Coupled Model Inter-comparison Project phase 6 (CMIP6): Organization, Design, and Timeline

Based on information and slides from
- Veronika Eyring (CMIP Panel chair)
- Meehl et al. (2014, EOS, vol. 95, 77-84)
- discussions at the WGCM (Working Group on Coupled Modeling) meeting (October 2014)

Please see the CMIP Panel website for additional information and updates:
http://www.wcrp-climate.org/index.php/wgcm-cmip/about-cmip

Contact for questions: CMIP Panel Chair Veronika Eyring
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Scientific Background for CMIP6 Design

The scientific background for CMIP6 is the six WCRP Grand Challenges plus a theme encapsulating questions related to biogeochemical forcings and feedbacks:

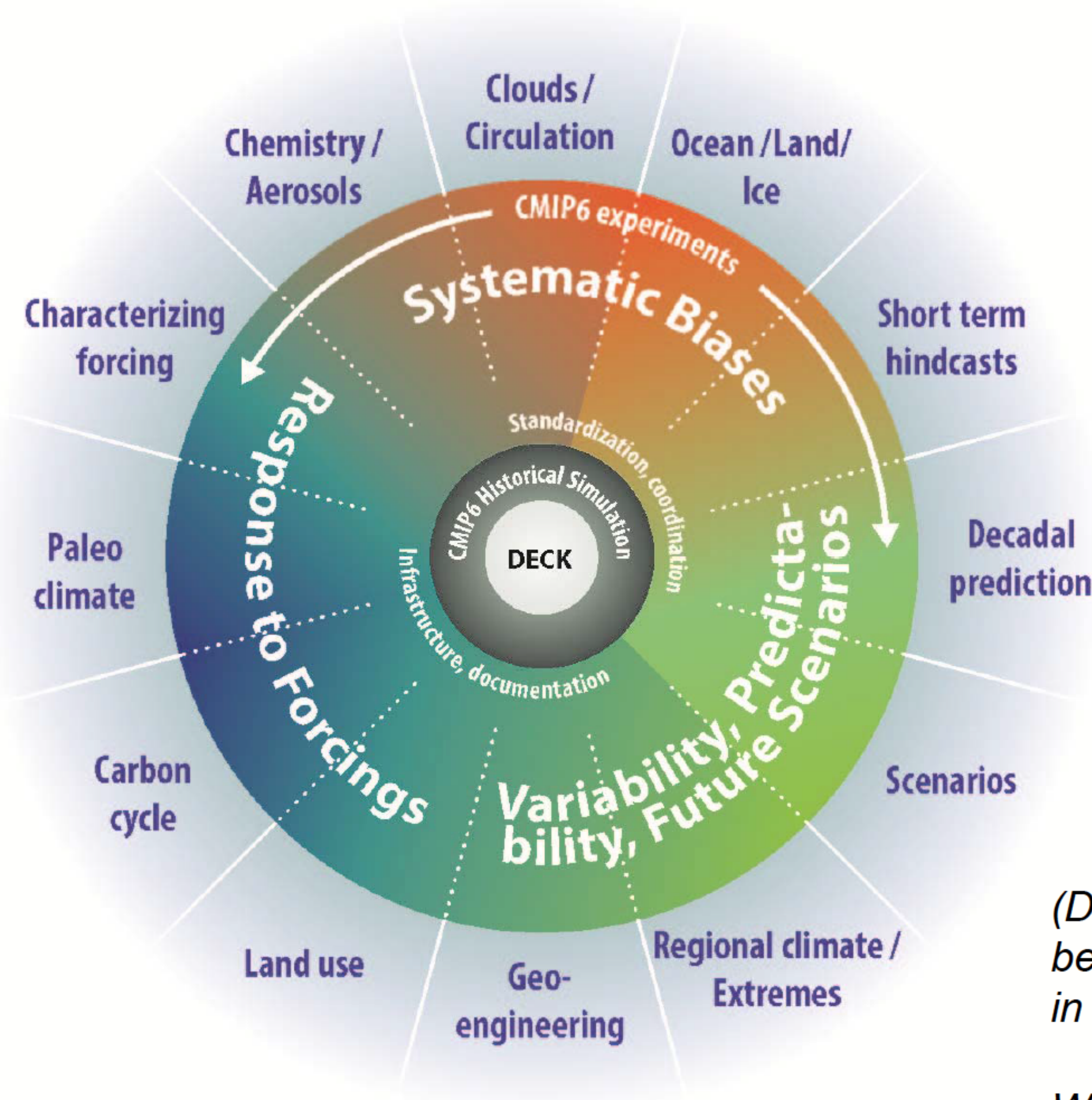
1. Clouds, Circulation, and Climate Sensitivity
2. Changes in Cryosphere
3. Climate Extremes
4. Regional Climate Information
5. Regional Sea Level Rise
6. Water Availability
7. Biogeochemical forcings and feedbacks (AIMES & WGCM)

The specific experimental design is focused on three broad scientific questions:

1. How does the Earth System respond to forcing?
2. What are the origins and consequences of systematic model biases?
3. How can we assess future climate changes given climate variability, predictability, and uncertainties in scenarios?

