WACCM Working Group Meeting
February, 22, 2010

Dan Marsh, NCAR, Boulder

Outline

- WACCM4 status & CMIP5 / AR5 update
- Development priorities
- WACCM community support

WACCM Versions

- 3.1.9
  - Released ‘workhorse’ version, available from the dataportal
- 3.5.48
  - CCMVal / WMO simulations
- 3.6.x
  - WACCM / CAM-Chem codes combined
- 4
  - Run within CCSM, capable of running with a deep-ocean model
  - IPCC CMIP5 / AR5 version
- WACCM-X
  - Thermospheric extension of WACCM

WACCM contribution to IPCC AR5

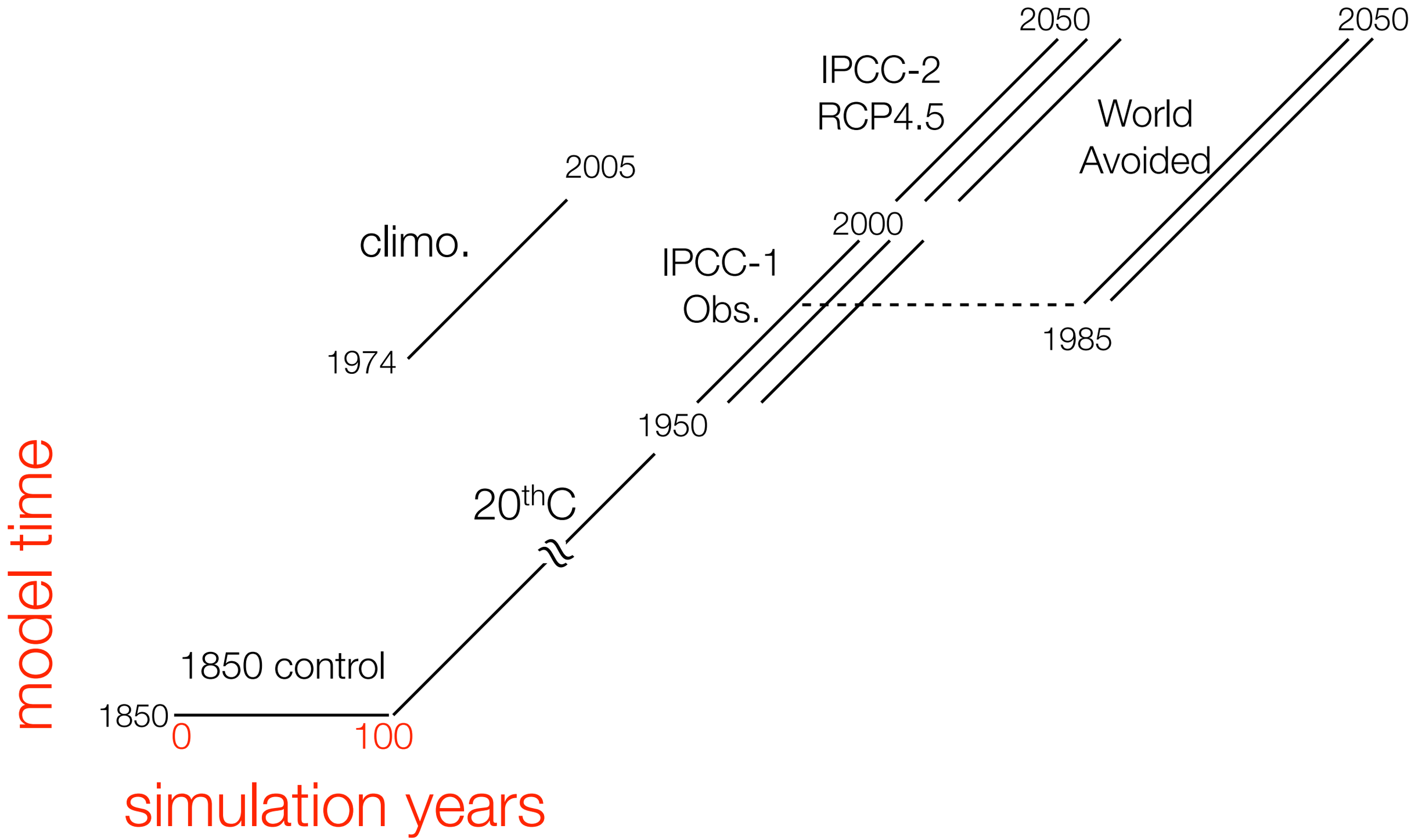
IPCC AR5 or CMIP5 Long-term Experiments with a Carbon Cycle Component

