Plans for the CCWG: 2007 and beyond

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NCAR

CCWG activities in the past year

PCM and CCSM3 made significant contributions to the IPCC AR4 (through individual papers focusing specifically on PCM and CCSM3, and PCM and CCSM3 data in the CMIP3 multi-model dataset at PCMDI now accessed by over 1000 scientists, and over 200 papers published so far); analyses of PCM and CCSM3 climate change experiments are ongoing

CCSM3 T42 30 member ensemble (with CVWG), 2000-2061

CCSM3 5 member ensembles, 20th century experiments with natural forcings, and with anthropogenic forcings

CCSM3 carbon aerosol 6 member ensemble

Test runs of T170 version of CCSM3

Formulate mitigation scenario experiments

A strategy is being proposed by the WCRP Working Group on Coupled Models (WGCM) and Analysis Integration and Modeling of the Earth System (AIMES) for an experimental design addressing aspects of near term and longer term stabilization experiments

Begun at an Aspen Global Change Institute session August 2006, and continued at a joint WGCM/AIMES meeting in Victoria September 2006

EOS article summarizing process appeared several weeks ago (Hibbard, Meehl, Cox and Friedlingstein, 2007: A strategy for climate change stabilization experiments, EOS)

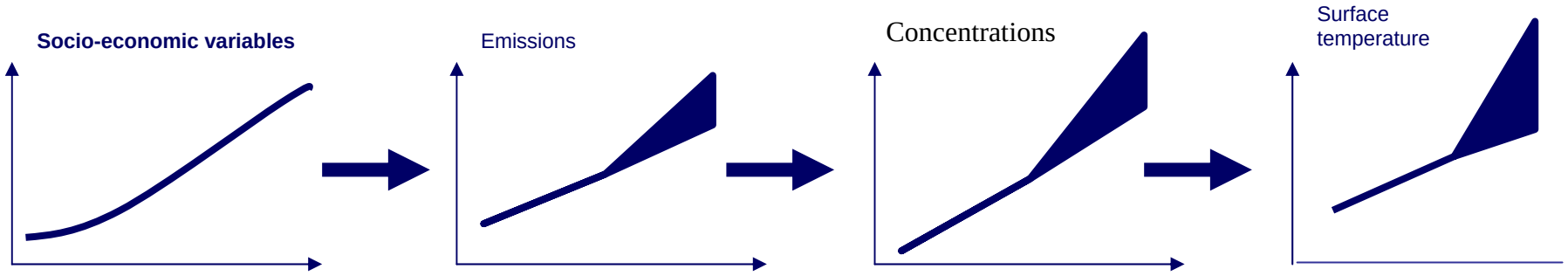
And a WCRP/CLIVAR/IGBP white paper (Meehl and Hibbard, 2007) contains more details

Designed to directly coordinate climate modeling, impacts and scenario communities (IPCC WGs 1, 2, and 3)

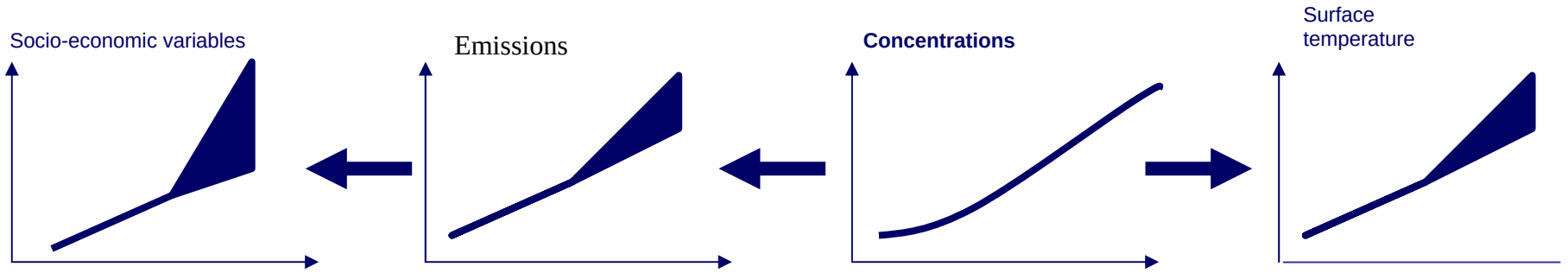
Two classes of models for two time frames and types of scientific questions:

