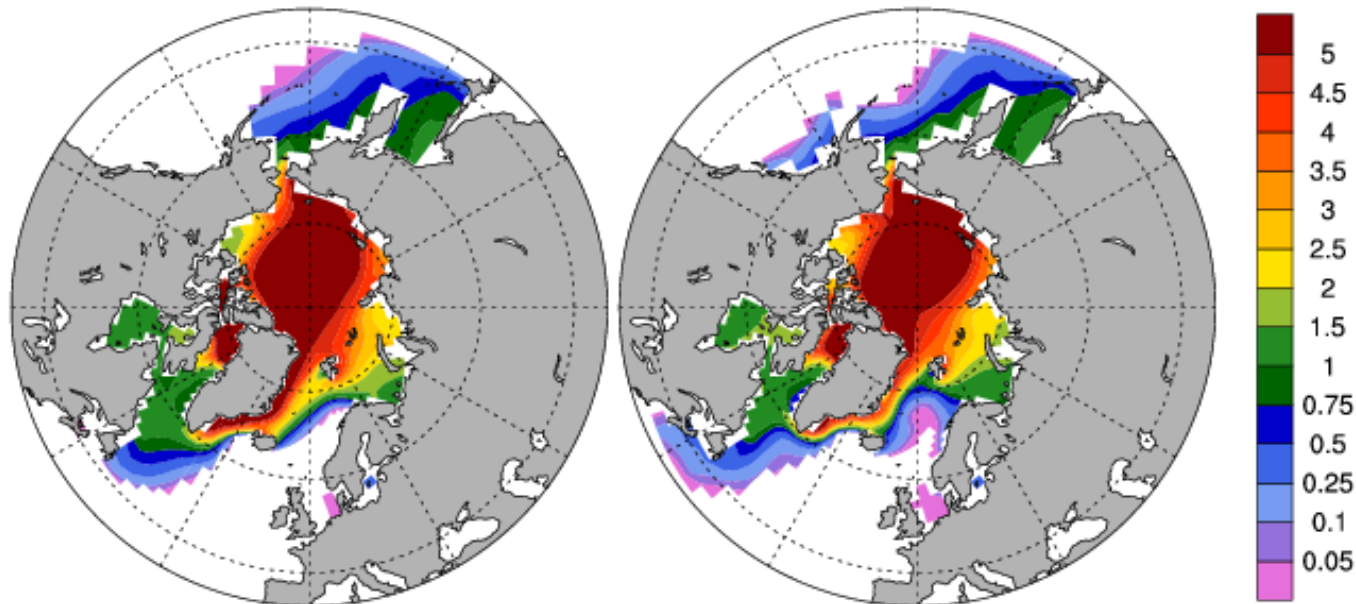


The Low Resolution CESM1 and other updates.

David Bailey, Christine Shields, and Gokhan Danabasoglu
 NCAR Earth System Laboratory



NCAR is sponsored by the National Science Foundation.

CICE in CESM1

- CESM1.0 released last week.
- CICE is essentially the same in CCSM4.0 / CESM1.0.
- Main difference is that aerosol deposition now comes from CAM/DATM.
- Also have radiative forcing diagnostics in CESM1.
- Working on resyncing with LANL version.

Why low resolution?

- The people want it (38 out of 40 scientists agree!)
- It's fast (72 years per day on 3 bluefire nodes.)
- Good for porting / testing.