	Years	# Runs	KGAU
WACCM (70 levels) 1960-2050 20th Century + RCP 4.5	91	3	431

Other "high-top" AR5 models

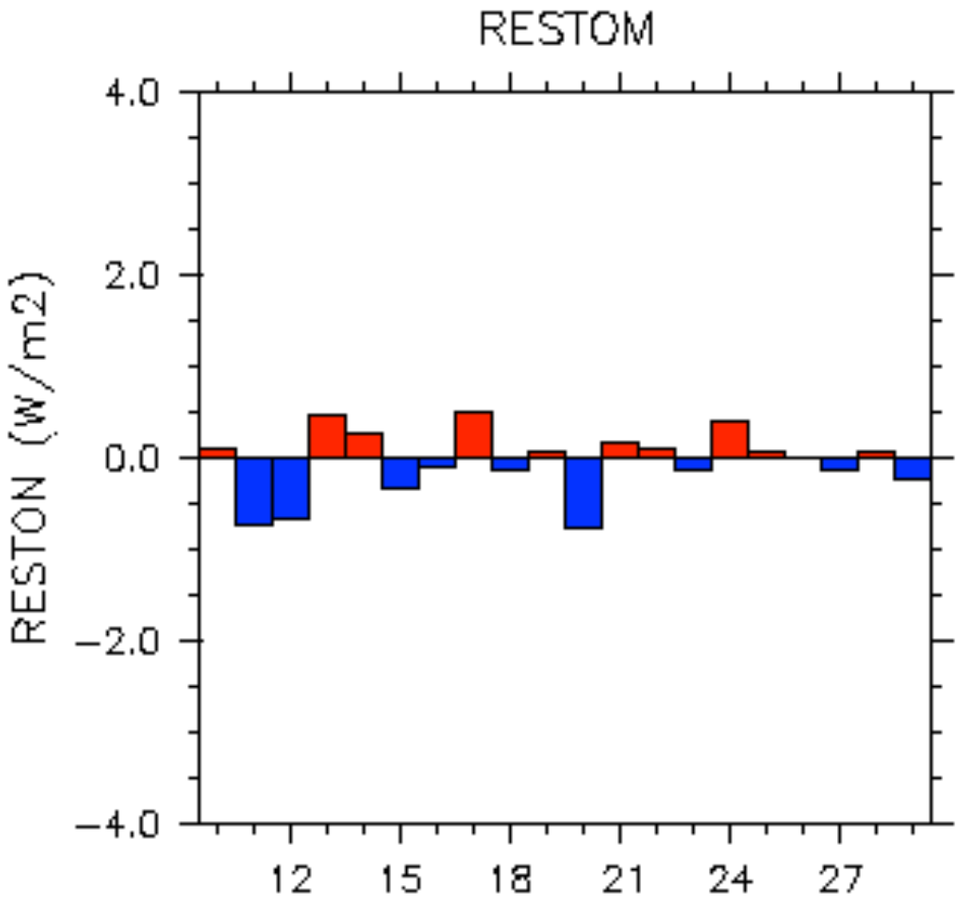
Institute	Model	Scenario	Contact
Hadley	HadGEM2	RCP4.5 to 2100	neal.butchart@metoffice.gov.uk
MPI	ECHAM6/ MPIOM	RCP4.5,2.6,8.5	marco.giorgetta@zmaw.de
GFDL	CM2	?	john.austin@noaa.gov
NCAR	CCSM: WACCM + POP2	RCP4.5 to 2050	rgarcia@ucar.edu marsh@ucar.edu
CMCC	ECHAM5+OPA	?	manzini@bo.ingv.it
GISS	GISS?	All 4 RCPs	dshindell@giss.nasa.gov
DMI	EC_Earth	RCP4.5 to 2100	shuting@dmi.dk boc@dmi.dk