1. Near term (decadal prediction), out to 2030, high resolution, chemistry and aerosols, no carbon cycle feedback, single scenario (e.g. regional climate change, extremes)
2. Longer term, out to 2100 and beyond, lower resolution, carbon cycle, two benchmark stabilization concentration scenarios, low and high, (e.g. quantify carbon cycle feedbacks, relative effects of policy actions for mitigation/adaptation)

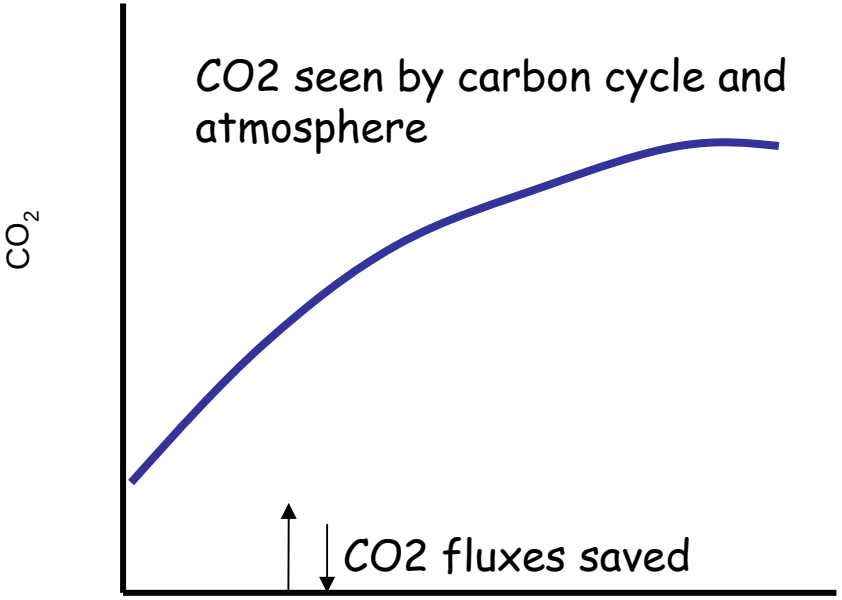
- Forward approach: start with socio-economic variables

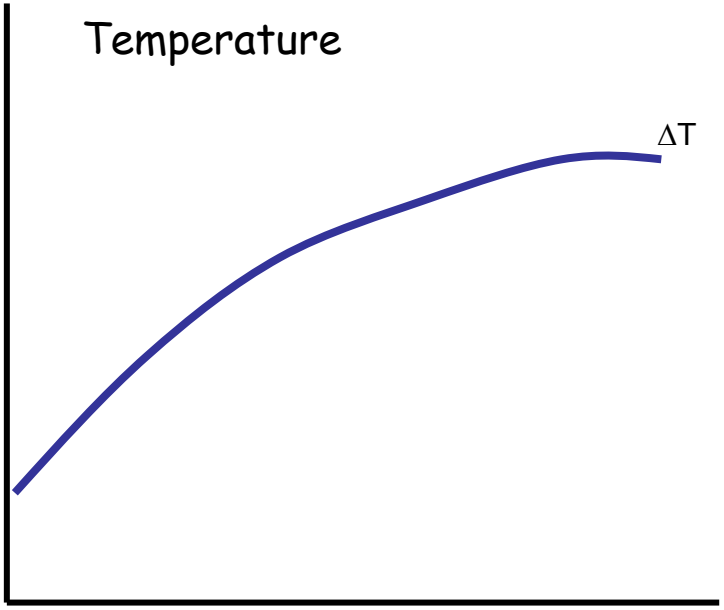


- Reverse approach: start with stabilization scenario concentrations



Experiment #1:
Carbon Cycle sees increasing CO2 Concentrations and ΔT;
Land/Ocean CO2 fluxes saved to derive emissions for WG3