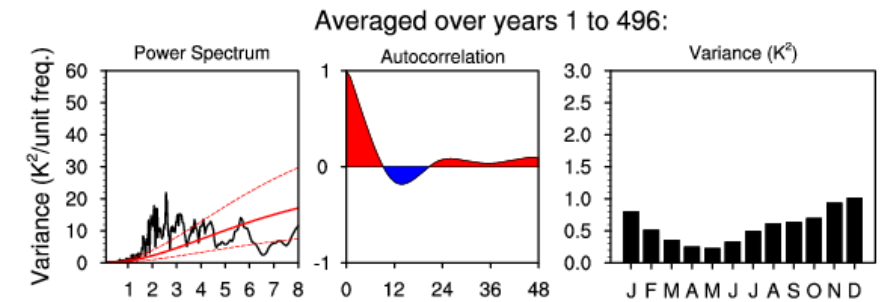
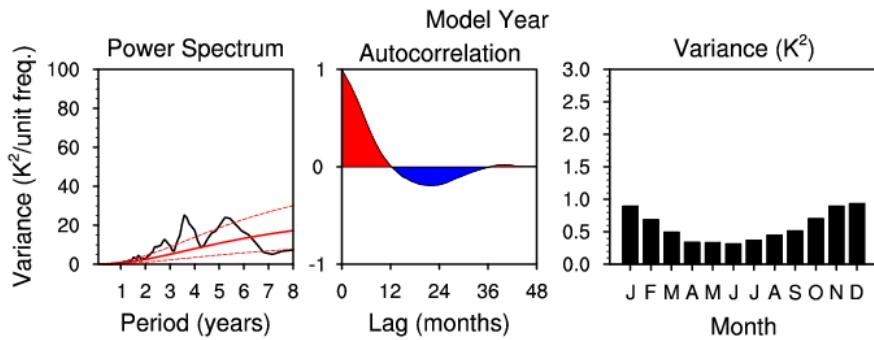
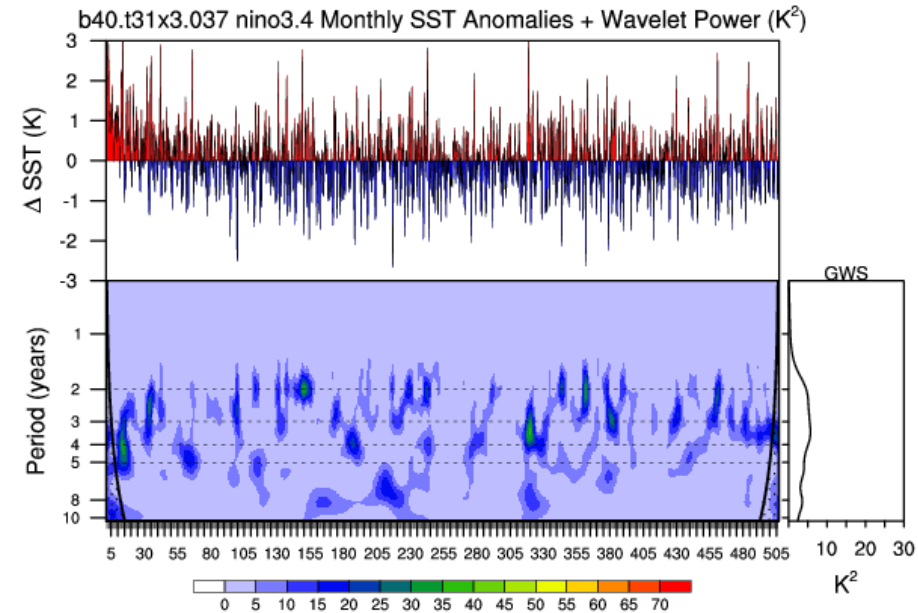
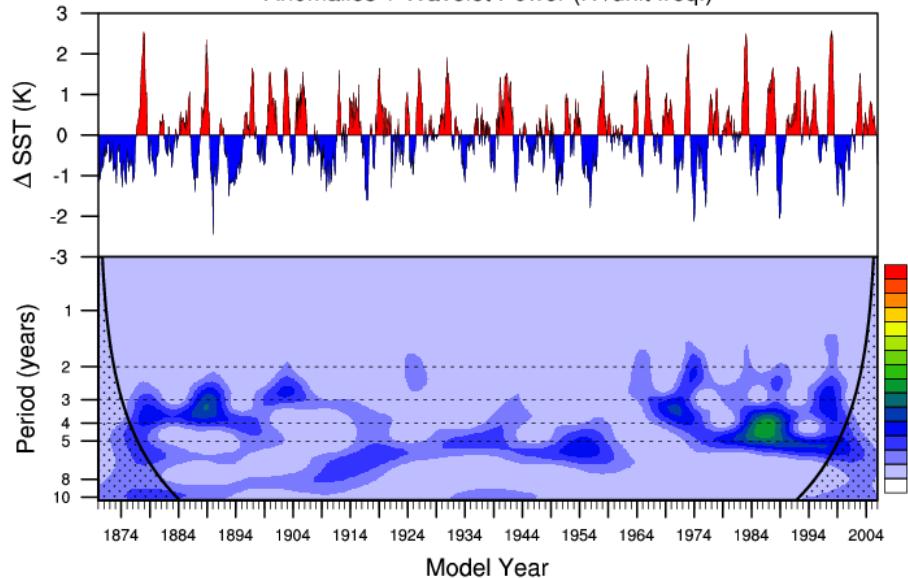
CESM1 low resolution.