AIMES: Analysis, Integration, and Modeling of the Earth System

DECK: Diagnosis, Evaluation, and Characterization of Klima



Note: *The themes in the outer circle of the figure might be slightly revised at the end of the MIP endorsement process*

DECK (entry card for CMIP)

i. AMIP simulation (~1979-2014)

ii. Pre-industrial control simulation

iii. 1%/yr CO_2 increase

iv. Abrupt $4xCO_2$ run

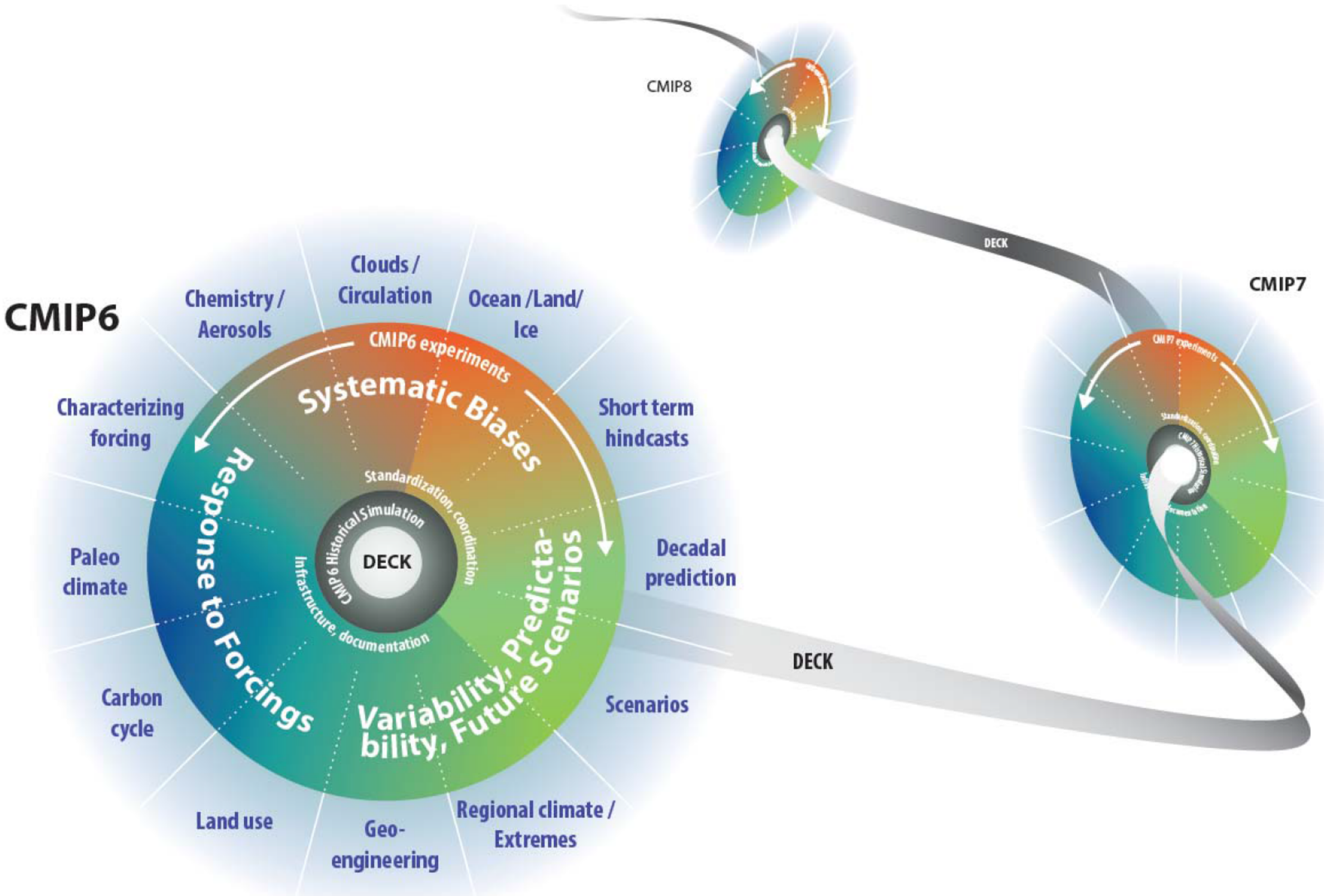
CMIP6 Historical Simulation (entry card for CMIP6)

v. Historical simulation using CMIP6 forcings (1850-2014)

(DECK & CMIP6 Historical Simulation to be run for each model configuration used in the subsequent CMIP6-Endorsed MIPs)

With proto-DECK experiments (LMIP,OMIP etc.) in CMIP6 Tier1

CMIP Continuity



The DECK experiments are chosen to

1. provide continuity across past and future phases of CMIP,
2. evolve as little as possible over time,
3. be well-established,
4. be part of the model development cycle.

