

Coordinated Ocean-ice Reference Experiments (CORE) Interannually Varying Air-Sea Flux Data Sets

Large and Yeager (2009, *Climate Dynamics*, v33, 341-364)

Data set covers the 1948-2007 period. However, it is truly interannual starting in 1984.

W. G. Large, S. G. Yeager: Global climatology of an interannually varying air-sea flux data set

345

Table 1 Characteristics of datasets used for computing the CORE.v2 fluxes and for determining objective adjustments to forcing data

Variables	Source	Frequency	Duration	Resolution	Coverage	Basis
SST	Hadley-OI	Monthly	1871–2007 ^a	1°	Global	Satellite
Atmospheric State	NCEP	6 hourly	1948–2006 ^a	T62	Global	NWP
Radiation	ISCCP-FD	Daily	1984–2006 ^a	2.5°	Global	Satellite
Precipitation	GPCP	Monthly	1979–2006 ^a	2.5°	Global	Satellite
Precipitation	CMAP	Monthly	1979–2006 ^a	2.5°	Global	Blend
Precipitation	S-H-Y	Monthly	Climatology	0.5°	50°N–90°N	In situ
Ice fraction	NSIDC	Daily	10/79–2006 ^a	25 km	Global	Satellite
All	NOC	Monthly	1980–1995	1°	Global	Ships
All	TAO	Daily	1995–2004 ^a	2°–20°	Pacific	Buoys
Most	PIRATA	Daily	1998–2004 ^a	2°–20°	Atlantic	Buoys
Vector winds	QSCAT	6 hourly	1999–2004 ^a	0.5°	Global	Satellite
Air temperature	POLES	12 hourly	1979–2003	100 km	60°N–90°N	In situ
Precipitation	MSU	Monthly	1979–1993	2.5°	55°S–55°N	Satellite

^a Ongoing production of the dataset is expected beyond these durations

<http://data1.gfdl.noaa.gov/nomads/forms/mom4.html>

CORE UPDATES SINCE MAY 2009

Data sets have been extended to the end of 2007.

River runoff:

- The original (released) runoff data were based on the 19 continental drainage basin approach described in Large and Yeager (2004, NCAR Tech. Note).

- Monthly-mean climatological runoff data have been made available in August 2010*. The data are based on Dai et al. (2009, J. Climate, v22, 2773-2791). The climatology is based on the 1948-2004 average. **Note that we added continental runoff from Antarctica.**

- Interannually varying runoff data for the period 1948-2004 are available. Unfortunately, Dai et al. do not wish to keep the runoff data up-to-date.

Hindcast simulations forced with the CORE interannually varying data sets are used to

- study Atlantic Meridional Overturning Circulation (AMOC) variability and related mechanisms,
- initialize decadal prediction simulations as they provide a consistent ocean - sea-ice initial condition set,
- answer other scientific questions....

CORE-2 INTERANNUAL FORCED SIMULATIONS WITH CCSM4

Set I: Ocean only,

Set II: Ocean - ice coupled

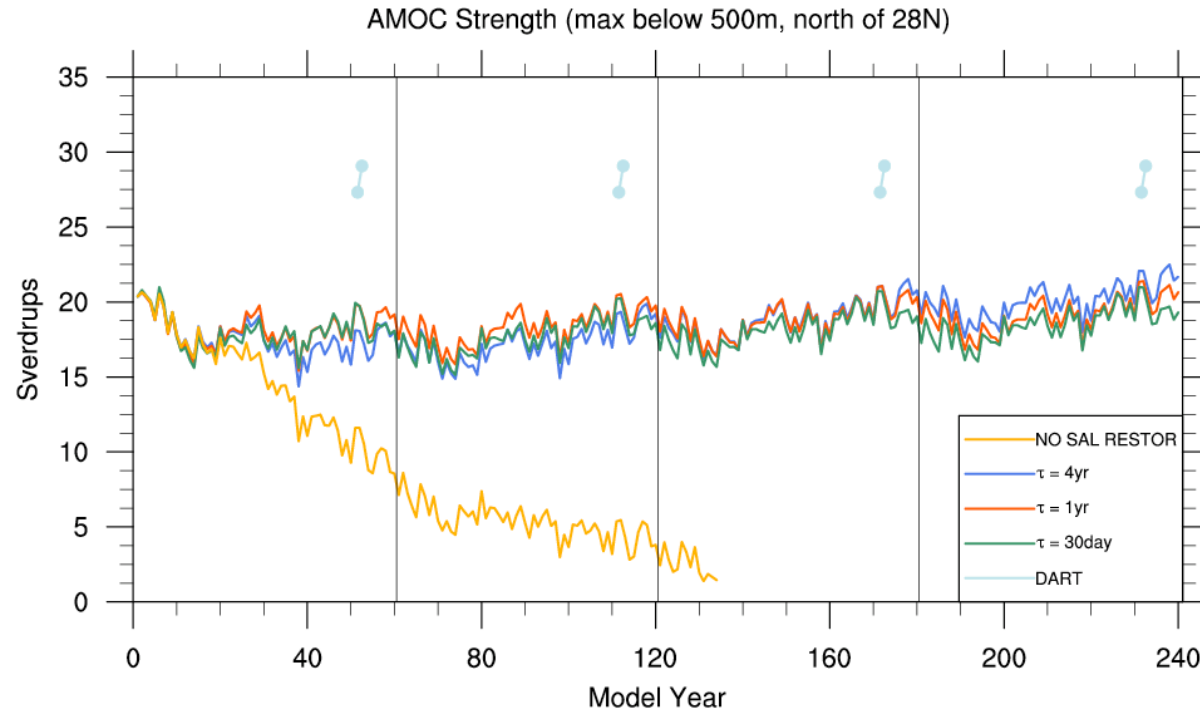
In each set, 4 different salinity restoring time scales are used:

- 1 month,
- 1 year,
- 4 years,
- infinity, i.e., no restoring

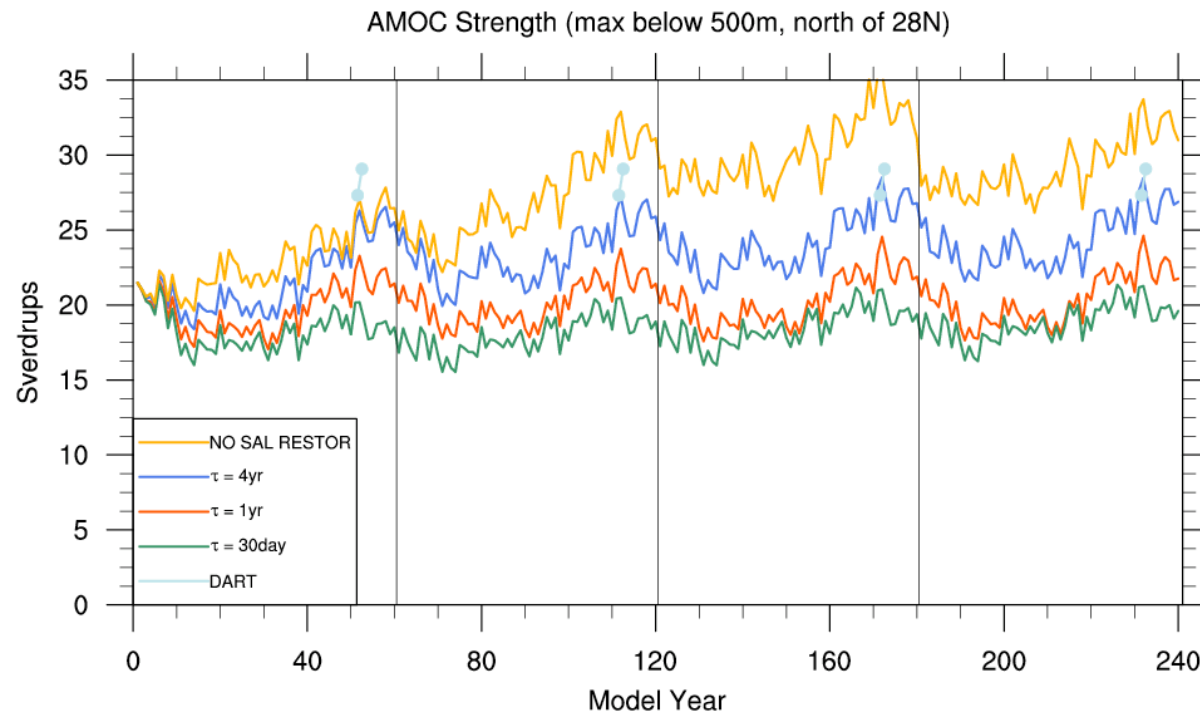
Cases are integrated for 240 years each, corresponding to 4 cycles of 1948-2007 forcing data.