- T31 – gx3v7
- Spectral dynamical core with CAM4 physics.
- Turbulent mountain stress (CAM5).
- No land ice runoff.
- Very low “snow albedos”.
- FV core low res?



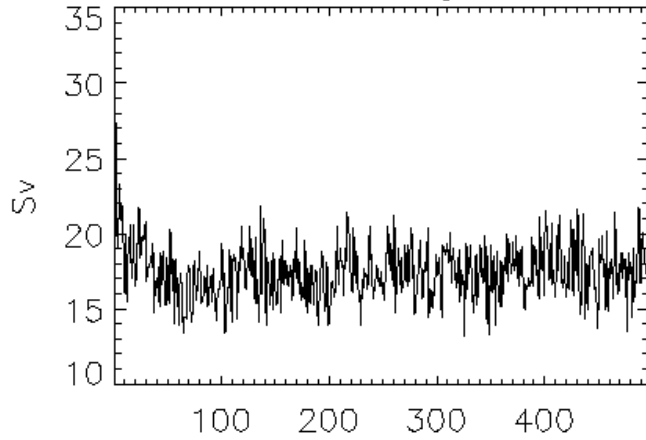
El-Niño Southern Oscillation - Better

HadiSST - nino3.4 Monthly SST Anomalies (5N-5S,170W-120W)
Anomalies + Wavelet Power (K^2 /unit freq.)

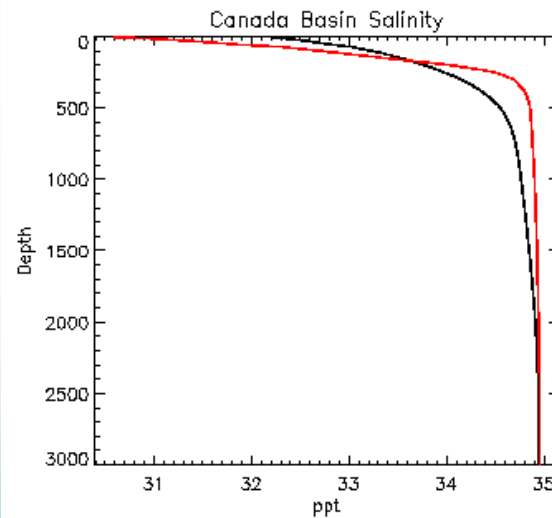
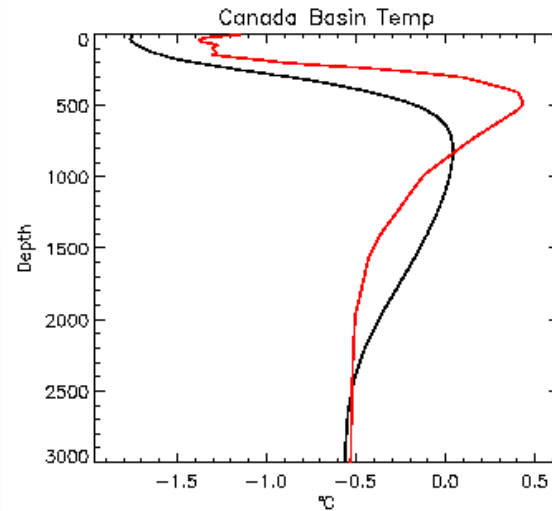
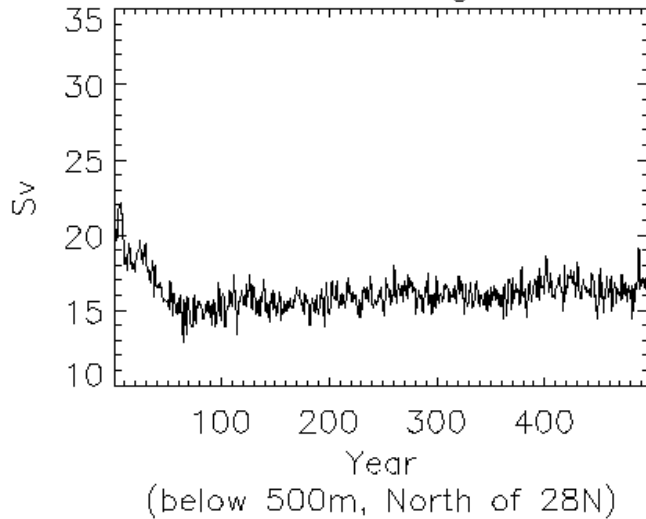