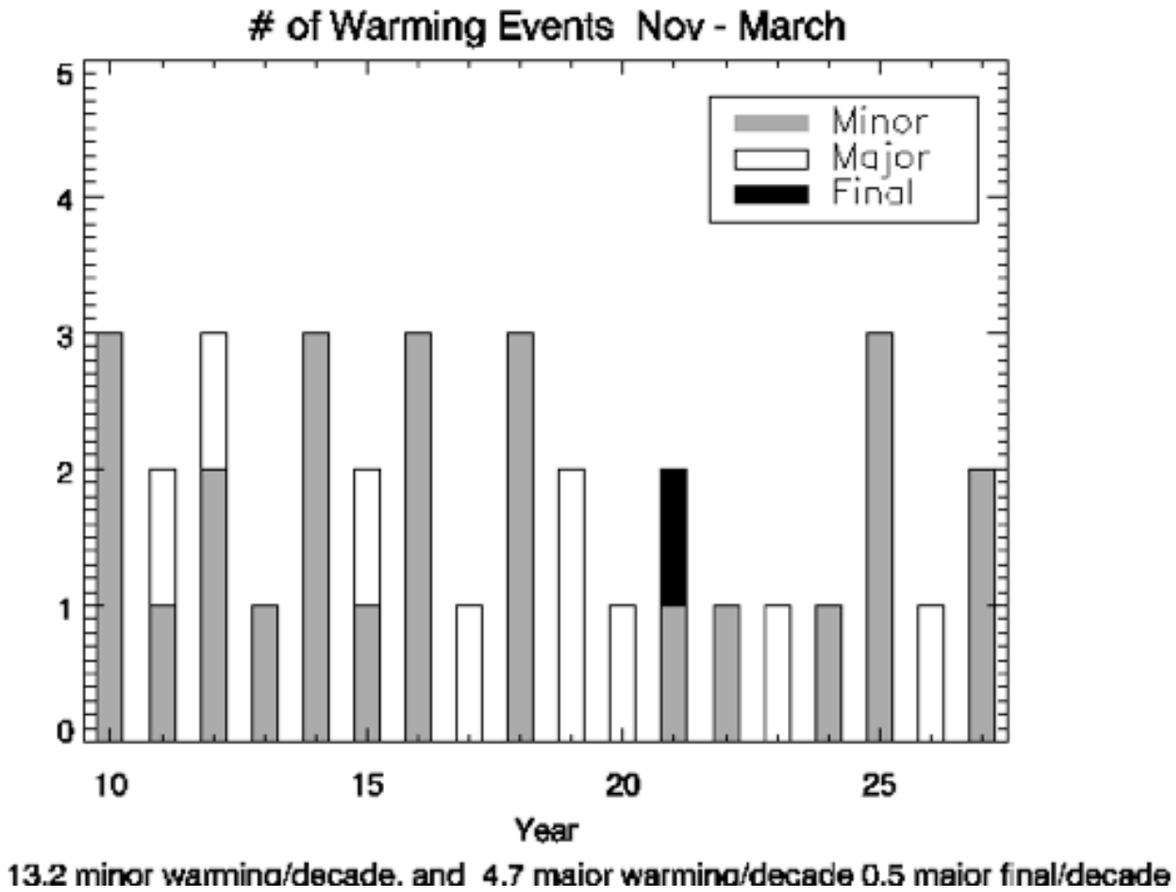
Planned coupled simulations 2010



1850 Control status