The CMIP Phase X Historical Simulation is chosen to

1. serve as a benchmark for CMIP6-Endorsed MIPs
2. use the specific forcings consistent with Phase X of CMIP
3. be decoupled from model development cycle if needed.

Main Criteria for Endorsement of MIPs by the CMIP panel

1. MIP and its experiments address at least one of the key science questions of CMIP6.
2. MIP demonstrates connectivity to the DECK experiments and the CMIP6 Historical Simulation.
3. MIP adopts the CMIP modeling infrastructure standards and conventions.
4. All experiments are tiered, well-defined, and useful in a multi-model context and don't overlap with other CMIP6 experiments.
5. Unless a Tier 1 experiment differs only slightly from another well-established experiment, it must already have been performed by more than one modeling group.
6. A sufficient number of modeling centers (~8) are committed to performing all of the MIP's Tier 1 experiments and providing all the requested diagnostics needed to answer at least one of its science questions.
7. MIP presents an analysis plan describing how it will use all proposed experiments, any relevant observations, and specially requested model output to evaluate the models and address its science questions.
8. MIP has completed the MIP template questionnaire.
9. MIP contributes a paper on its experimental design to a CMIP6 Special Issue.
10. MIP considers reporting on the results by co-authoring a paper with the modeling groups.

* For "Diagnostic-MIPs" only non-experimental criteria apply

MIPs that have applied for CMIP6 endorsement
(02 December 2014)

	Short Name of MIP	Long Name of MIP
1	**AerChemMIP**	Aerosols and Chemistry Model Intercomparison Project
2	**C4MIP**	Coupled Climate Carbon Cycle Model Intercomparison Project
3	**CFMIP**	Cloud Feedback Model Intercomparison Project
4	**DAMIP**	Detection and Attribution Model Intercomparison Project
5	**DCPP**	Decadal Climate Prediction Project
6	**ENSOMIP**	ENSO Model Intercomparison Project
7	**FAFMIP**	Flux-Anomaly-Forced Model Intercomparison Project
8	**GeoMIP**	Geoengineering Model Intercomparison Project
9	**GMMIP**	Global Monsoons Model Intercomparison Project
10	**HighResMIP**	High Resolution Model Intercomparison Project
11	**ISMIP6**	Ice Sheet Model Intercomparison Project for CMIP6
12	**LS3MIP**	Land Surface, Snow and Soil Moisture
13	**LUMIP**	Land-Use Model Intercomparison Project
14	**OCMIP6**	Ocean Carbon Cycle Model Intercomparison Project, Phase 6
15	**OMIP**	Ocean Model Intercomparison Project
16	**PDRMIP**	Precipitation Driver and Response Model Intercomparison Project
17	**PMIP**	Palaeoclimate Modelling Intercomparison Project
18	**RFMIP**	Radiative Forcing Model Intercomparison Project
19	**ScenarioMIP**	Scenario Model Intercomparison Project
20	**SolarMIP**	Solar Model Intercomparison Project
21	**VolMIP**	Volcanic Forcings Model Intercomparison Project
	Diagnostic MIPs (i.e., no proposed experiments rather requesting that certain output is archived and/or contributing to the evaluation and analysis in a coordinated manner)	
22	**CORDEX**	Coordinated Regional Climate Downscaling Experiment
23	**DynVar**	Dynamics and Variability of the Stratosphere-Troposphere System
24	**GDDEX**	Global Dynamical Downscaling Experiment
25	**SIMIP**	Sea-Ice Model Intercomparison Project
26	**VIAAB**	VIA Advisory Board for CMIP6

MIP Endorsement Process Timeline

- October 2014: First feedback from WGCM and modeling groups on their September proposals sent to MIP co-chairs (CMIP Panel)
- 29 November 2014: MIP proposal (except for information of the data request) scientifically revised and harmonized with other MIPs (MIP co-chairs)
- 30 November 2014: Revised proposals sent to WGCM, WCRP GCs, biogeochemical forcing theme & projects (WGCM co-chairs), MIP co-chairs and modeling groups for review (CMIP Panel)
- 15 January 2015: review process finished
- 15 February 2015: Synthesis of comments and recommendations for each MIP finished and sent to MIP co-chairs (WGCM members organized by WGCM co-chairs)
- 31 March 2015: Final MIP proposals with all information (including data request) sent to CMIP Panel and WIP co-chairs (MIP co-chairs)
- 30 April 2015: MIP endorsement (CMIP Panel and WGCM co-chairs)
- April - December 2015: Special Issue on the CMIP6 experimental design opens with envisaged submission of the endorsed MIPs and the CMIP6 forcings.