Global-mean of salinity restoring fluxes is zero.

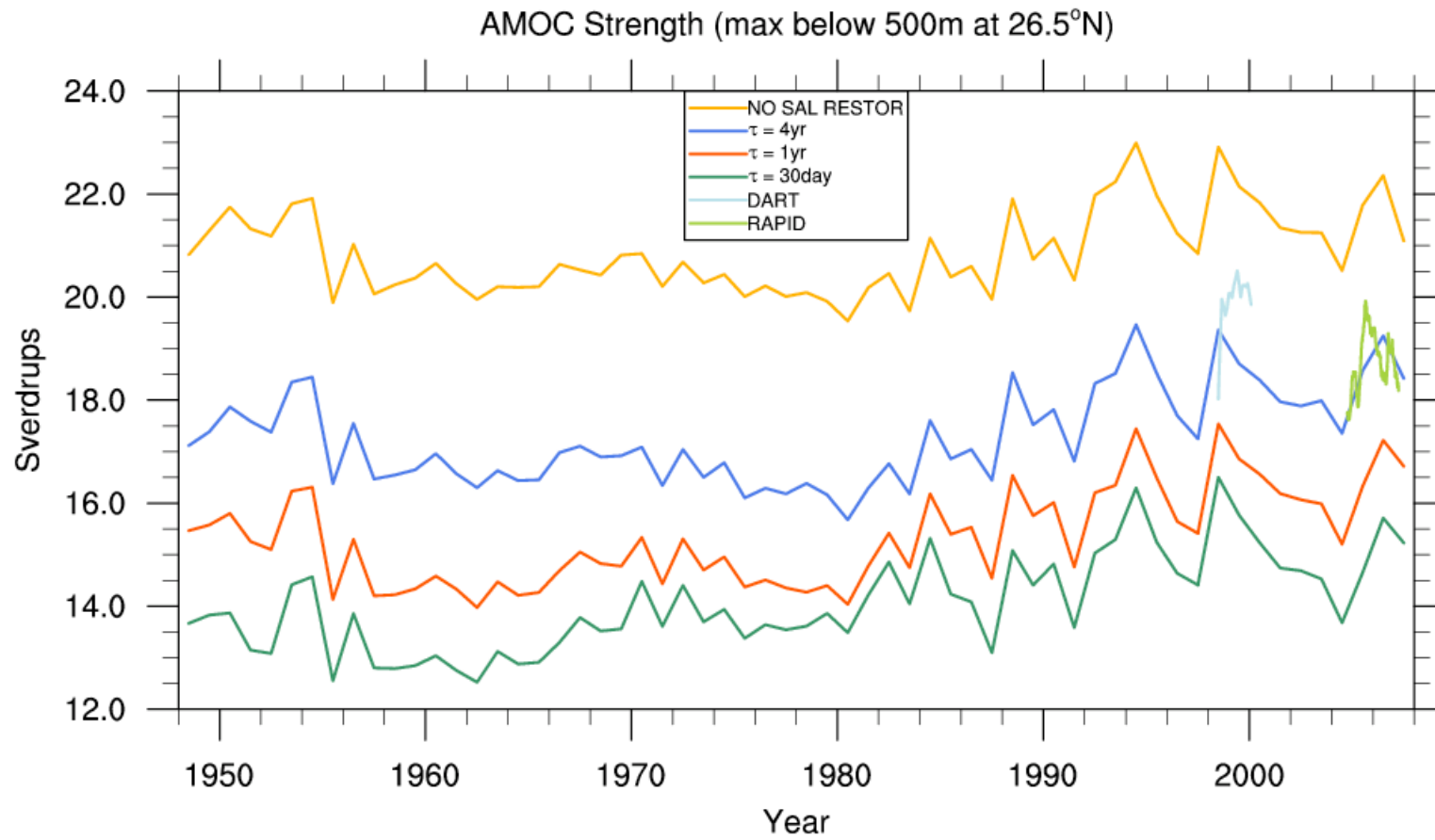
Ocean-only



Ocean-ice coupled



Ocean - ice coupled



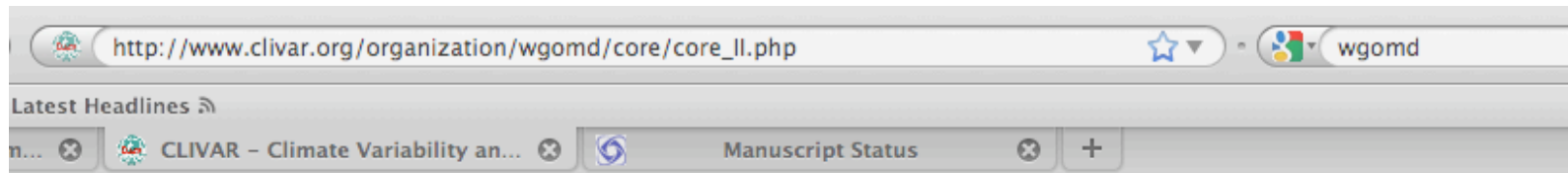
AMOC Properties in Ocean - Ice Hindcast Simulations

AMOC maximum north of 28°N

Case	Mean (Sv)	Std Dev (Sv)	1960-2000 Trend
No restoring	30.2	2.2	1.5
4 years	24.2	1.9	1.2
1 year	20.3	1.7	1.2
1 month	18.5	1.2	0.9

AMOC maximum at 26.5°N

Case	Mean (Sv)	Std Dev (Sv)	1960-2000 Trend
No restoring	21.2	1.1	0.7
4 years	17.0	1.0	0.6
1 year	15.2	0.92	0.6
1 month	13.8	0.95	0.6



[Co-ordinated Ocean-Ice Reference Experiments](#)

CORE I

CORE II

CORE III

CORE IAF.v2 Air Sea Flux Data Set

Version 2 of the Coordinated Ocean-ice Reference Experiments (CORE) datasets used for forcing global ocean-ice models has been released. The interannually varying forcing (CORE IAF.v2) now extends from 1948-2007. Note that the CORE V2 [release notes](#) also give some new recommendations for the experimental protocol for the interannual forced CORE-II simulations. The data is available for download from the [GDFL server](#), and is documented in:

Large, W.G. and S.G. Yeager, 2008: The Global Climatology of an Interannually Varying Air Sea Flux Data Set, *Climate Dynamics*, DOI 10.1007/s00382-008-0441-3, 24pp.