Ocean Simulation - Better

Max Global Overturning b40.t31x3.037



Max Atlantic Overturning b40.t31x3.03



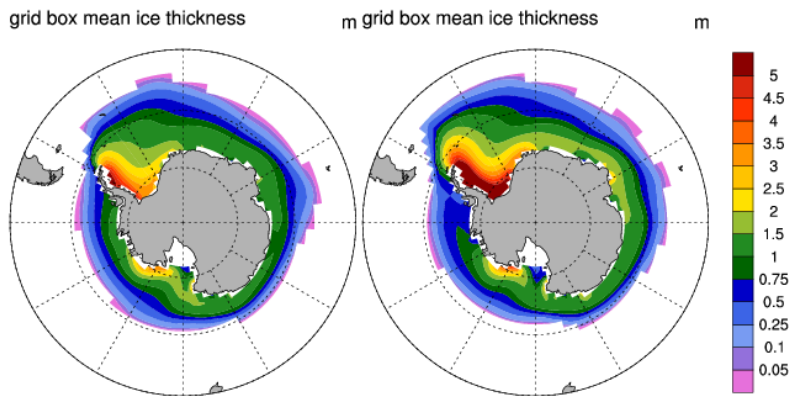
b40.t31x3.037

PHC Obs

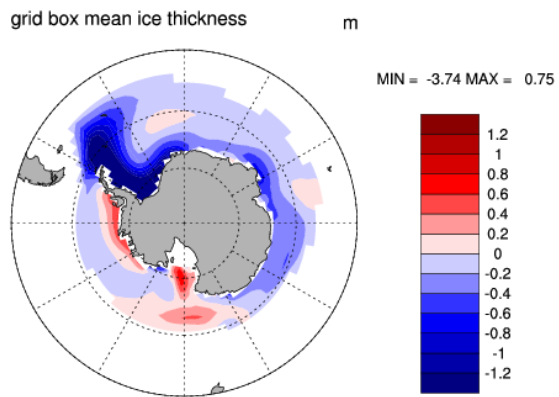
Southern Hemisphere Sea Ice - Better

JAS Mean

b40.t131x3.037 Yrs 0481 - 0500 **b30.105 Yrs 0400 - 0419**

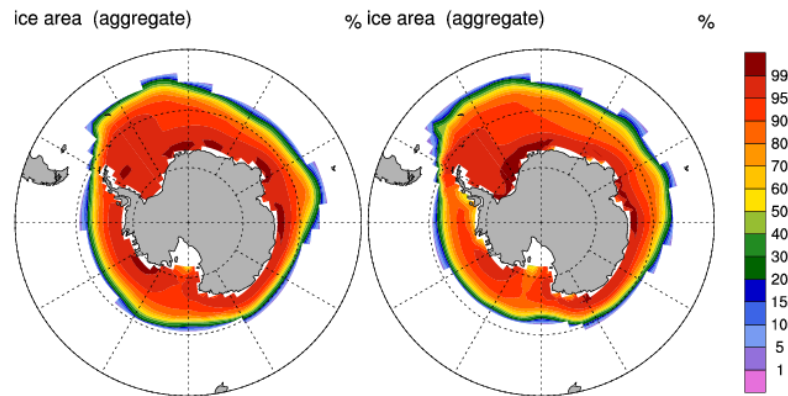


b40.t131x3.037 - b30.105

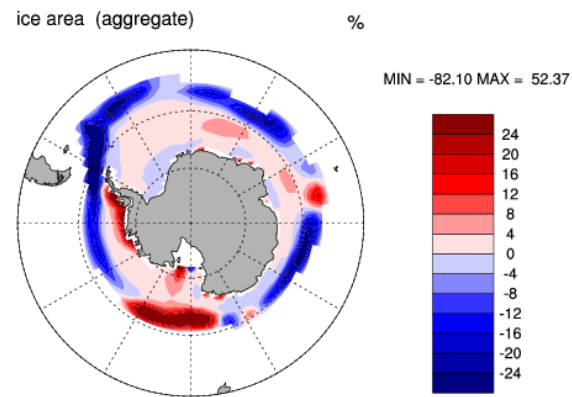


JAS Mean

b40.t131x3.037 Yrs 0481 - 0500 **b30.105 Yrs 0400 - 0419**