CMIP6 Data Request Timeline

- 15 December 2014: Template for CMIP data request sent to MIP co-chairs (WIP co-chairs)
- 31 January 2015: Experiment and variable list sent to WIP co-chairs (MIP co-chairs)
- 15 March 2015: Synthesized data request ready (WIP co-chairs in collaboration with CMIP Panel)
- 30 April 2015: Data request reviewed and sent to WIP co-chairs and CMIP Panel chair (Model groups and MIP co-chairs)
- 15 July 2015: Final data request published

CMIP6 Forcing Datasets Timeline

- 31 January 2015: Initial description of each forcing dataset sent to CMIP Panel chair (Forcing Group)
- 31 March 2015: Initial description reviewed (Model groups)
- 31 December 2015: Description of forcing datasets in CMIP6 Special Issue (Forcing Group)
- Early 2016: Forcing datasets available (Forcing group)

Ocean Model Inter-comparison Project (OMIP)
a.k.a. Coordinated Ocean – ice Reference Experiments phase II, CORE-II

Gokhan Danabasoglu and Steve Griffies

An experimental protocol for ocean – sea-ice coupled simulations forced with inter-annually varying atmospheric data sets for the 1948-2007 period (Large and Yeager 2009). This effort is coordinated by the CLIVAR Ocean Model Development Panel (OMDP).

These hindcast simulations provide a framework for

- evaluation, understanding, and improvement of ocean models,
- investigation of mechanisms for seasonal, inter-annual, and decadal variability,
- evaluation of robustness of mechanisms across models,
- complementing data assimilation in bridging observations and modeling and in providing ocean initial conditions for climate (decadal) prediction simulations.

Ocean Model Inter-comparison Project (OMIP)
a.k.a. Coordinated Ocean – ice Reference Experiments phase II, CORE-II

Addresses "What are the origins and consequences of systematic model biases?"

Tier 1: One 300+ year experiment

CORE-II Special Issue of Ocean Modelling
(20+ participating models)

- North Atlantic and Atlantic meridional overturning circulation (AMOC)
  Part I: Mean states (Danabasoglu & Yeager), PUBLISHED
  Part II: Variability (Danabasoglu & Yeager),
- Global and regional sea level (Griffies & Yin), PUBLISHED
- Southern Ocean water masses, ventilation, and sea-ice (Downes & Farneti),
- Antarctic Circumpolar Current and Southern Ocean overturning circulation (Farneti & Downes),
- Arctic Ocean and sea-ice (Gerdes, Wang, & Drange),
- South Atlantic simulations (Farneti),
- Ocean circulation in temperature and salinity space (Nurser & Zika),
- Indian Ocean (Ravichandran, Rahaman, Harrison, Swathi, & Griffies),
- Pacific Ocean circulation and its variability (Tseng),
- Indonesian Throughflow (England & Santoso).

Sampling the Physical Ocean in CMIP6 Simulations

CLIVAR Ocean Model Development Panel (OMDP)
Committee on CMIP6 Ocean Model Output

Stephen M. Griffies (NOAA Geophysical Fluid Dynamics Laboratory, USA)
Alistair J. Adcroft (NOAA/GFDL and Princeton University, USA)
V. Balaji (NOAA/GFDL and Princeton University, USA)
Gokhan Danabasoglu (National Center for Atmospheric Research, USA)
Paul J. Durack (LLNL/Program for Climate Model Diagnosis and Intercomparison, USA)
Peter J. Gleckler (LLNL/Program for Climate Model Diagnosis and Intercomparison, USA)
Jonathan M. Gregory (Hadley Centre and University of Reading, UK)
John P. Krasting (NOAA Geophysical Fluid Dynamics Laboratory, USA)
Trevor J. McDougall (University of New South Wales, AUS)
Ronald J. Stouffer (NOAA Geophysical Fluid Dynamics Laboratory, USA)
Karl E. Taylor (LLNL/Program for Climate Model Diagnosis and Intercomparison, USA)