Access CORE II simulations

Two sets of experiments have been archived by NCAR on the Earth System Grid (ESG) for anyone interested to look at and analyze. These experiments have been conducted using the nominal 1 degree horizontal resolution version of the CCSM4 ocean model. Both are forced with the CORE v2 IAF data sets (Large and Yeager, 2008). One is with an active sea-ice model and the other has a data ice model. Currently, the data is from the fourth (last) forcing cycle, but if there is any interest, the other cycles can be provided as well.

Contact [Steve Yeager](#) for further information.

[CCSM POP run c.b27.01:](#)

Ocean-only 4-year restoring

1948-2007 CORE2 ocean-only hindcast with nominal 1 degree resolution. Initialized from a state of rest and Levitus T/S. Model years 181-240 correspond to the fourth cycle of 60-year (1948-2007) forcing. Atmospheric state variables are based on the CORE-II protocol. Daily sea ice fraction is prescribed from NSIDC bootstrapv2 satellite data. Monthly climatological river runoff is based on Dai and Trenberth (2002) discharge estimates. A weak salinity restoring (50m/4year) flux is applied globally after subtraction of global mean.

[CCSM POP run g.b29.01:](#)

Ocean-ice coupled 4-year restoring

1948-2007 CORE2 ocean-ice hindcast with nominal 1 degree resolution. Initialized from a state of rest and Levitus T/S. Model years 181-240 correspond to the fourth cycle of 60-year (1948-2007) forcing. Atmospheric state variables are based on the CORE-II protocol. A freely-evolving dynamic/thermodynamic sea ice model is used (CICE). Monthly climatological river runoff is based on Dai and Trenberth (2002) discharge estimates. A weak salinity restoring (50m/4year) flux is applied globally after subtraction of global mean.

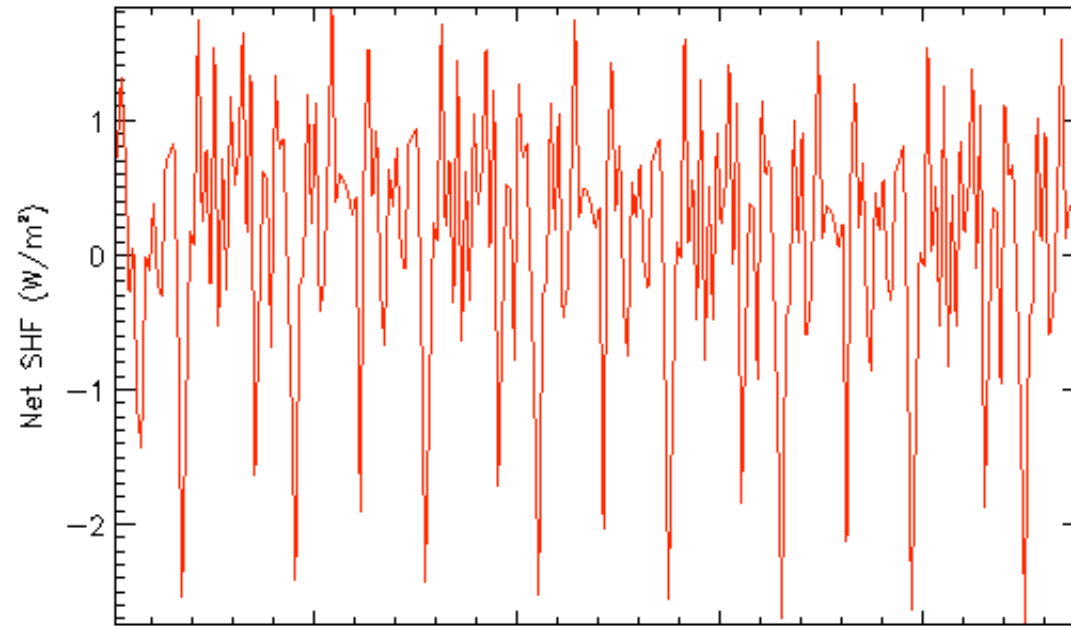
To access the data from the Earth System Grid archive:

Access requires membership (after registration to the ESG generally) of the group "CCSM4POP". Please follow the ESG-directed instructions.

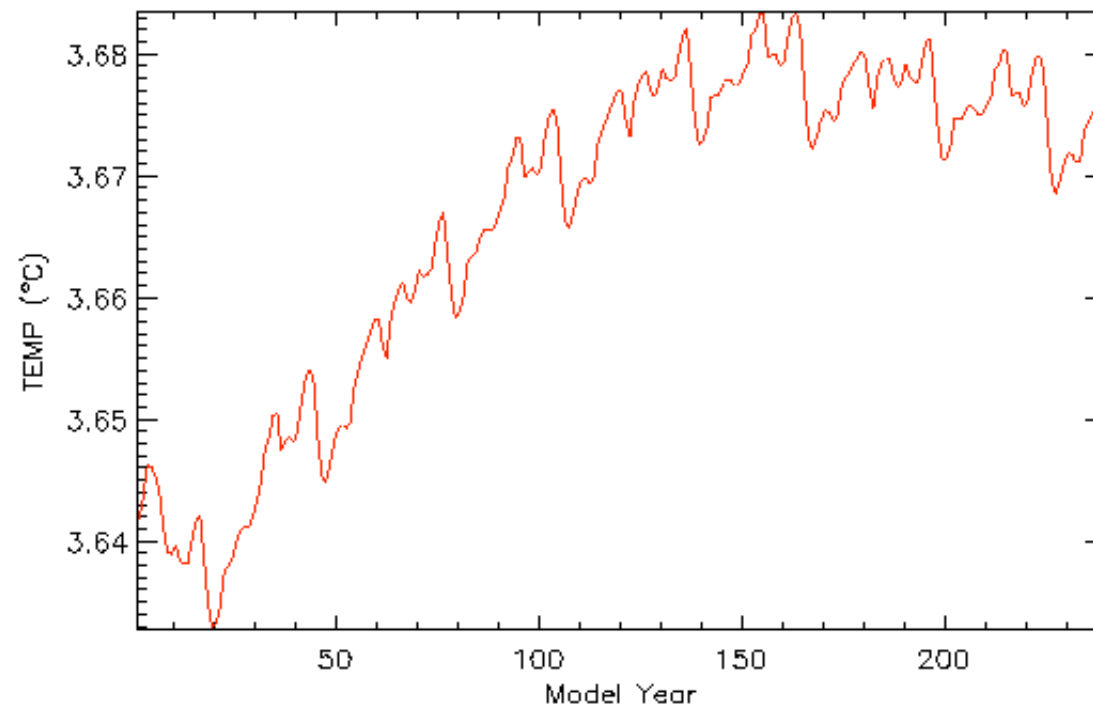
[CCSM POP run c.b27.01](#)
[CCSM POP run g.b29.01](#)

35 registered users (08/2010)