b40.t131x3.037 - b30.105



Arctic Atmosphere - Worse

ANN

b40.t31x3.037 (yrs 451-500)

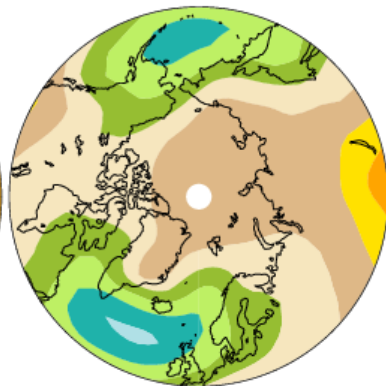
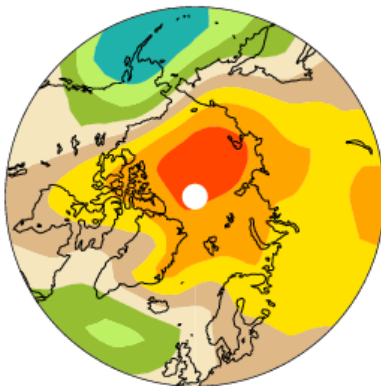
b30.105 (yrs 350-399)

Sea-level pressure

millibars

Sea-level pressure

millibars



MEAN= 1016.58 Min= 1003.00 Max= 1025.92

MEAN= 1012.64 Min= 1002.25 Max= 1022.28

991 997 1003 1009 1015 1021 1027 1033

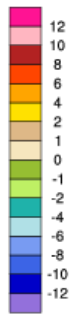
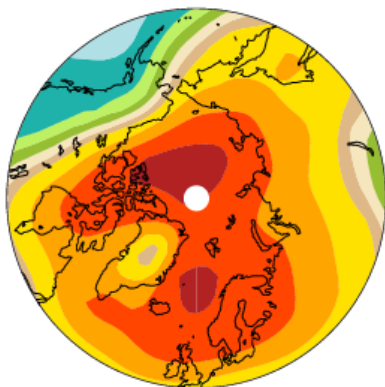
991 997 1003 1009 1015 1021 1027 1033