Version 1.0
November 25, 2014

Abstract

We present recommendations for sampling physical ocean fields for the World Climate Research Program (WCRP) Coupled Model Intercomparison Project #6 (CMIP6), including its suite of satellite MIPs such as the Ocean Model Intercomparison Project (OMIP). We motivate the diagnostics by presenting salient scientific reasons for their relevance, and present a practical framework for meaningful comparisons across climate models and observational based measurements. We focus on diagnostics related to physical properties and processes within the simulated ocean, along with associated ocean boundary fluxes. The audience for this document includes the WCRP Working Group for Coupled Modeling (WGCM), the CMIP panel, CLIVAR Scientific Steering Group (SSG), CLIVAR Ocean Model Development Panel (OMDP), scientists contributing model results to CMIP, and scientists analyzing ocean climate simulations.

https://dl.dropboxusercontent.com/u/38722087/CMIP6_ocean/version1p0/CMIP6_ocean_version1p0.pdf

OCMIP6: Ocean Carbon Cycle Model Inter-comparison Project phase 6

James Orr

OCMIP is an open international collaboration that aims to improve and accelerate development of global-scale, three-dimensional, ocean biogeochemical models that include the carbon cycle and related biogeochemical and ecosystem components.

Proposed experiments

OCMIP6 will exploit results from the planned CMIP6 experiments. In addition, new OCMIP6 protocols will be developed i) to run CMIP6 ocean dynamical-biogeochemical models in stand-alone mode, forced by data-based historical forcing (reanalysis data) and ii) to update protocols to evaluate circulation models with passive tracers, namely CFCs and SF6.

Proposed evaluation/analysis of the CMIP DECK and CMIP6 experiments

- Compare results from the ocean biogeochemical components of the CMIP6 earth system models;
- Analyze the analogous forced ocean simulations with the CMIP6 ocean biogeochemical models, focusing in part on how internal variability differs between coupled and forced simulations;
- Validate the CMIP6 ocean model components by comparing their simulations of 2 passive tracers (CFC and SF6) to a large global observational database.

C4MIP: Coupled Climate Carbon Cycle Model Inter-comparison Project

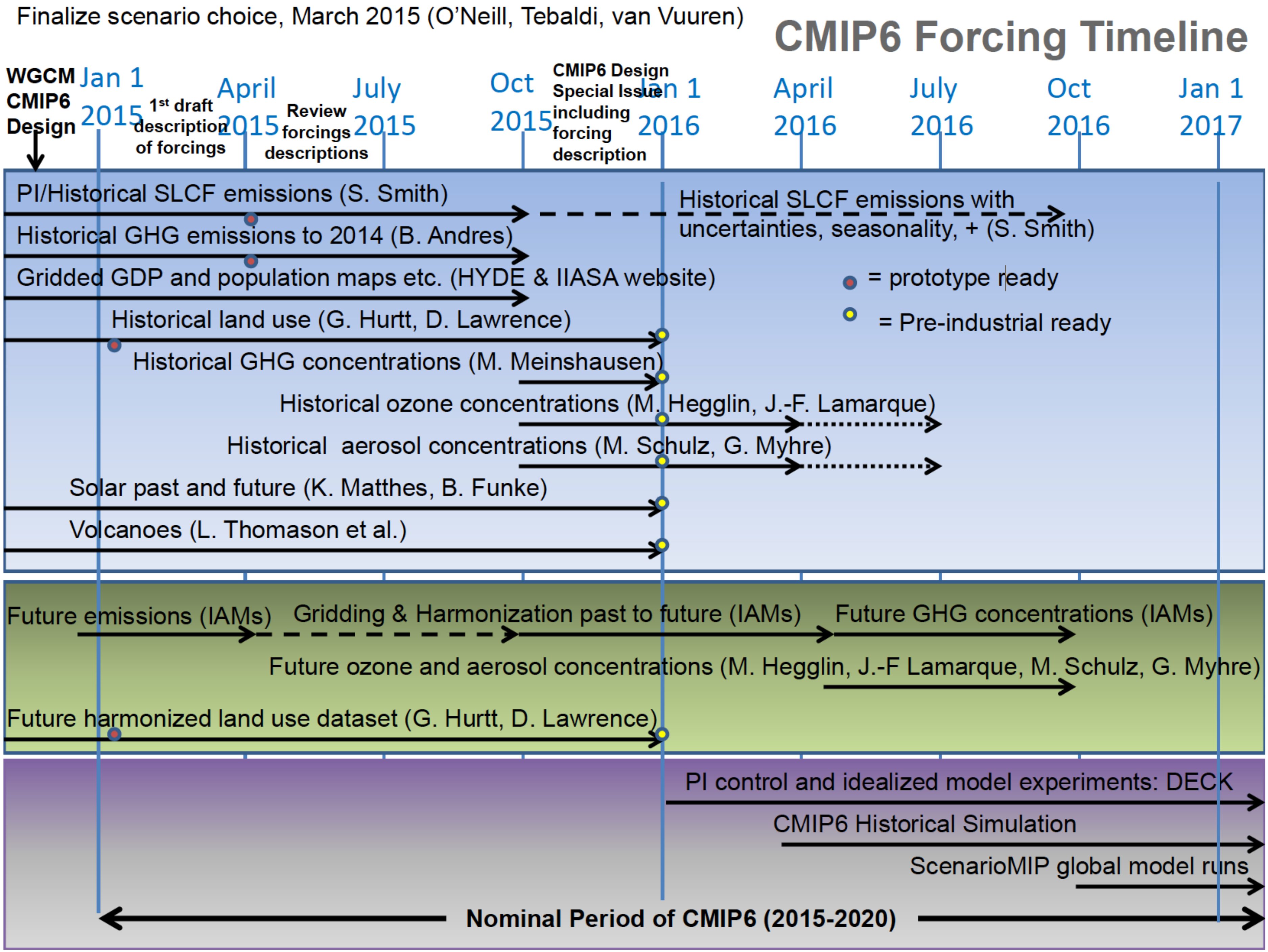
Vivek Arora, Pierre Friedlingstein, Chris Jones