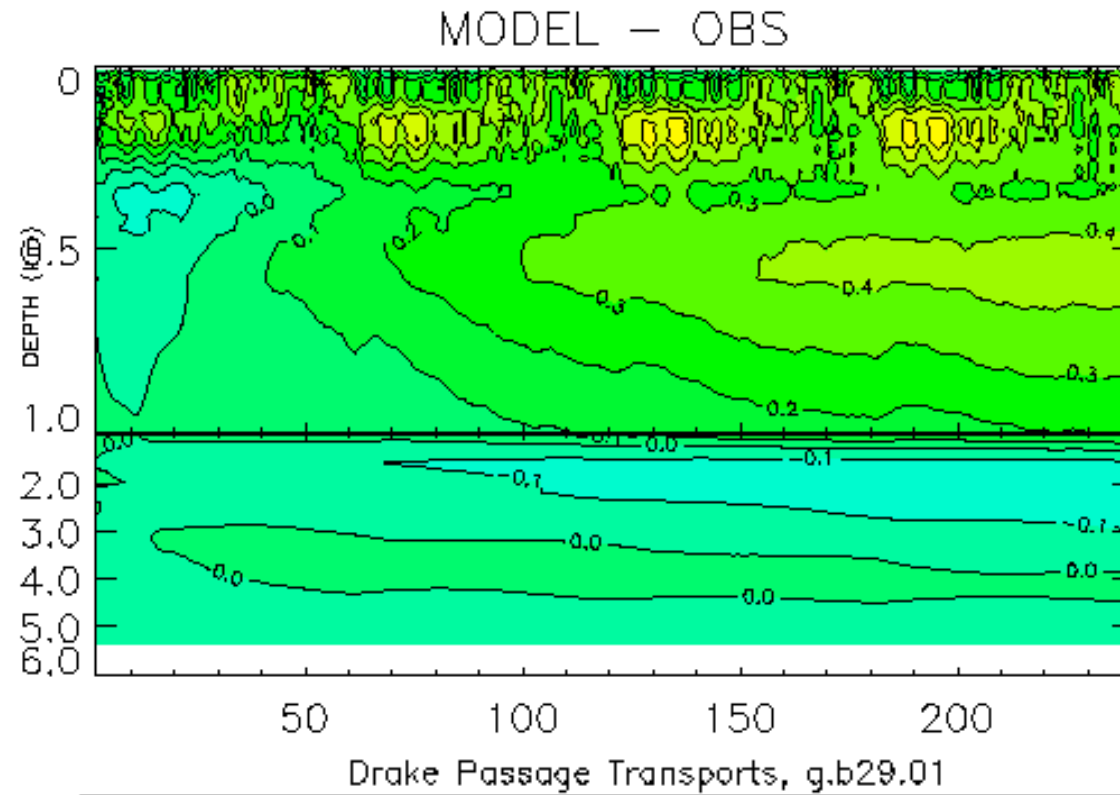
Annual- and
global-mean
net surface
heat flux



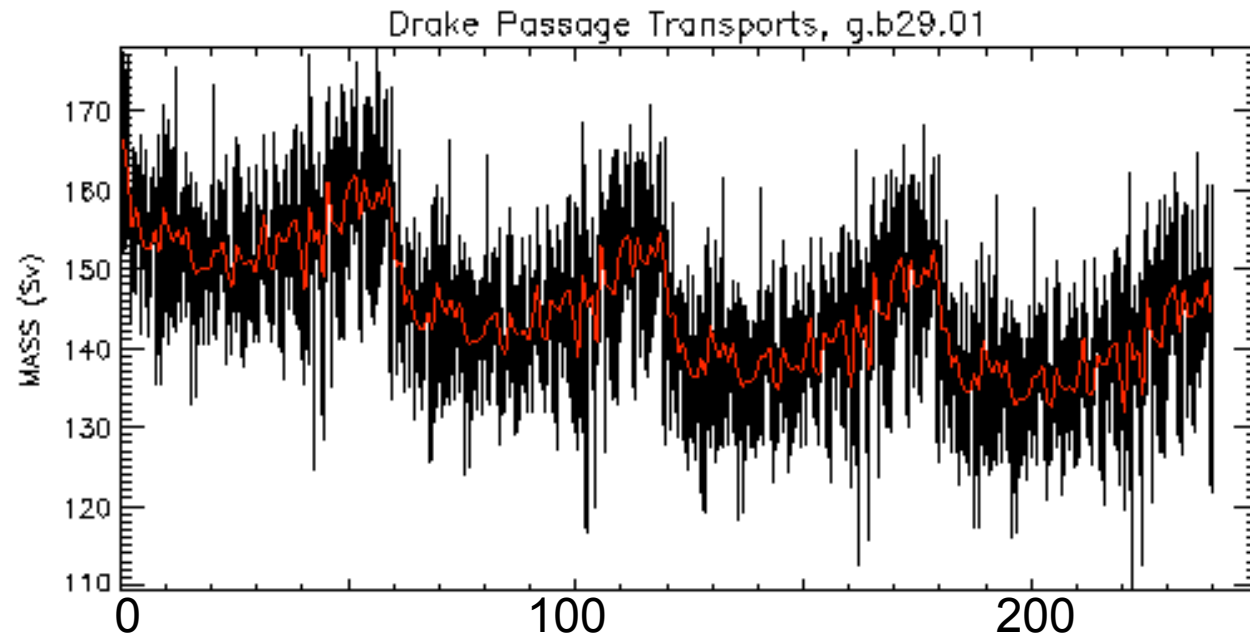
Annual- and
global-mean
temperature



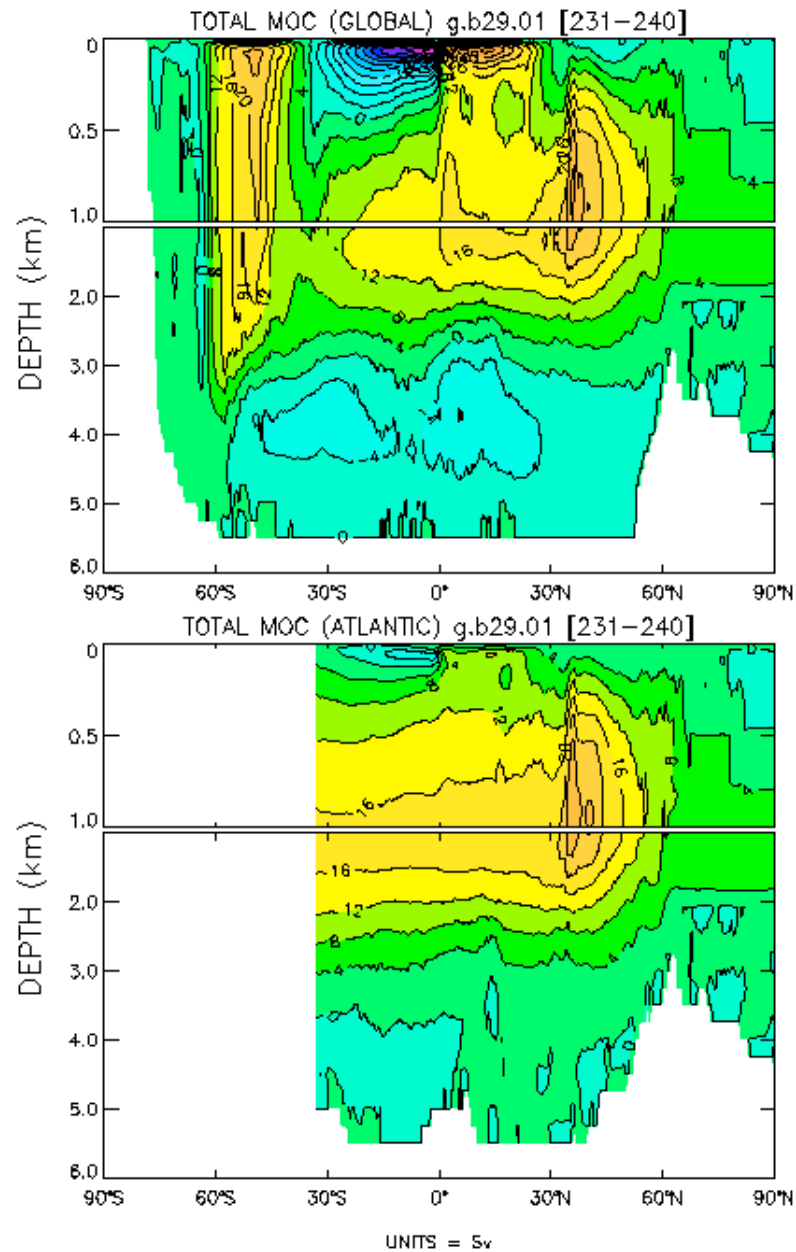
Annual-mean
temperature
profile time
series (°C)