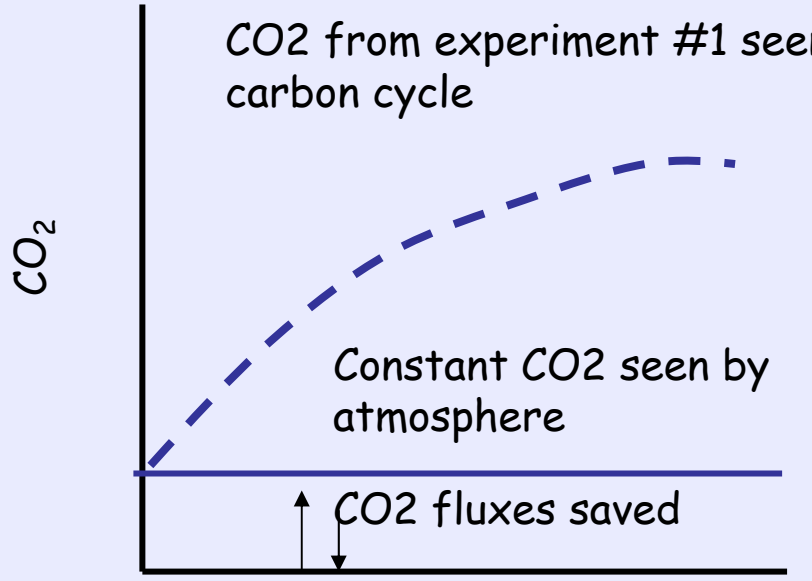


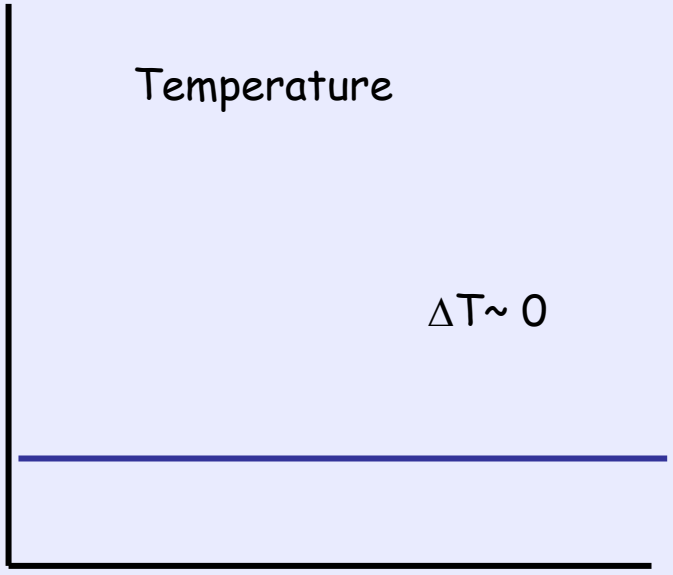


Land/Ocean CO_2 fluxes are NOT interactive with atmosphere

Experiment #2:
Carbon Cycle sees CO_2 Concentrations from Experiment #1; atmospheric CO_2 and T are constant;
Land/Ocean CO_2 fluxes saved to derive emissions for WG3

Difference in derived emissions between experiments 1 and 2 is magnitude of carbon cycle feedback in terms of emissions