Goals

- The primary focus of C4MIP is to understand and quantify future (century-scale) changes in land and ocean carbon storage and fluxes
- Idealized experiments will be used to separate and quantify the sensitivity of land and ocean carbon cycle to changes in climate and changes in atmospheric CO2 concentration
- Historical experiments will be used to evaluate model performance and investigate potential for future constraints
- Future scenario experiments will be used to quantify future changes in carbon storage and hence quantify the atmospheric CO2 concentration and related climate change for given CO2 emissions, or diagnose the emissions compatible with a prescribed atmospheric CO2 concentration pathway

Experiments

- DECK simulations
- CMIP6 Historical Simulation
- Tier1.1: 1%BGC: biogeochemically-coupled version of 1% per year increasing CO2 up to 4xCO2 simulation. CO2 increase only affects carbon cycle models, radiative code sees pre-industrial CO2
- Tier1.2: Emission-driven future scenario (SSP-based RCP SSP5-8.5) up to 2100


Finalize scenario choice, March 2015 (O'Neill, Tebaldi, van Vuuren)
CMIP6 Forcing Timeline
WGCM CMIP6 Design
Jan 1 2015
1st draft description of forcings
April 2015
Review forcings descriptions
July 2015
Oct 2015
CMIP6 Design Special Issue including forcing description
Jan 1 2016
April 2016
July 2016
Oct 2016
Jan 1 2017
PI/Historical SLCF emissions (S. Smith)
Historical SLCF emissions with uncertainties, seasonality, + (S. Smith)
Historical GHG emissions to 2014 (B. Andres)
Gridded GDP and population maps etc. (HYDE & IIASA website)
= prototype ready
= Pre-industrial ready
Historical land use (G. Hurtt, D. Lawrence)
Historical GHG concentrations (M. Meinshausen)
Historical ozone concentrations (M. Hegglin, J.-F. Lamarque)
Historical aerosol concentrations (M. Schulz, G. Myhre)
Solar past and future (K. Matthes, B. Funke)
Volcanoes (L. Thomason et al.)
Future emissions (IAMs)
Gridding & Harmonization past to future (IAMs)
Future GHG concentrations (IAMs)
Future ozone and aerosol concentrations (M. Hegglin, J.-F Lamarque, M. Schulz, G. Myhre)
Future harmonized land use dataset (G. Hurtt, D. Lawrence)
PI control and idealized model experiments: DECK
CMIP6 Historical Simulation
ScenarioMIP global model runs
Nominal Period of CMIP6 (2015-2020)

U.S. CLIVAR Climate Process Teams (CPTs)

CPTs are highly collaborative projects involving teams of theoreticians, observationalists, process modelers, and coupled climate modelers formed around specific issues or key uncertainties in coupled climate model systems and their components.

Climate Process Modeling and Science Teams: Motivation and Concept, U.S. CLIVAR SSC, 2002, U.S. CLIVAR Office Report 2002-1.

CPT Objectives

- Expedite the transfer of theoretical and practical process-understanding into improved treatment of those processes in climate model systems, and demonstrate, through testing and diagnostics, the (climate) impact of these improvements;
- Parameterizing missing unresolved processes / physics in climate models and advancing our understanding of how particular processes impact the climate system;
- Identify additional process study activities necessary to further refine climate model fidelity;
- Develop requirements for sustained observations needed by climate model systems.

Some Guidelines:

- For maximal impact and assessment of robustness, CPTs should explicitly involve more than one climate model; but the number of models should not be so large that CPTs would result in an inter-comparison project, i.e., CPTs are not just another MIP!
- No new observations;
- Success of the CPTs will be measured not only by advances in knowledge, i.e., publications, but more importantly by its practical productivity as evidenced by development of new capabilities and products;
- Readiness element.