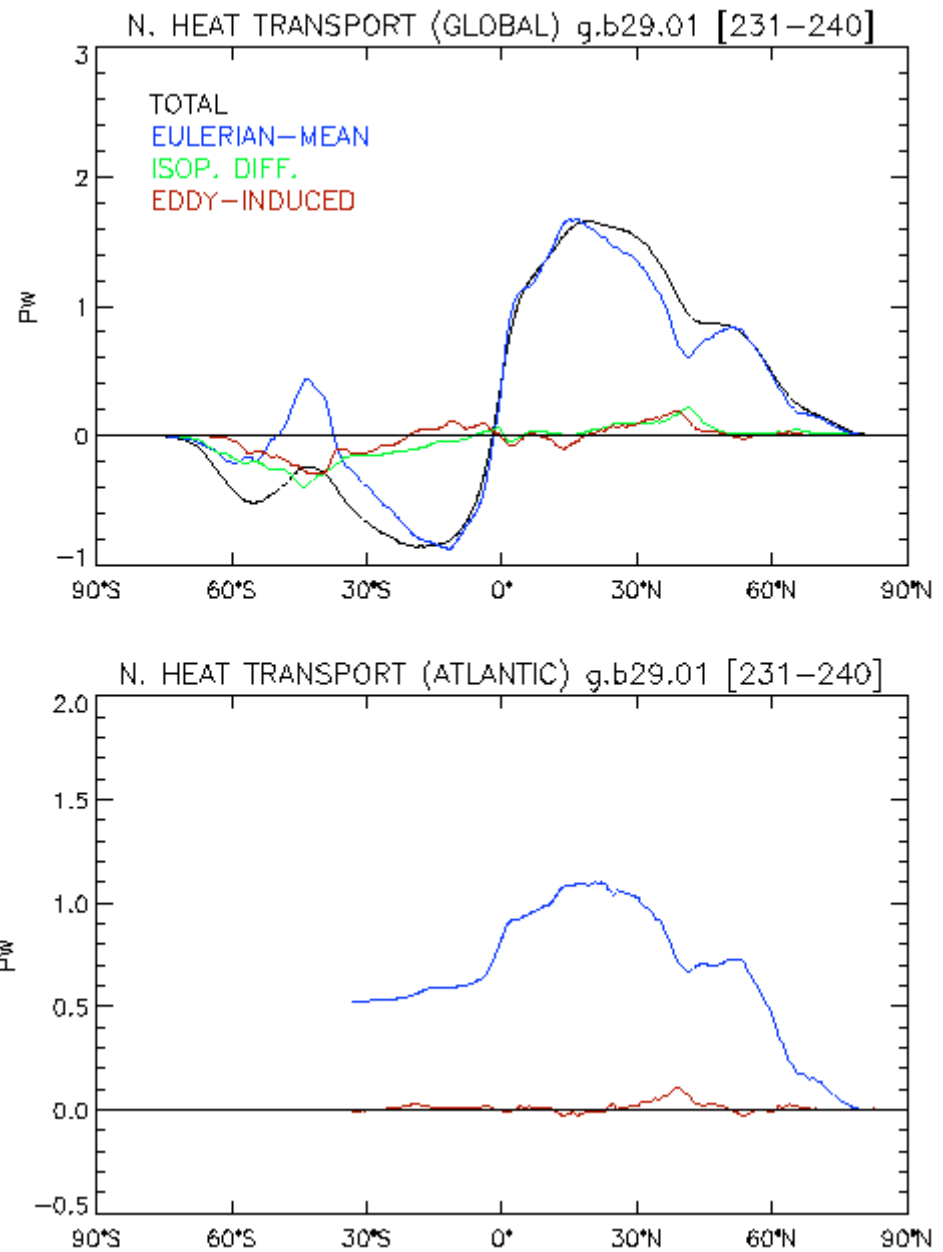
Drake Passage
transport time
series



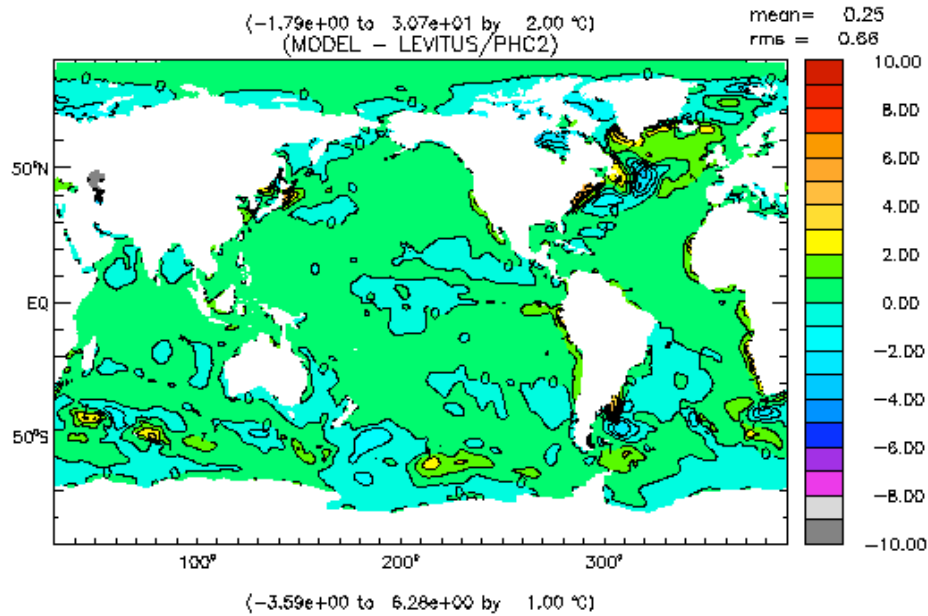
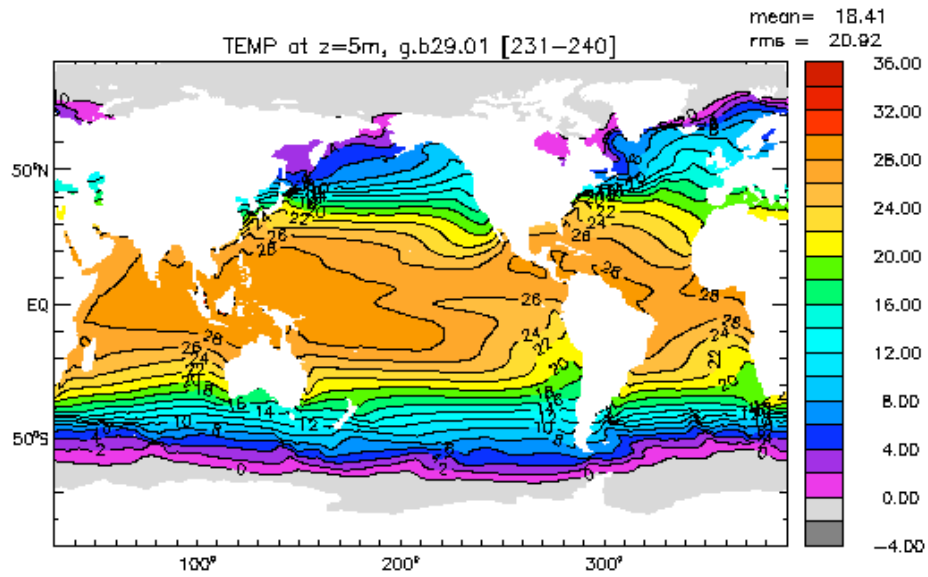
Meridional overturning circulation