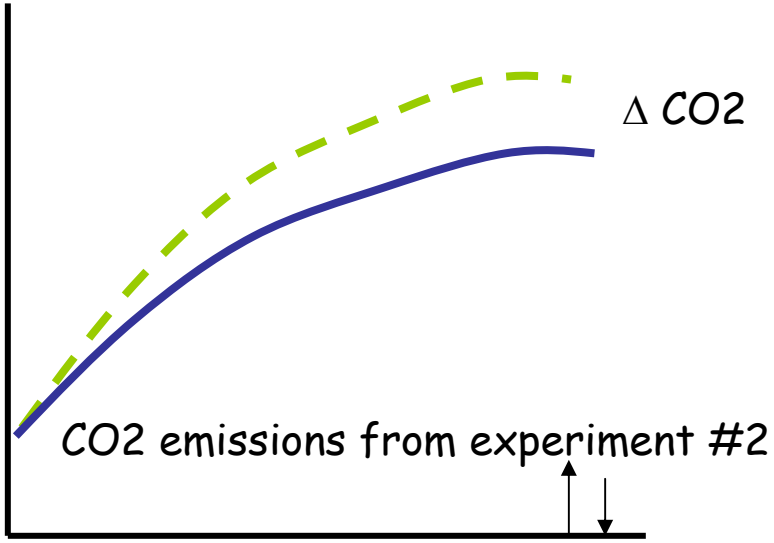


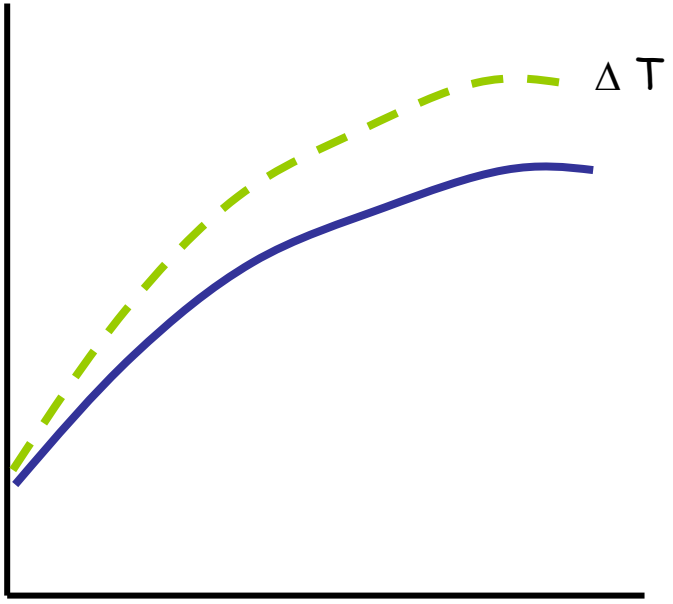


Land/Ocean CO_2fluxes are NOT interactive with atmosphere

Experiment #3: fully coupled ESM driven by emissions

emissions from Exp. #1 are used to drive carbon cycle-climate model; difference in climate change between experiment 1 and 3 is magnitude of carbon cycle feedback in terms of climate change





Interpolation between benchmark scenarios done by pattern scaling and use of EMICs

Groups with either ESMs or AOGCMs can participate

Experiments are being planned to address science questions of interest to the communities involved, but could also be the basis for assessment in a possible IPCC AR5 (TBD spring, 2008)