CPT Awards

First Round - 2003:

1. Low-Latitude Cloud Feedbacks on Climate Sensitivity
2. Ocean Eddy Mixed-Layer Interactions
3. Gravity Current Entrainment

Second Round 2010:

1. Internal-Wave Driven Mixing in Global Ocean Models
2. Ocean Mixing Processes Associated with High Spatial Heterogeneity in Sea Ice and the Implications for Climate Models
3. Cloud Parameterization and Aerosol Indirect Effects
4. Stratocumulus to Cumulus Transition

In anticipation of a third round of CPTs …..

CPT Review Committee of the US CLIVAR Process Study Model Improvement (PSMI) Panel: Amala Mahadevan, Aneesh Subramanian, and Caroline Ummenhofer;

Questionnarie to seven modeling centers / groups:

- NCAR,
- NOAA GFDL,
- NOAA NCEP,
- NASA GISS,
- NASA GMAO,
- DoE ACME,
- ONR NRL

Responses received from all (summarized here);

A CPT scoping workshop under consideration;

Anticipating call for proposals in 2015.

Summary of Responses to the Questionnarie
(based on input from Mahadevan, Subramanian, and Ummenhofer)

Two sections:

1. Lessons from past CPTs (NCAR & GFDL)
2. Model improvement needs and opportunities

CPT Strengths (NCAR and / or GFDL):

- Coordinated multi-institutional and multi-agency research efforts;
- Provides pathway for translating observationally, theoretically, and numerically derived process understanding to climate models; effective in making use of existing (and costly) observational programs;
- Topic choice for CPT determined by 'readiness' of process understanding from community, rather than by modeling center needs; topics that can be addressed within 3-5 years with existing observational data and (mostly) existing process modeling frameworks;
- Encourages multiple different approaches/ideas within a team, which mitigates risks, explores innovative approaches, and facilitates cross-fertilization; effective in building bridges between modeling centers and broader community;
- Collaboration between centers, rather than competition, building bridges among the community and modeling centers;

CPT Strengths (NCAR and / or GFDL):

- Goes beyond diagnosing model problems/biases, but seeks connection between biases and model physics, which is difficult and time consuming; process-focused, not bias-focused;

- Early-mid career CPT leaders and dedicated postdoc and scientific support personnel, all clearly invested in success of CPT; effective training of early career scientists;

- Annual workshop crucial for enhancing and establishing (new) collaborations; such exchange leverages more than what is directly funded;

- Most support going to community, not modeling centers;

- CPTs represent great value: The whole is greater than the sum of its individual components.

CPT Weaknesses (NCAR and / or GFDL):

- Unclear how to fund international collaborations;
- With thematically/temporally overlapping CPTs, key modeling center personnel can be over-taxed;
- Overly narrow proposal categories can lead to funding of weak CPTs;
- Productivity, as measured by publication output, potentially not so great (publication count should not be the metric for success for CPTs);
- Challenge to keep collaborations going after CPTs;
- Funding agency priorities can lead to complications.

How to make CPTs more effective (NCAR and / or GFDL):

There are many more ways that changes could make CPTs less effective and diluted, rather than more effective. Care is needed to build on demonstrated strengths.

- Encourage budgeting for dedicated project manager and technical support (e.g., website, cross-group communication, timely exchange of data, outreach, organizing conference session) to allow the lead-PI to focus on CPT topic. Such a model ensures success/lasting legacy of CPT, rather than funding a collection of loosely connected individual projects;
- Ensure support for annual workshops;
- Allow international collaborators to be funded (strongly suggested by only GFDL);
- Consider coordinating funding mechanisms across agencies;
- Ensure CPTs have focused scientific goals/models, without narrowly confining proposal categories.

Would you recommend CPTs to encompass the cryosphere, land surface, and biogeochemistry, in addition to the ocean and atmosphere?

In principle supportive, but …. not through a single solicitation, which would be too broad and involve too many agency programs, with a great risk of destructive competition within centers, agencies, and the community.

The agencies should decide on the scope of each CPT solicitation so that there are meaningful contributions to their programs and constituents.

An exception might be needed for multi-disciplinary processes.

What aspects of the Earth System Model require most attention?

Earth System Modeling aspects requiring most attention often cite processes at interfaces between different realms, e.g.:

- Ice-ocean interactions and sea-ice dynamics (glacier-fjord models, sea-ice thermodynamics);
- Air-sea interactions (atmospheric boundary processes, near-surface ocean processes);
- All aspects of hydrological cycle and convective parameterizations;
- Coastal/marginal sea processes (estuarine mixing, coastal upwelling);
- Vertical transports and surface processes in ocean (overturning, upwelling, waves);
- Polar feedbacks (ice-albedo, cloud radiative);
- Biogeochemistry (carbon cycle and climate feedbacks, ocean biology, dynamic vegetation);
- Interaction between land (canopy) and atmosphere;
- ....