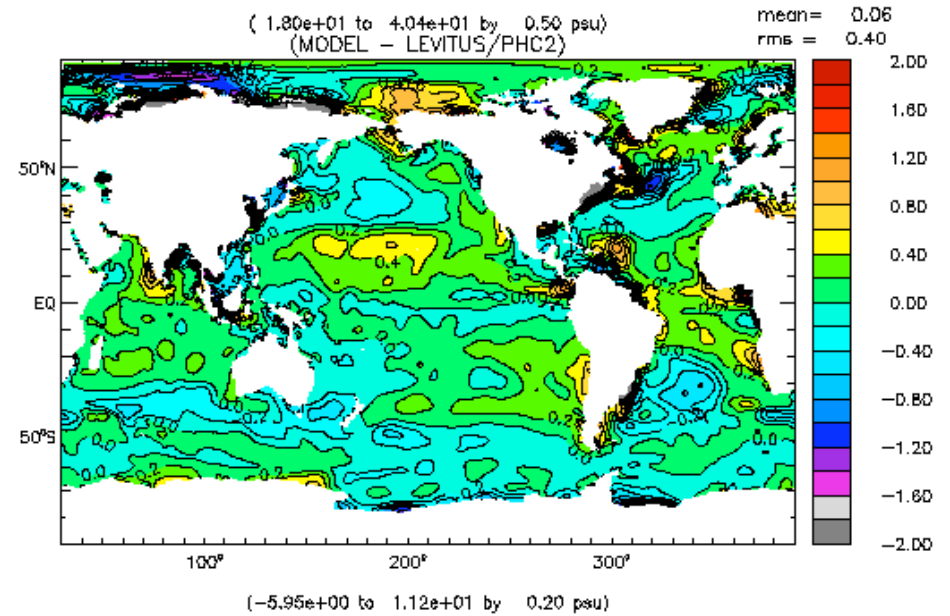
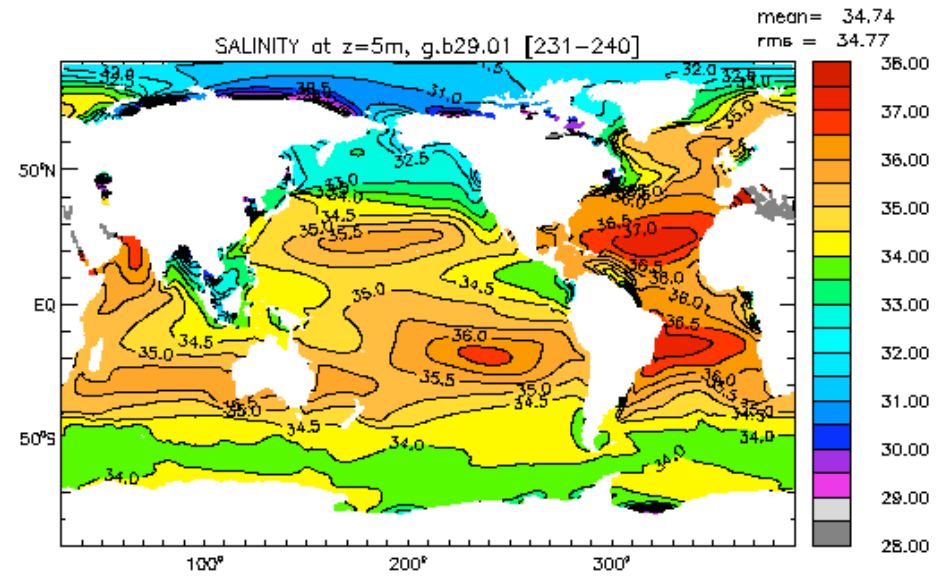
Northward heat transport



Surface temperature



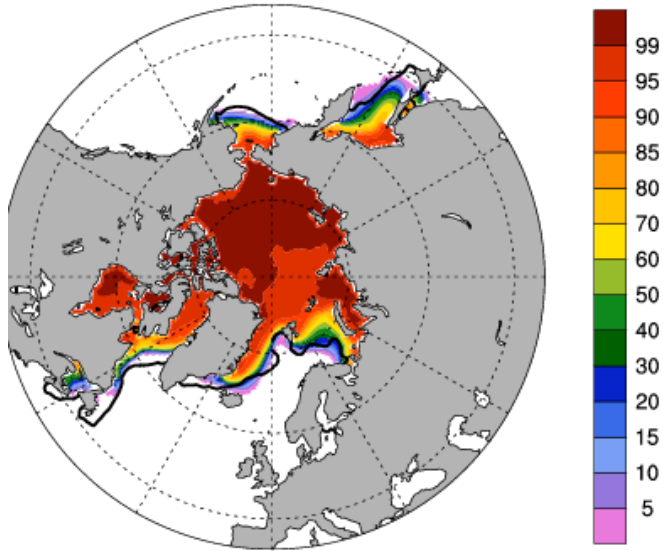
Surface salinity



JFM Mean Years 0231-0240

ice area (aggregate)