b40.t31x3.037 - b30.105

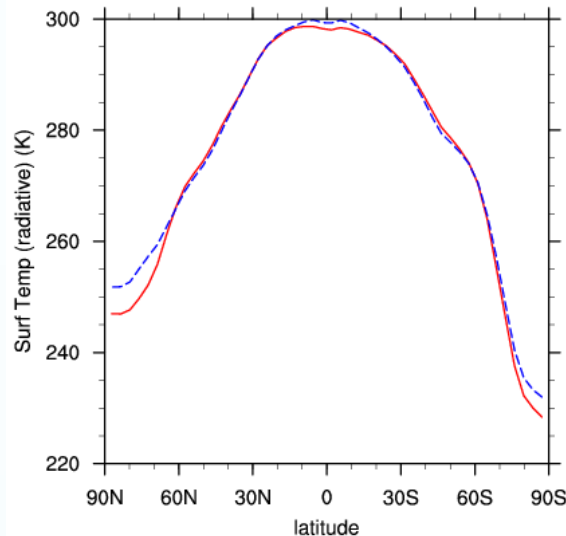
Sea-level pressure

millibars

MIN = -5.45 MAX = 8.65

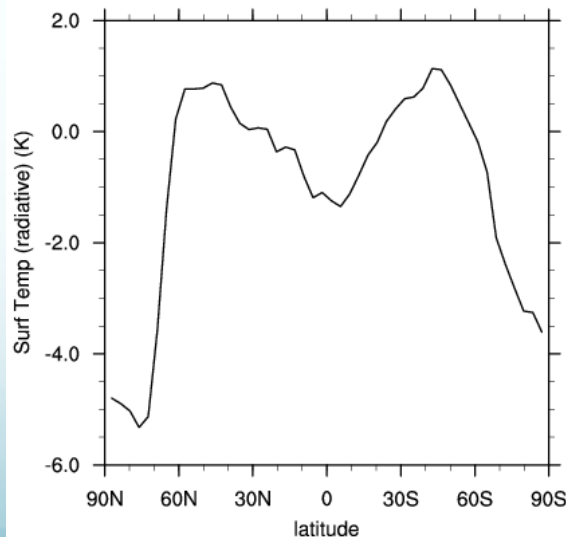


ANN



--- b30.105
— b40.t31x3.037

b40.t31x3.037 - b30.105



Northern Hemisphere Sea Ice – Meh?

JFM Mean

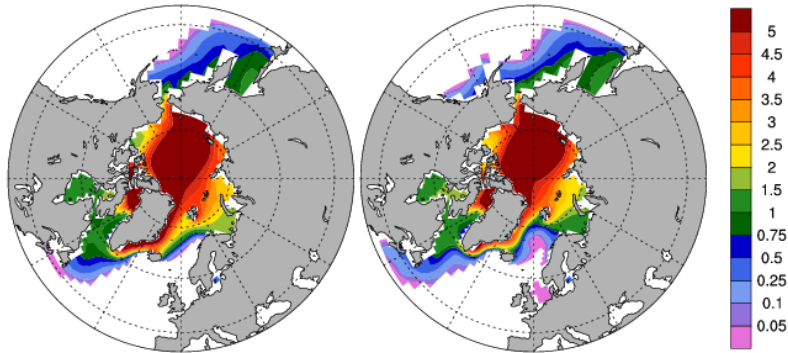
b40.t31x3.037 Yrs 0481 - 0500

b30.105 Yrs 0400 - 0419

grid box mean ice thickness

m grid box mean ice thickness

m



JFM Mean

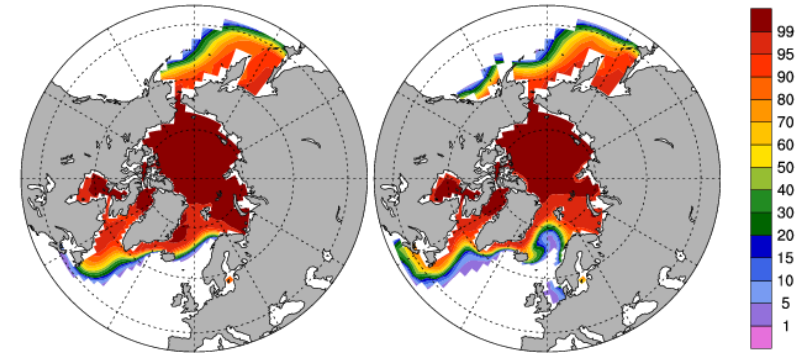
b40.t31x3.037 Yrs 0481 - 0500

b30.105 Yrs 0400 - 0419

ice area (aggregate)

% ice area (aggregate)

