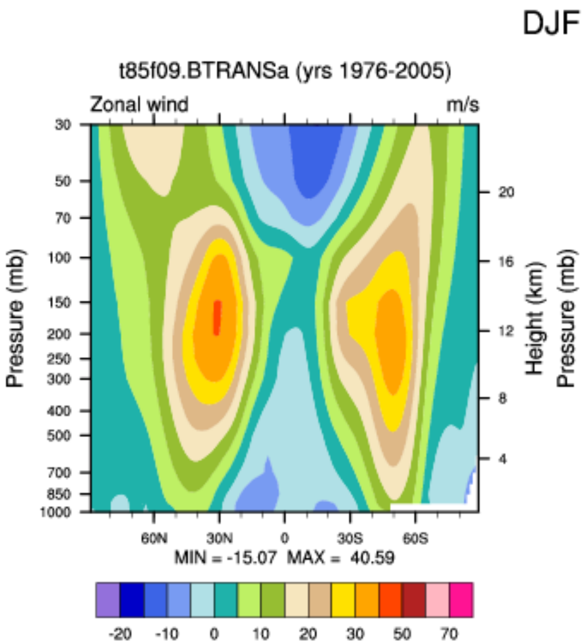



FV CCSM4

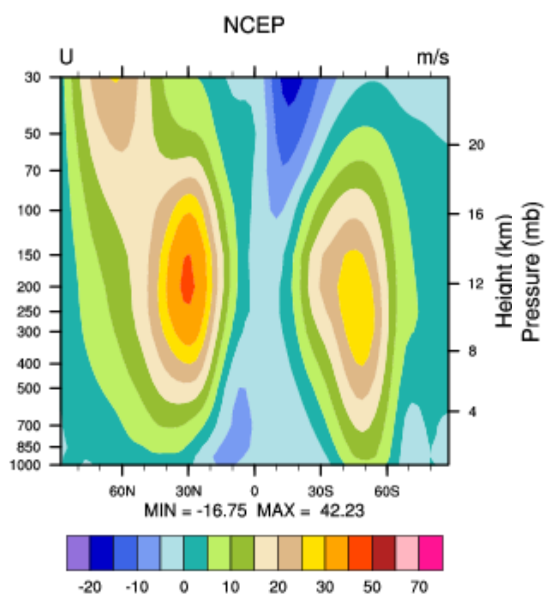
Note: Southern Hemisphere biases from reanalyses in SLP with T85 and FV CAM4 are about the same strength