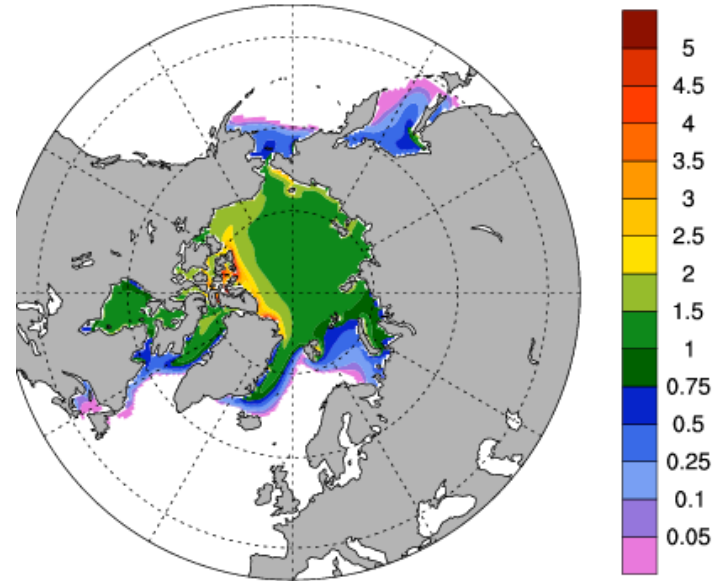
%



JFM Mean Years 0231-0240

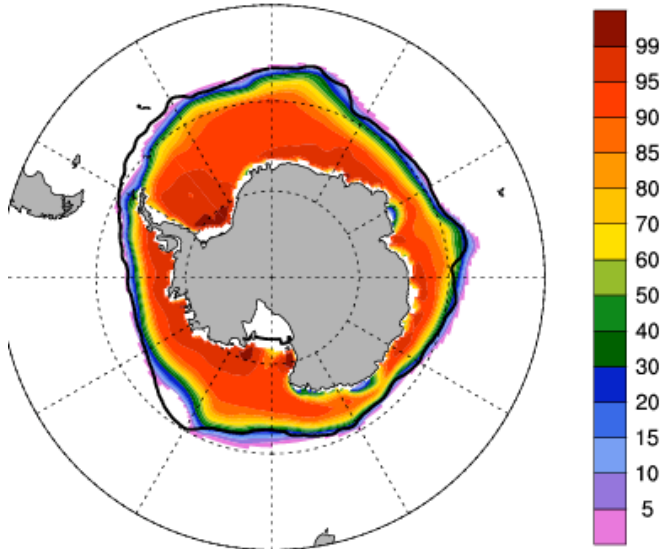
grid cell mean ice thickness

m



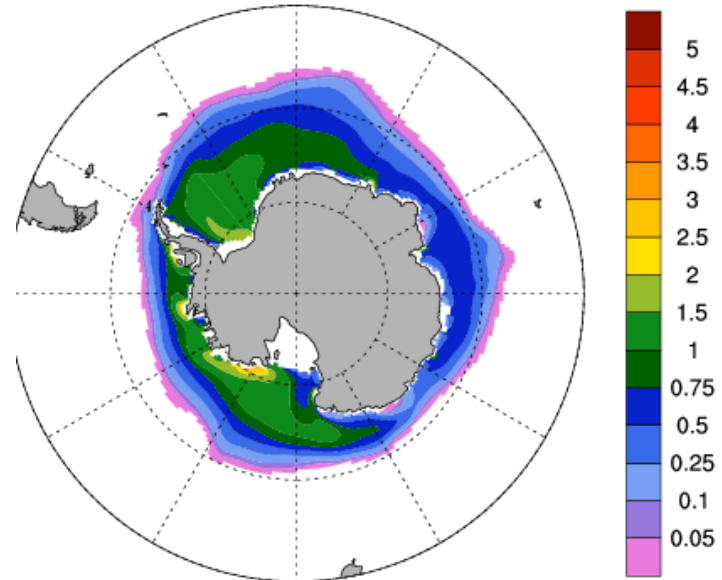
ice area (aggregate)