%

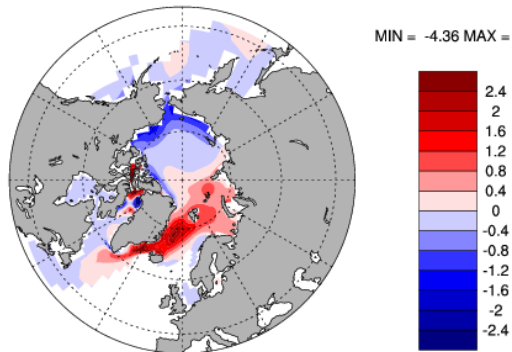


b40.t31x3.037 - b30.105

grid box mean ice thickness

m

MIN = -4.36 MAX = 8.95

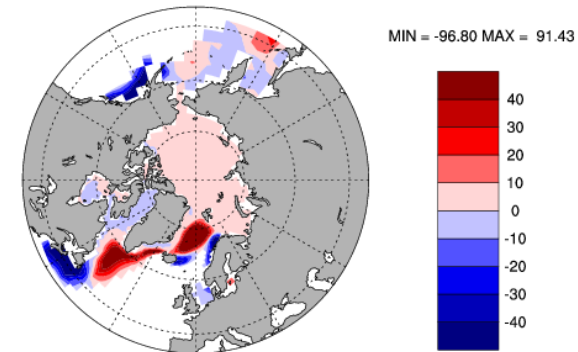


b40.t31x3.037 - b30.105

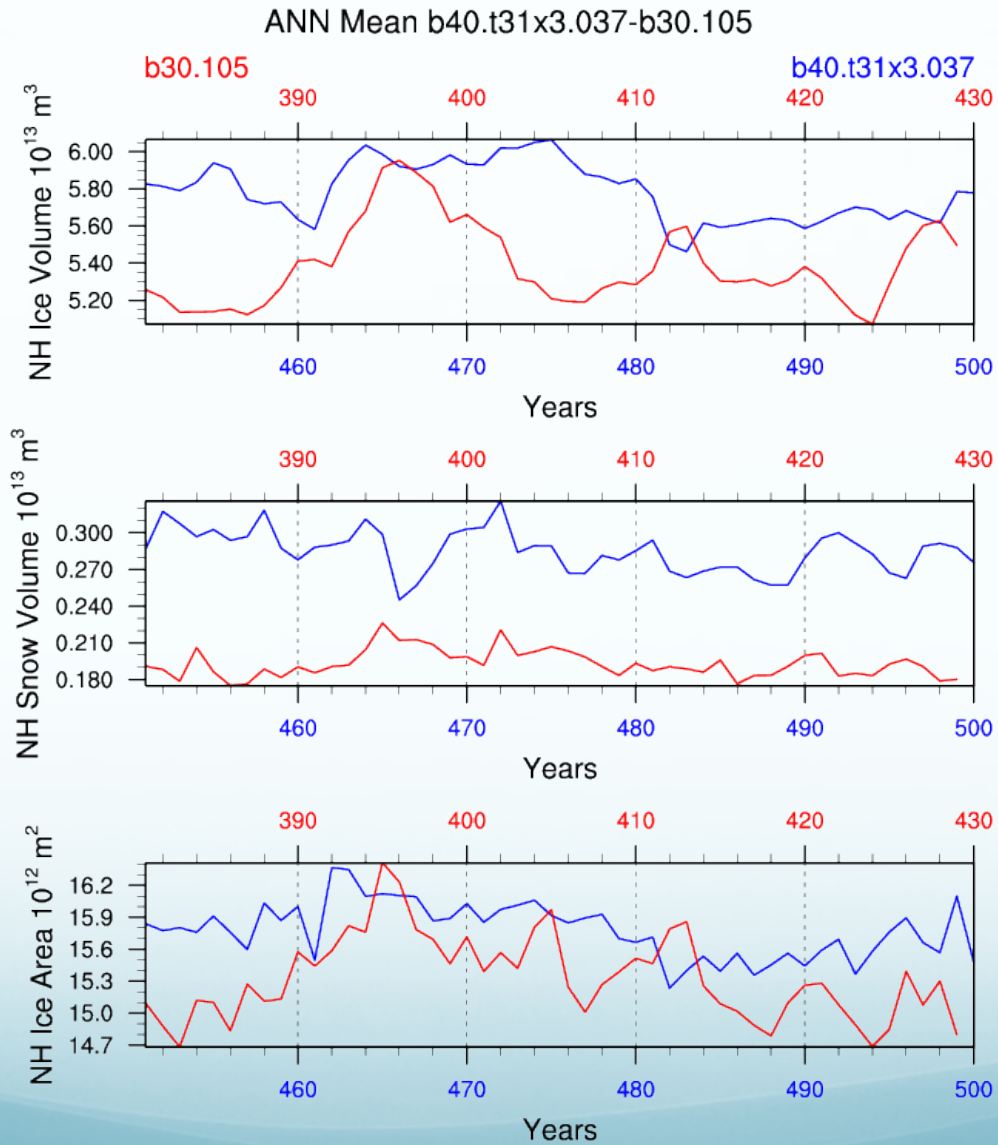
ice area (aggregate)