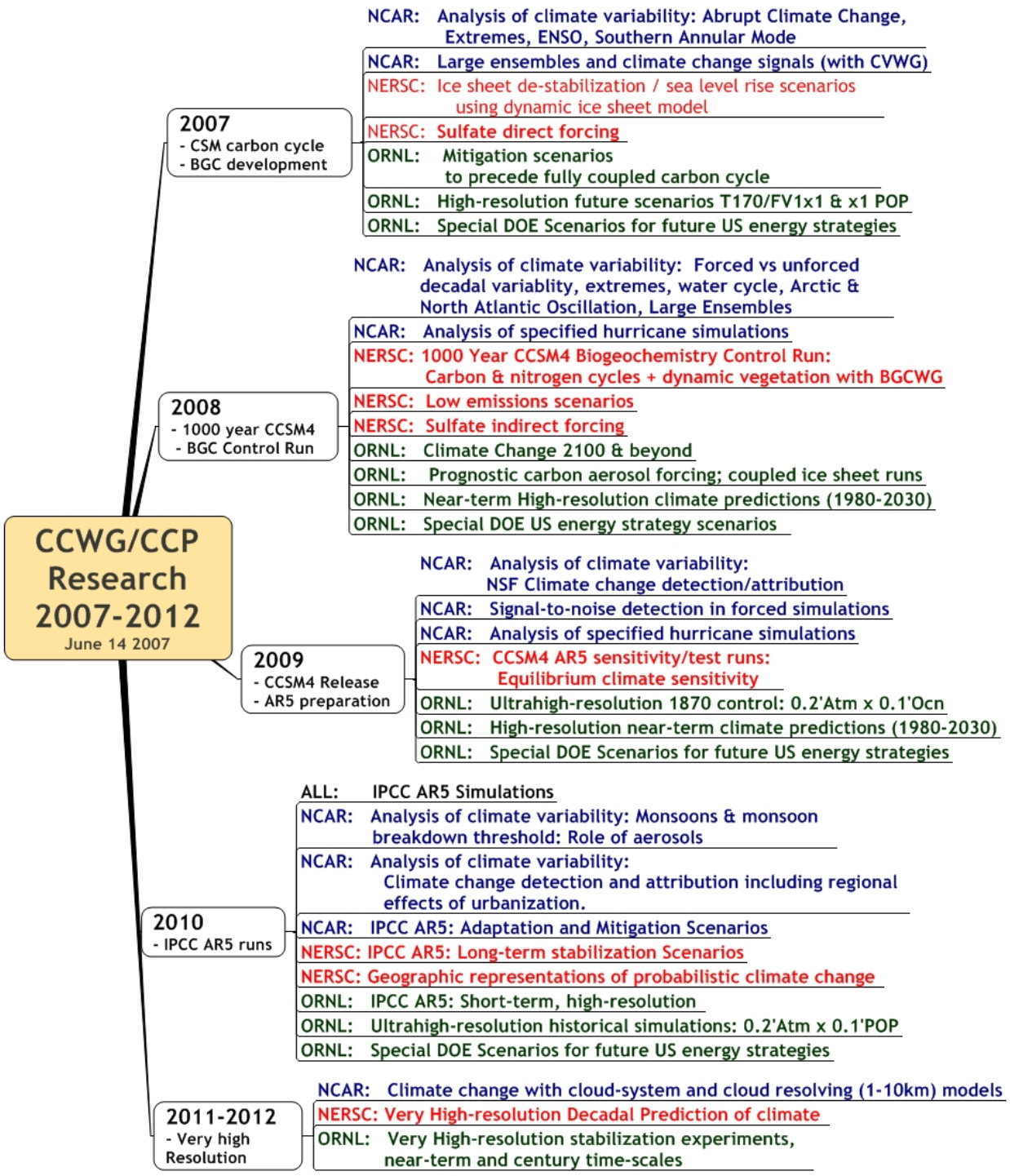
Experiments to be done with versions of CCSM4 in about 2009-2010 time frame