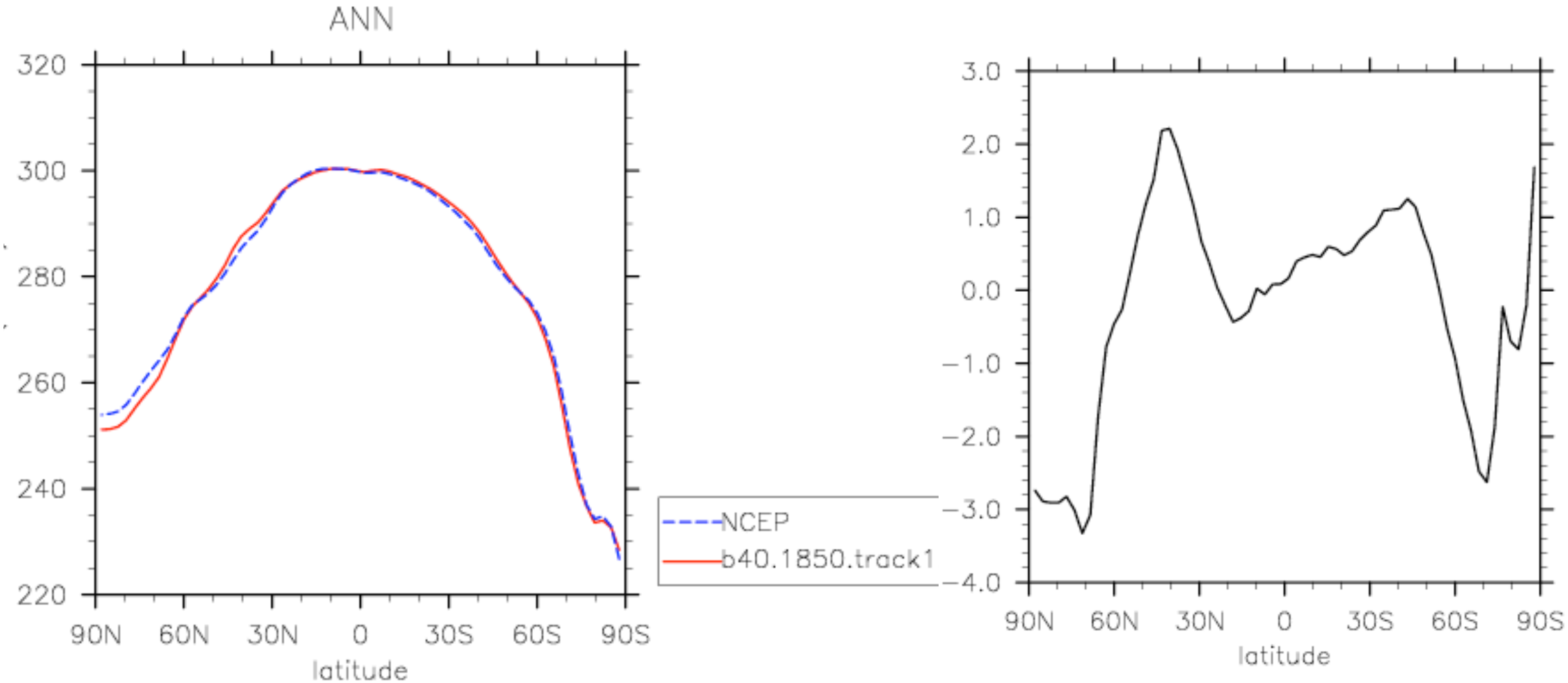
- 30 years completed, TOA imbalance = -0.047 W/m2 (yrs. 10-29)