%

MIN = -96.80 MAX = 91.43



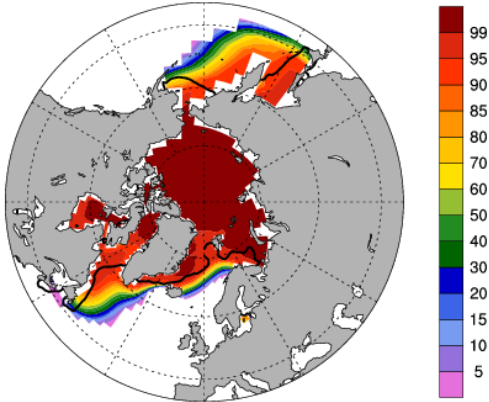
Northern Hemisphere Sea Ice – Meh?



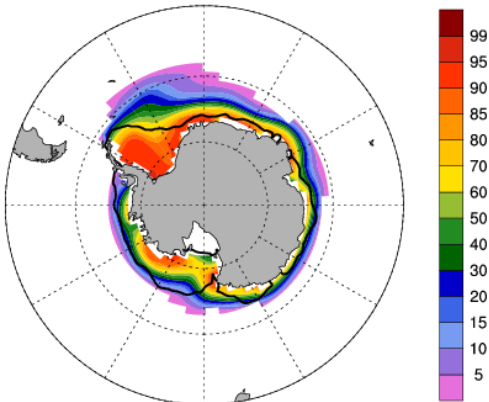
Sea Ice – T31x3 vs FV2 x 1

Case b40.t31x3.037
JFM Mean Years 0451-0500

ice area (aggregate) %

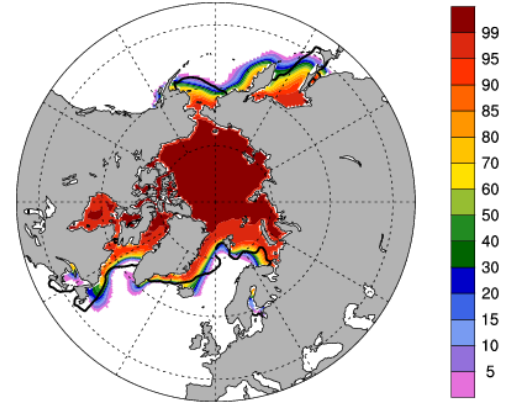


ice area (aggregate) %

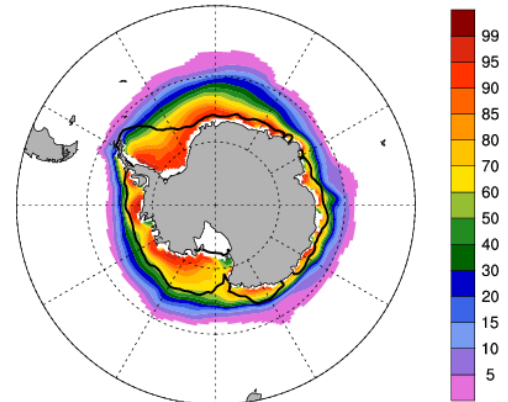


Case b40.1850.track1.2deg.003
JFM Mean Years 0629-0648

ice area (aggregate) %



ice area (aggregate) %



Summary

- Low resolution CESM1 will be available soon with 500+ year control run.
- Most characteristics are as good or better than CCSM3.
- NH too cold, leading to thick and too extensive sea ice despite unrealistically low albedos (TMS bad).
- SH sea ice is actually better (TMS good).
- Best overall simulation. Left to the community to adjust as needed (TMS, albedos, etc.)