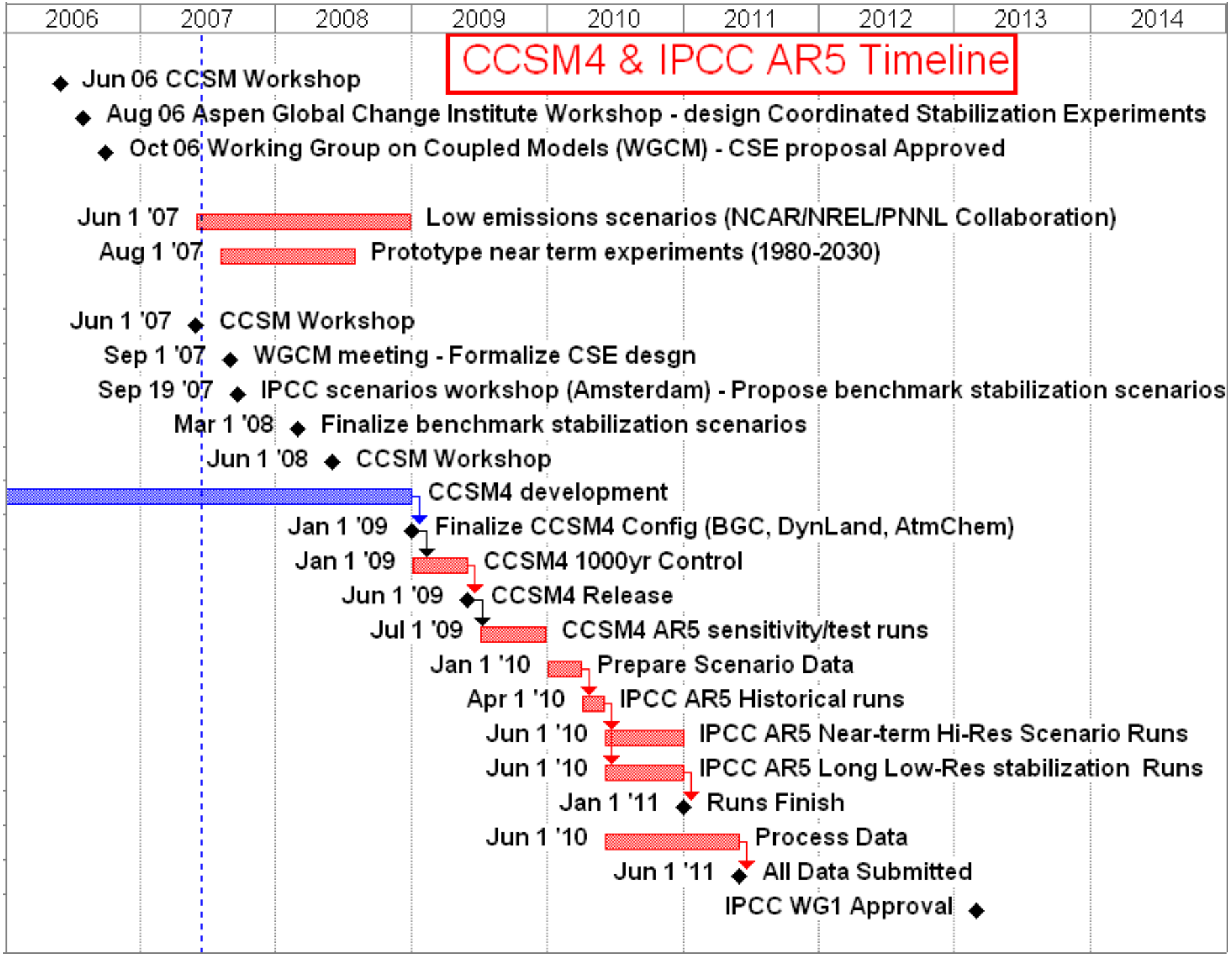
Feedback solicited from modeling community leading to WGCM meeting September, 2007,Hamburg

“Scenario consortium” planning September 2007 meeting in Amsterdam to determine benchmark concentration scenarios (lead-in EMF meeting in Snowmass, CO, July, 2007)

Benchmark scenarios finalized spring 2008

Most modeling groups will finalize new model versions about 2009 and begin running experiments around 2009-2010