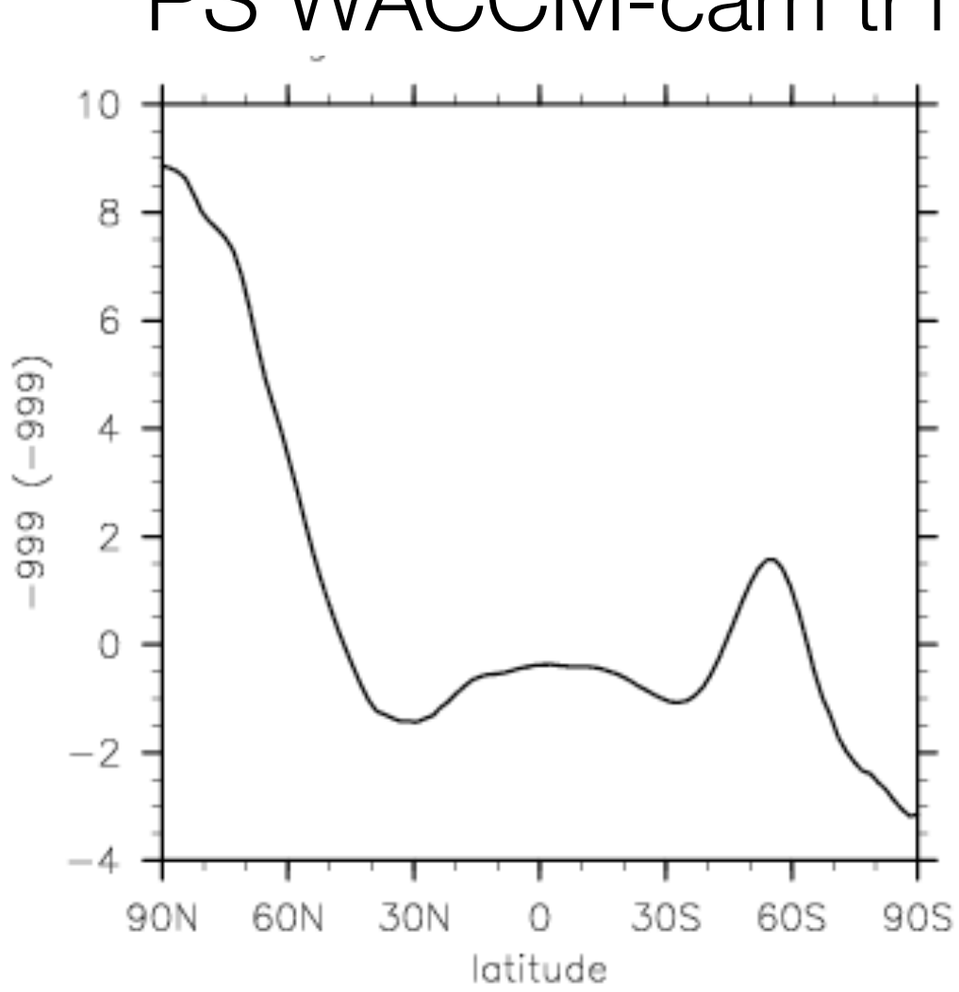
Known issues

- Surface temperature is too warm -comparable to present day for 1850
- WACCM global & annual mean is 287.9 vs. NCEP 287.7
- Seen in CAM track1 1850 2˚ simulations (287.6) -- better in CAM 1˚



WACCM with TMS

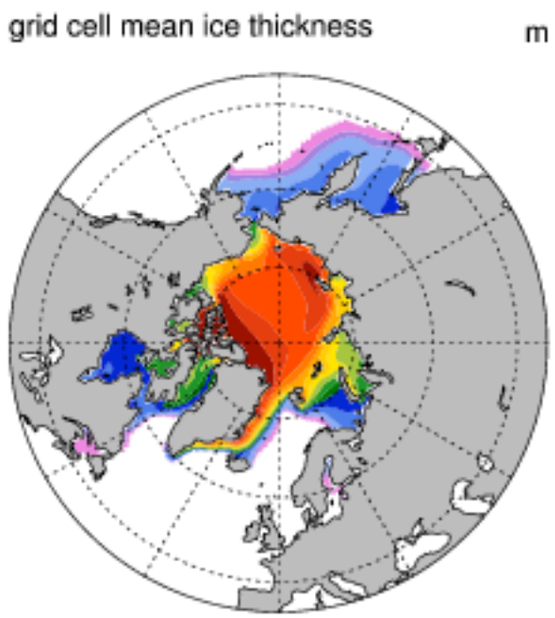
- NH pressure anomaly
- Due to turbulent mountain stress (TMS) parameterization (tested in CAM)
- Leads to a thickening of NH ice (next slide)



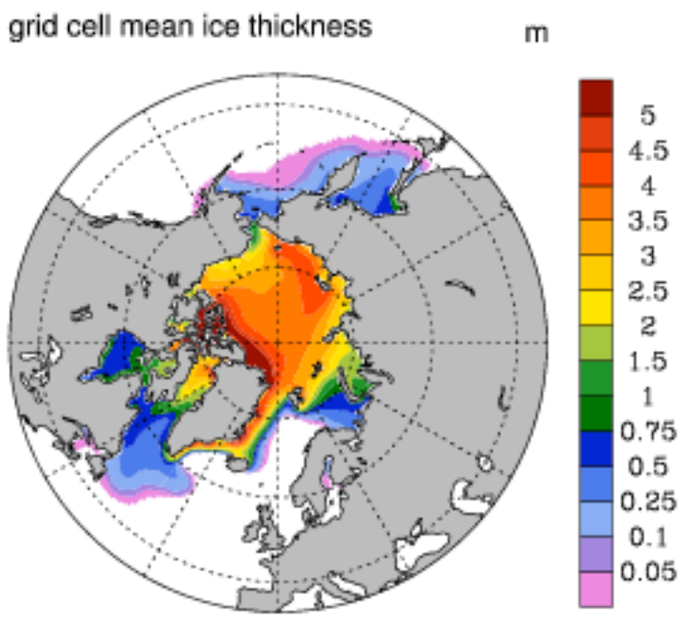
Note: TMS necessary to get frequency of sudden stratospheric warmings (SSW) correct