# Zonally averaged winds (DJF) versus FV

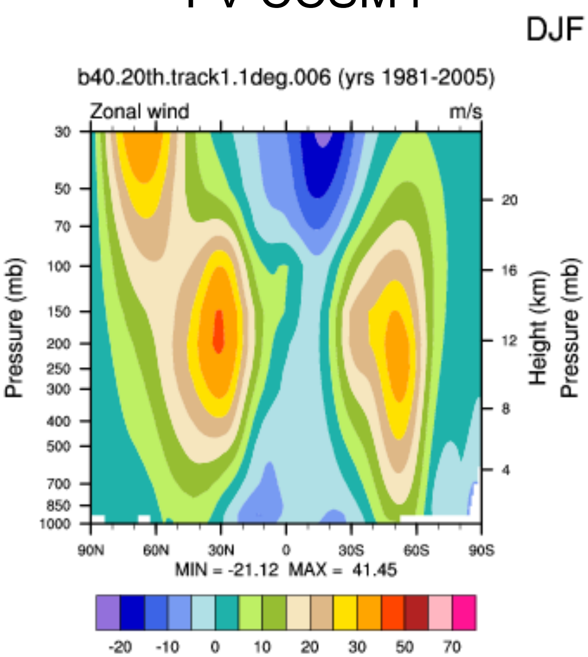
T85 CCSM4




NCEP Reanalyses




FV CCSM4

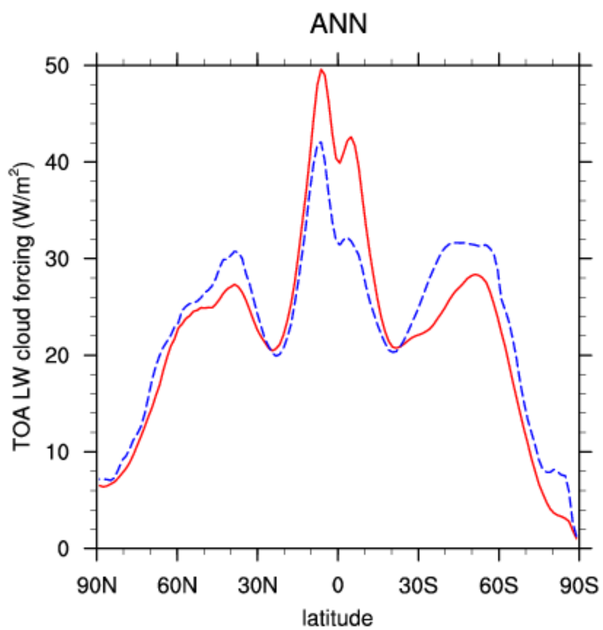



The polar winter stratosphere jet in T85 CAM4 is weaker than FV CAM4, and a little too weak compared to NCEP. Similar story near the surface.

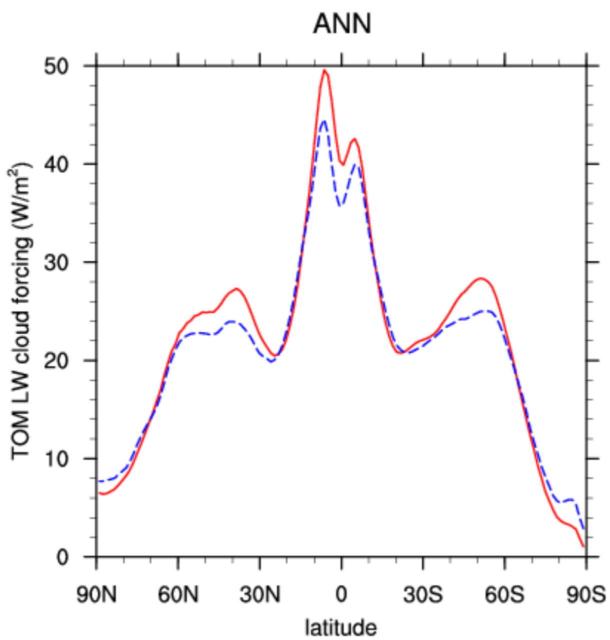
# T85 CCSM4:

- Upper level winds closer to reanalyses, surface winds strong
- Better representation of Aleutian and Icelandic lows; weaker low pressure bias between the lows
- Slightly better representation of ice concentration over the Labrador and Nordic Seas
- SH Austral summer: ice concentration also improved with T85 CCSM4

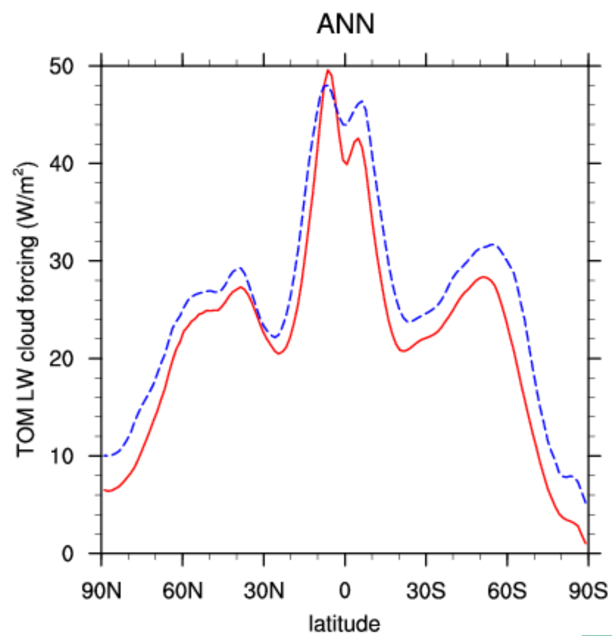
# Long Wave Cloud Forcing for CCSM4 T85 compared to CERES-EBAF, FV and T85 CCSM3