%



grid cell mean ice thickness

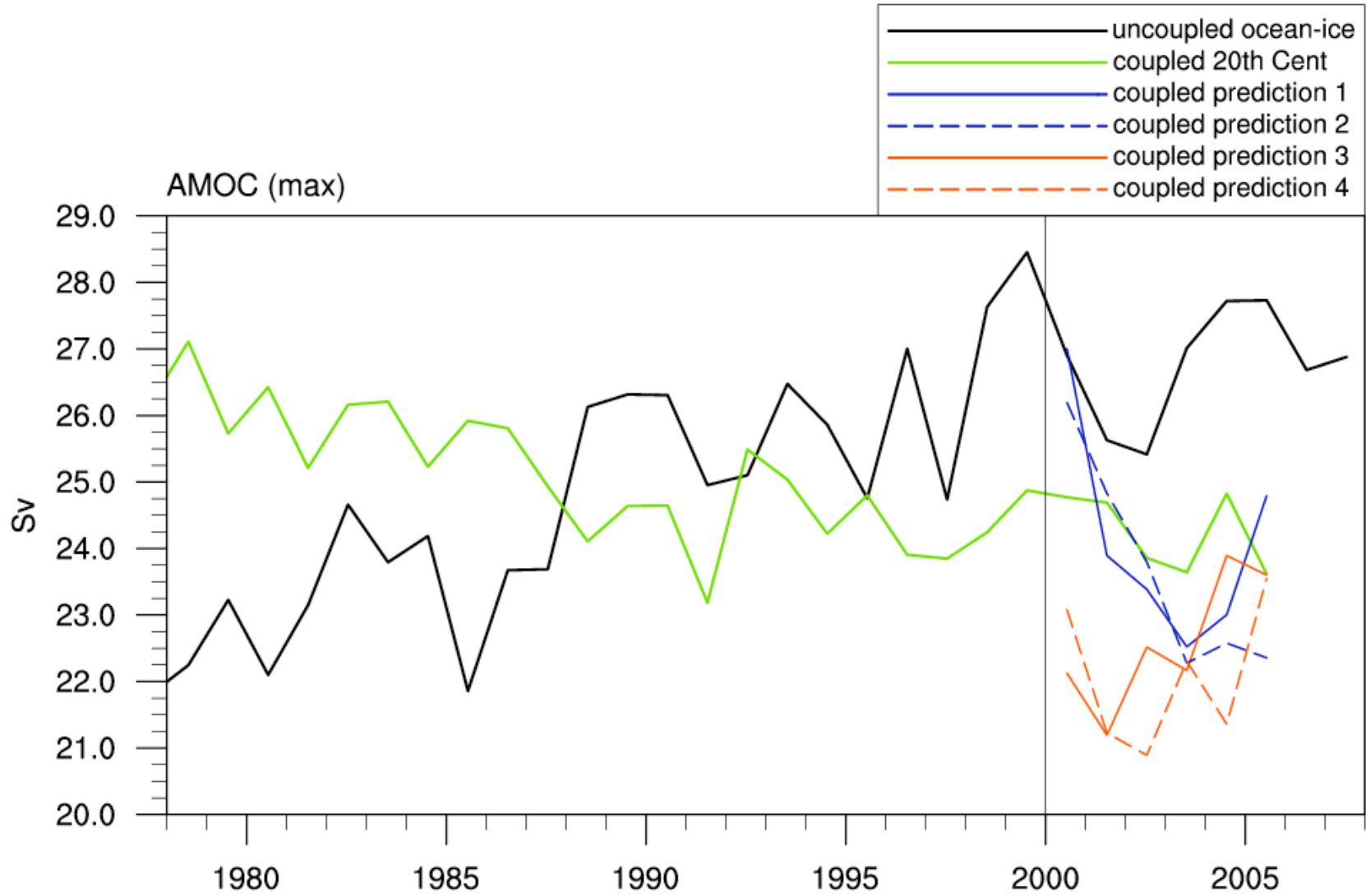
m



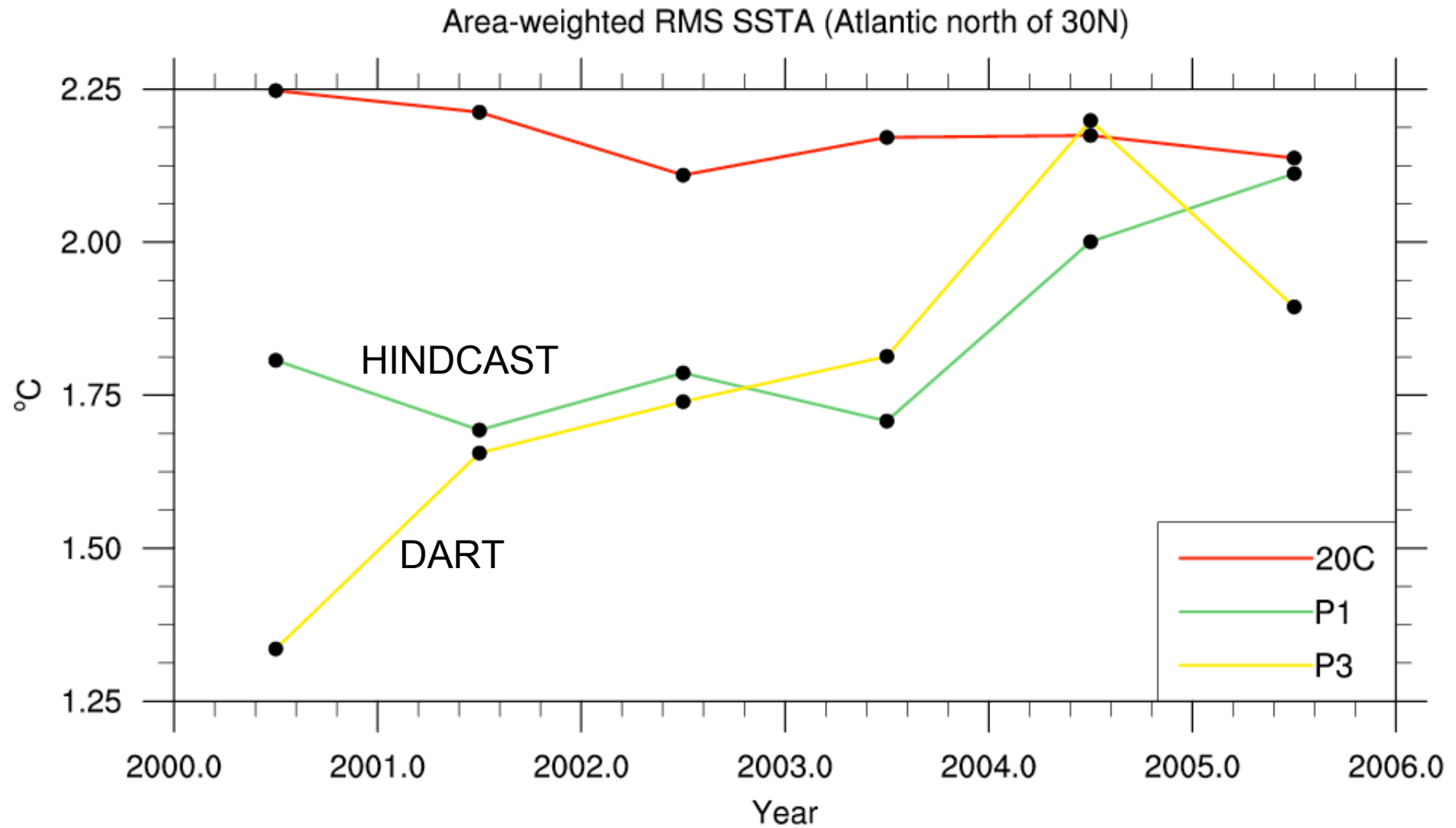
JAS Mean

JAS Mean

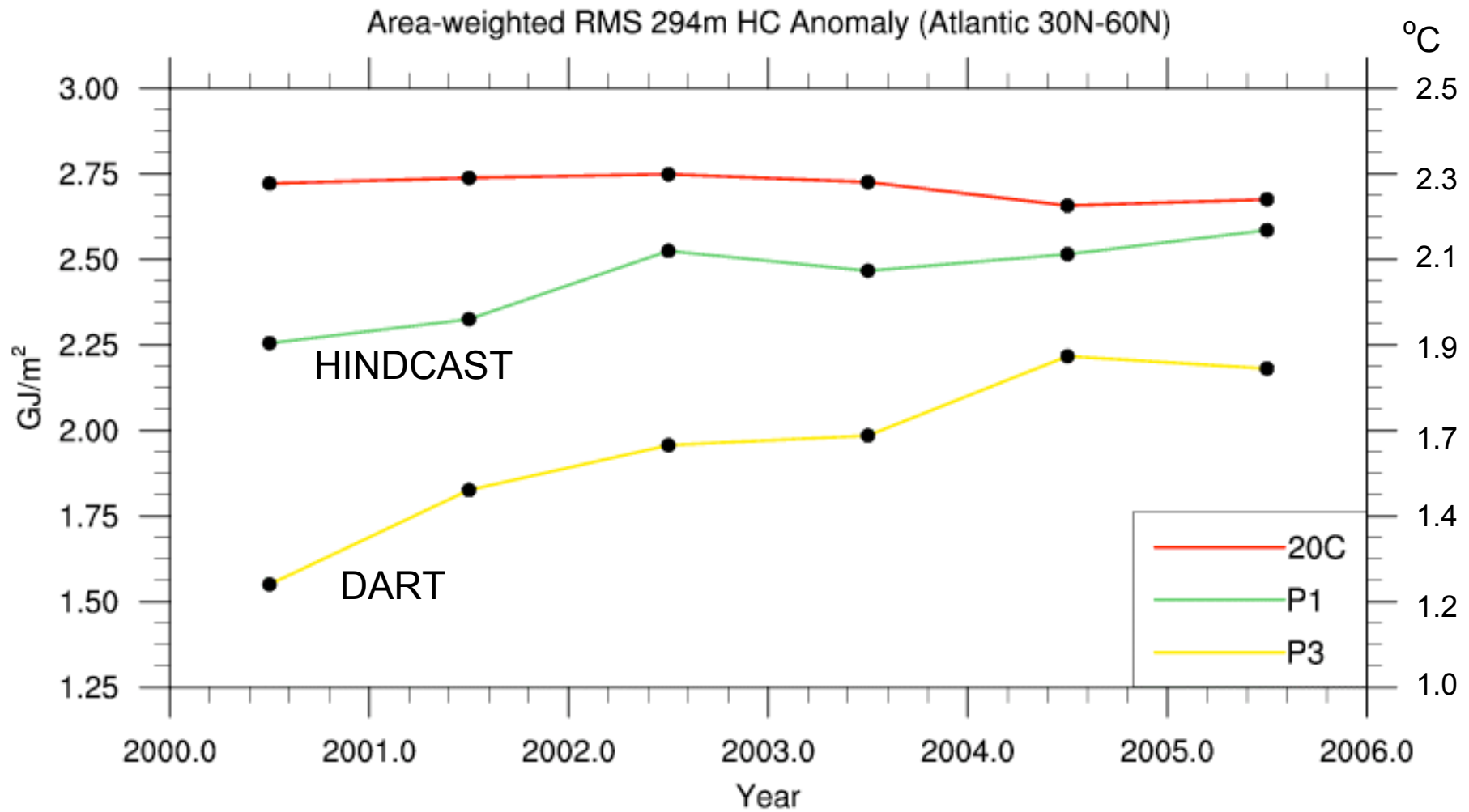
AMOC PREDICTABILITY AND CLIMATE DRIFT



SST information in the North Atlantic persists for 4-5 years



Upper ocean (0-300 m) heat content anomaly in the North Atlantic



Coordinated activities leading to joint publications?