NH Ice Thickness

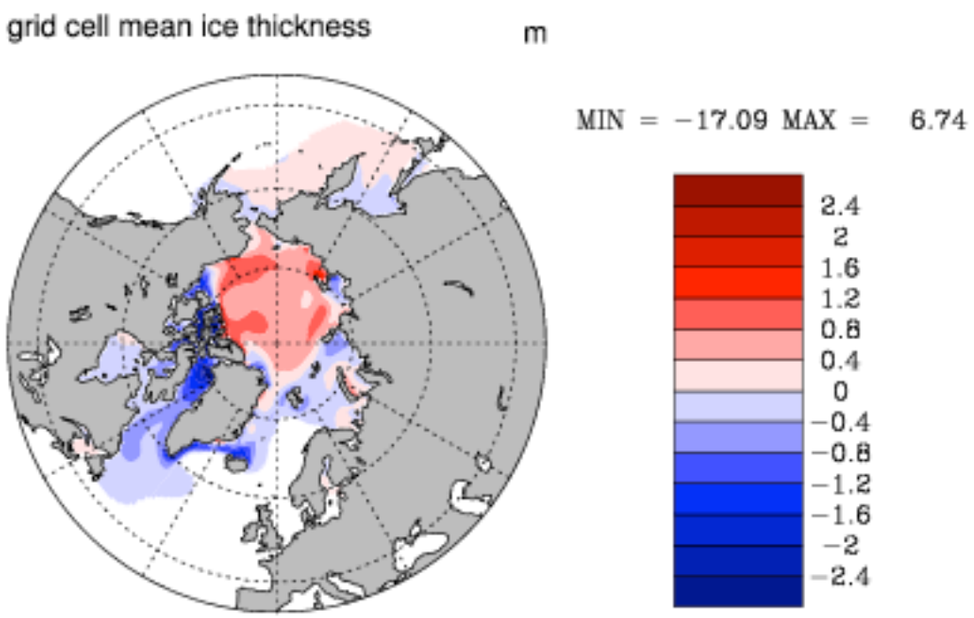
b40.1850.track1.2deg.wcm.003 Yrs 0030 - 0049