T85 vs. CERES-EBAF

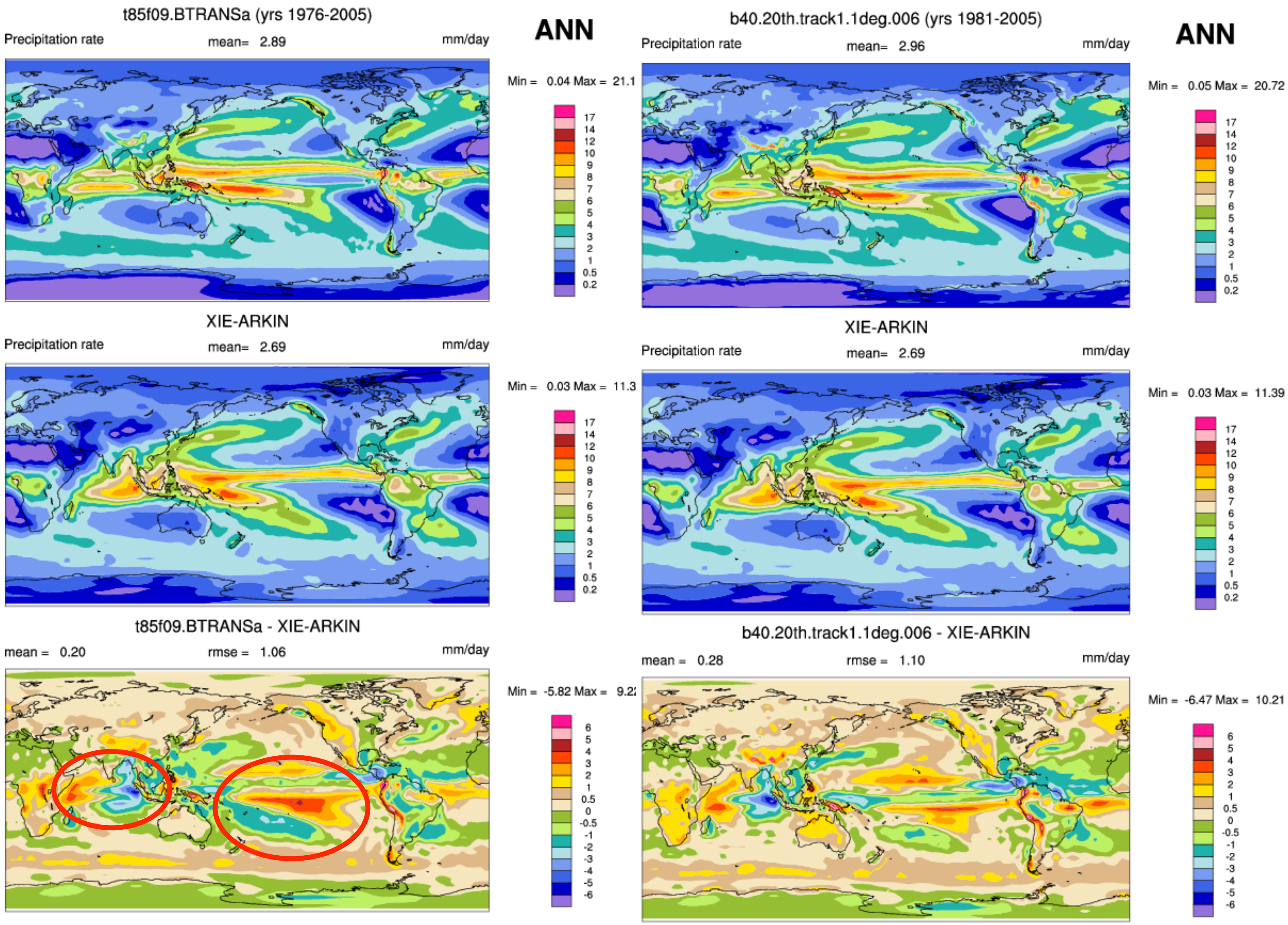



T85 vs. FV CCSM4




T85 vs CCSM3

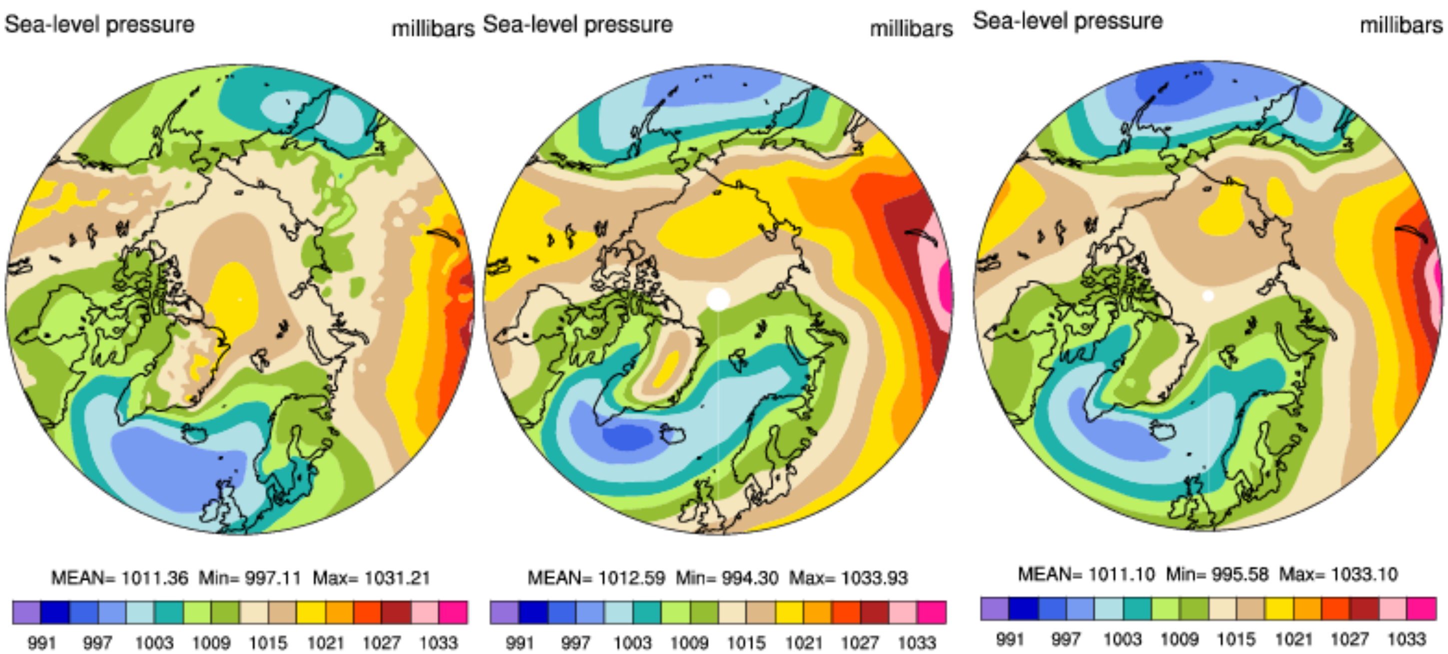
# Total Precipitable Water for T85 CCSM4 and FV compared to CMAP dataset




*CCSM3 has stronger double ITCZ, stronger biases

# Next Steps: Analyze T341.

Arctic Winter Sea Level Pressure
for uncoupled preindustrial configurations




T341 CAM4 NCEP reanalysis T85 CAM4

# Come see the T341 poster.
# Questions?