CCWG/CCP Research 2007-2012
June 14 2007
2007
- CSM carbon cycle
- BGC development
NCAR: Analysis of climate variability: Abrupt Climate Change, Extremes, ENSO, Southern Annular Mode
NCAR: Large ensembles and climate change signals (with CVWG)
NERSC: Ice sheet de-stabilization / sea level rise scenarios using dynamic ice sheet model
NERSC: Sulfate direct forcing
ORNL: Mitigation scenarios to precede fully coupled carbon cycle
ORNL: High-resolution future scenarios T170/FV1x1 & x1 POP
ORNL: Special DOE Scenarios for future US energy strategies
2008
- 1000 year CCSM4
- BGC Control Run
NCAR: Analysis of climate variability: Forced vs unforced decadal variablity, extremes, water cycle, Arctic & North Atlantic Oscillation, Large Ensembles
NCAR: Analysis of specified hurricane simulations
NERSC: 1000 Year CCSM4 Biogeochemistry Control Run: Carbon & nitrogen cycles + dynamic vegetation with BGCWG
NERSC: Low emissions scenarios
NERSC: Sulfate indirect forcing
ORNL: Climate Change 2100 & beyond
ORNL: Prognostic carbon aerosol forcing; coupled ice sheet runs
ORNL: Near-term High-resolution climate predictions (1980-2030)
ORNL: Special DOE US energy strategy scenarios
2009
- CCSM4 Release
- AR5 preparation
NCAR: Analysis of climate variability: NSF Climate change detection/attribution
NCAR: Signal-to-noise detection in forced simulations
NCAR: Analysis of specified hurricane simulations
NERSC: CCSM4 AR5 sensitivity/test runs: Equilibrium climate sensitivity
ORNL: Ultrahigh-resolution 1870 control: 0.2'Atm x 0.1'Ocn
ORNL: High-resolution near-term climate predictions (1980-2030)
ORNL: Special DOE Scenarios for future US energy strategies
2010
- IPCC AR5 runs
ALL: IPCC AR5 Simulations
NCAR: Analysis of climate variability: Monsoons & monsoon breakdown threshold: Role of aerosols
NCAR: Analysis of climate variability: Climate change detection and attribution including regional effects of urbanization.
NCAR: IPCC AR5: Adaptation and Mitigation Scenarios
NERSC: IPCC AR5: Long-term stabilization Scenarios
NERSC: Geographic representations of probabilistic climate change
ORNL: IPCC AR5: Short-term, high-resolution
ORNL: Ultrahigh-resolution historical simulations: 0.2'Atm x 0.1'POP
ORNL: Special DOE Scenarios for future US energy strategies
2011-2012
- Very high Resolution
NCAR: Climate change with cloud-system and cloud resolving (1-10km) models
NERSC: Very High-resolution Decadal Prediction of climate
ORNL: Very High-resolution stabilization experiments, near-term and century time-scales


2006
2007
2008
2009
2010
2011
2012
2013
2014
CCSM4 & IPCC AR5 Timeline
Jun 06 CCSM Workshop
Aug 06 Aspen Global Change Institute Workshop - design Coordinated Stabilization Experiments
Oct 06 Working Group on Coupled Models (WGCM) - CSE proposal Approved
Jun 1 '07
Low emissions scenarios (NCAR/NREL/PNNL Collaboration)
Aug 1 '07
Prototype near term experiments (1980-2030)
Jun 1 '07
CCSM Workshop
Sep 1 '07
WGCM meeting - Formalize CSE desgn
Sep 19 '07
IPCC scenarios workshop (Amsterdam) - Propose benchmark stabilization scenarios
Mar 1 '08
Finalize benchmark stabilization scenarios
Jun 1 '08
CCSM Workshop
CCSM4 development
Jan 1 '09
Finalize CCSM4 Config (BGC, DynLand, AtmChem)
Jan 1 '09
CCSM4 1000yr Control
Jun 1 '09
CCSM4 Release
Jul 1 '09
CCSM4 AR5 sensitivity/test runs
Jan 1 '10
Prepare Scenario Data
Apr 1 '10
IPCC AR5 Historical runs
Jun 1 '10
IPCC AR5 Near-term Hi-Res Scenario Runs
Jun 1 '10
IPCC AR5 Long Low-Res stabilization Runs
Jan 1 '11
Runs Finish
Jun 1 '10
Process Data
Jun 1 '11
All Data Submitted
IPCC WG1 Approval