b40.1850.track1.2deg.003 Yrs 0481 - 0500

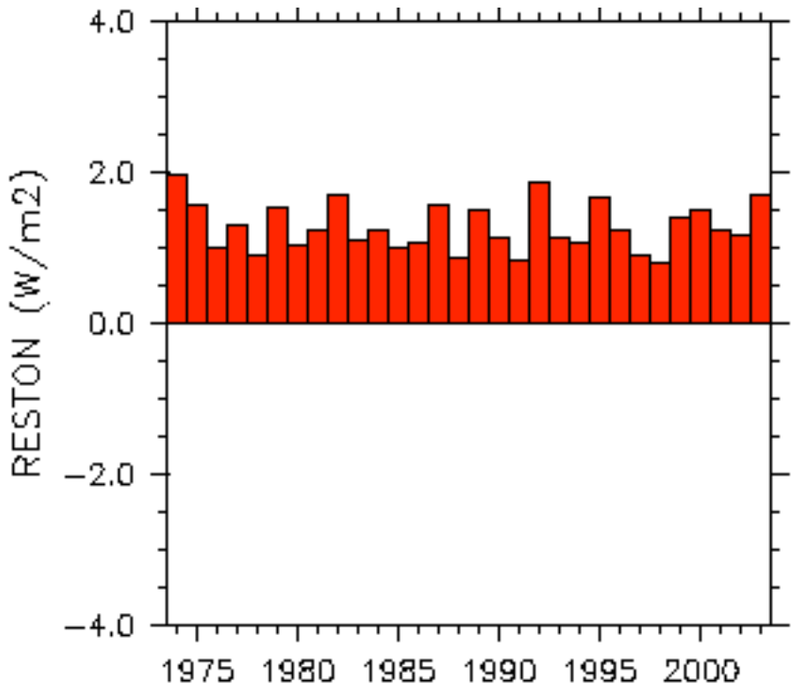


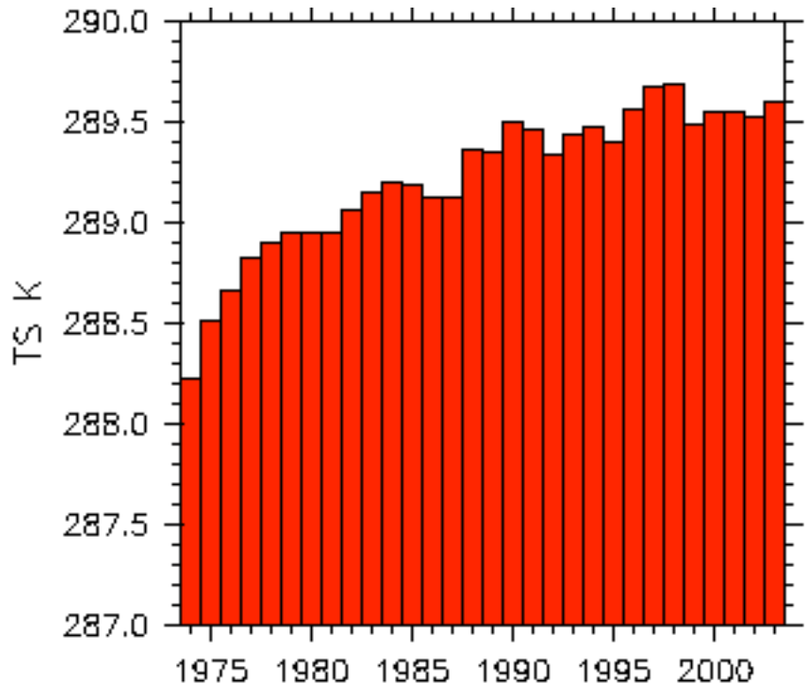
b40.1850.track1.2deg.wcm.003 - b40.1850.track1.2deg.003



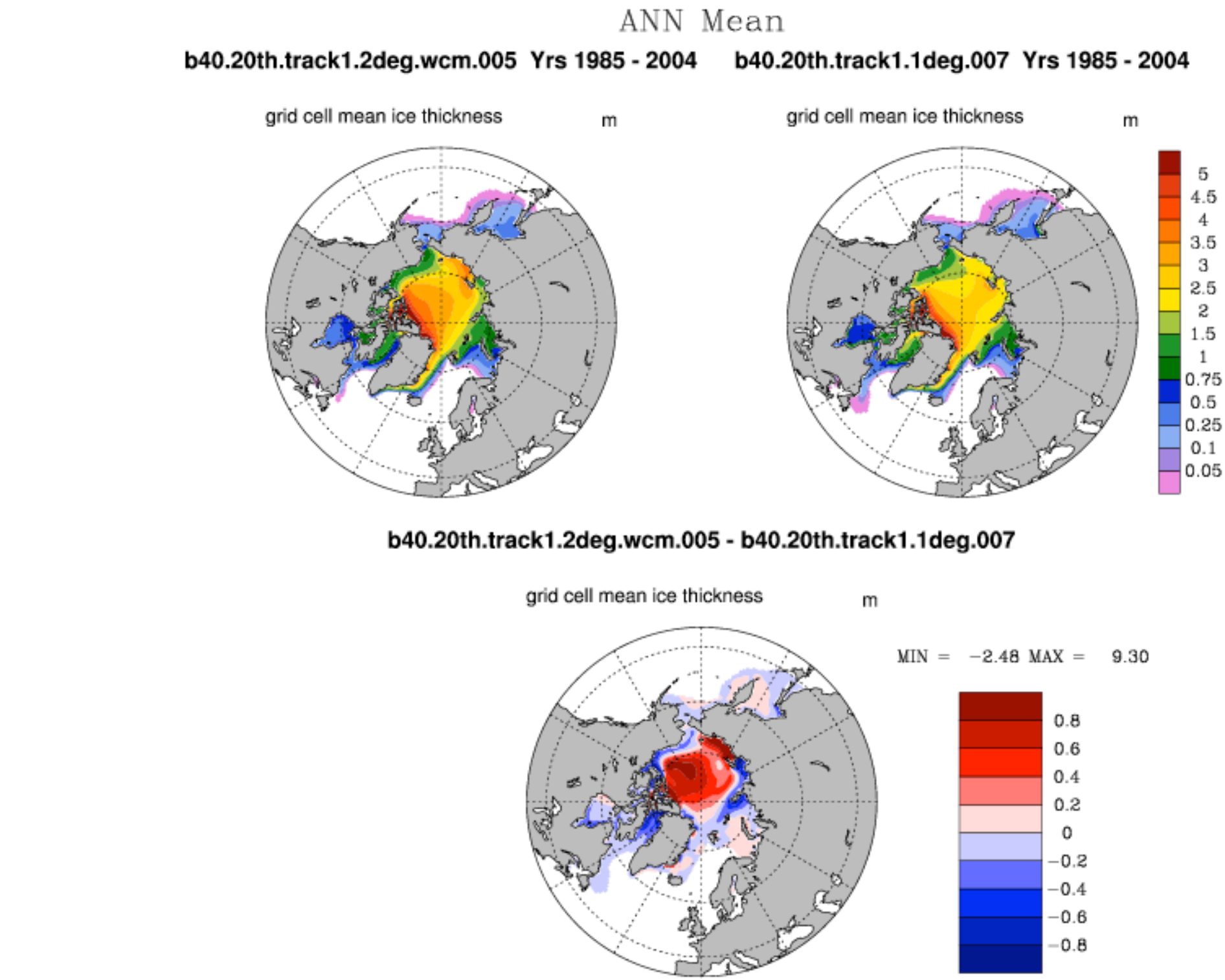
1977-2000 “climo” test

- CCMVal REFB1 forcing
- TOA imbalance (1985-2004) is 1.25 W/m^2, implying GHG warming is 1.3 W/m^2. CAM track1 20th vs 1850 is 1.16 W/m^2.
- Surface temperature is 289.463 compared to 288.277 (with observed SSTs/sea ice)





NH Ice thickness vs Track1 1° (1985-2004)



NH annual mean timeseries vs. Track1 1°

Next...

- Continue to evaluate 1850 control & climo. run
- Conduct 1850 to present simulation
- Begin CMIP5 / AR5 ensemble simulations

Development Priorities

- Validate and release coupled WACCM4
  - TMS tuning? Can we fix pressure anomaly and maintain SSW freq.?
- Migrate WACCM to CAM5 code base
  - Move to new RT code (RRTMG)
  - Unify photolysis and heating calculations (with CCWG)
  - Internally generated QBO
- Evaluate/improve Specified Dynamics WACCM
- Add medium energy electron particle precipitation (with CU)

CSL CCSM SCIENCE

see www.ccsm.ucar.edu/management/docs.html

Experiment	Model Configuration (see Notes below)	# of runs	# of years	GAU / year	Total (KGAU)
3.1.1 WACCM4 development	WACCM4-4X WACCM4 CCSM/WACCM4 WACCM4-103L-TC	3 2 2 5	50 50 50 10	330 1320 1580 3880	49 132 158 194
3.1.2 QBO generation	WACCM4-140 L	2	25	2640	132
3.1.3 SSW climatology	WACCM4	6	30	1320	238
3.1.4 UTLS studies	WACCM-SD WACCM-SD-1X WACCM4-103L-TC	1 1 2	5 5 20	3320 13,280 3880	16 66 155
3.1.5 Aviation impacts	WACCM4-103L-TC	2	10	3880	78
3.1.6 I/T Variability	WACCM-X	1	3	14,140	42
Total					**1,260**

WACCM community support

- WACCM working group has a full-time liaison since mid-January - Mike Mills (mmills@ucar.edu)

- Useful links at http://www.ccsm.ucar.edu/working_groups/WACCM/ including
  - CCSM bulletin board (http://bb.cgd.ucar.edu/) -- has a WACCM section, please use and support this resource to build a WACCM knowledge base

- Model output / documentation / source code on WACCM Community Data Portal (http://cdp.ucar.edu/)
  - Registration has doubled since last June (~120 registrants)

WACCM4 release at June CCSM meeting

- WACCM4 will be part of the CESM1 release
- Support for only “track 1” configuration (same climate as 3.5.48)
  - no aerosol indirect effect
  - CAMRT radiative transfer code
- Same code base as CAM-CHEM
  - improved specification of chemical forcing
  - integration of chemical pre-processor
- Requirements:
  - Full documentation
  - Release of control simulations

WAWG co-chair replacements

- Current terms end Summer 2010

- Would like to appoint new co-chairs at CCSM workshop -- term to begin September 1, 2010

- Hanli Liu will be new internal co-chair

- Suggestions for external co-chair very welcome - please contact me or Aaron

Thank you