Strongest model biases (varies across models):

- Double ITCZ, precipitation intensity distribution across all spatio-temporal scales, tropical cyclones;
- Ocean heat uptake, storage, and redistribution, e.g., Southern Ocean;
- biases in tropical ocean SSTs;
- ENSO (e.g., amplitude, periodicity), MJO and other modes of climate variability (PNA, NAO, AO, AMV);
- Coastal upwelling and stratus decks (eastern boundary regions, including ocean biogeochemistry);
- Clouds (e.g., aerosol-cloud interactions, low-level clouds, liquid/ice water content);
- Diurnal cycle over land and ocean;
- Subtropical cloud radiative effects in the Southern Ocean;
- Ice-sheet dynamics and discharge;
- ……

Challenges with modeling climate variability:

Problems seen as emergent phenomena in climate models arising from difficulty in simulating specific processes;

challenging phenomena include internal climate variability (e.g., AMV, ENSO, MJO, monsoon) and distinguishing the variability signal from the model trend;

not enough observations for describing long term climate variability

Specific climate processes with potential to improve models in 3-5 years:

- Meso- and submeso-scale mixing in ocean (waves, tidal mixing); Southern Ocean mixing;
- Cloud microphysics (including aerosols), atmospheric turbulence, aspects of convection modeling (such as convective detrainment, cold pool triggering), cloud-radiation interaction;
- Interaction between marginal seas and open ocean (including freshwater discharge);
- Upwelling (coastal, equatorial) and links to stratus decks (clouds);
- Multi-decadal internal climate variability (AMV), and QBO to be resolved in the stratosphere;
- Increased model resolution and scale-aware parameterizations for various processes;
- Diurnal-to-annual surface processes (land and ocean);
- Ice-sheet atmospheric interactions, ice-sheet dynamics, ice-ocean interactions;
- Terrestrial carbon stores and land surface (surface/subsurface hydrological processes);
- ……

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Responses received from all (summarized here);

A CPT scoping workshop under consideration;

Anticipating call for proposals in 2015.

Working Group on Coupled Modeling (WGCM, co-chaired by S. Bony and C. Senior)

- Ensures good communication between the modeling groups and the WGCM panels (CMIP Panel, WIP)
- Facilitates communication between the CMIP Panel and WCRP Grand Challenges + Theme of collaboration on "Biogeochemical forcings and feedbacks", and WCRP core projects
- Organizes the review of MIP proposals for CMIP6 endorsement

CMIP Panel (V. Eyring (chair), J. Meehl, B. Stevens, R. Stouffer, K. Taylor)

- Sub-committee of the WGCM which is responsible for direct coordination of CMIP
- Oversees the whole CMIP process
- Coordinates the DECK activity and the CMIP Phase X Historical Simulation
- Coordinates and approves endorsement of CMIP6 MIPs
- Oversees and approves scientific content of the CMIP data request
- Facilitates communication between the MIPs, modeling groups and the WIP

WGCM Infrastructure Panel (WIP, co-chaired by V. Balaji and K. Taylor)

- Establishes standards and policies for sharing climate model output and ensure consistency across WGCM activities
- Extends standards as needed to meet evolving needs.
- Reviews and provides guidance on requirements of the infrastructure (e.g. level of service, accessibility, level of security)
- Oversees technical part of the CMIP6 data request and puts it together.

Contribution of MIPs to the three CMIP6 science questions

Short Name of MIP	The experimental CMIP6 design is focused on three broad scientific questions. Please rank the three science questions in order of importance for and input from your MIP (from 1-3 with 1 being most important and 0 for not relevant at all)		
	How does the Earth System respond to forcing?	What are the origins and consequences of systematic model biases?	How can we assess future climate changes given climate variability, predictability and uncertainties in scenarios?
AerChemMIP	1	2	3
C4MIP	1	3	2
CFMIP	1	2	3
DAMIP	1	3	2
DCPP	2	3	1
ENSOMIP	1	2	3
FAFMIP	1	2	3
GeoMIP	1	2	3
GMMIP	1	2	3
HighResMIP	2	1	3
ISMIP6	1	3	2
LS3MIP	2	1	3
LUMIP	1	3	2
OCMIP6	1	1	2
OMIP	3	1	2
PDRMIP	1	2	3
PMIP	1	2	2
RFMIP	1	2	3
ScenarioMIP	2	3	1
SolarMIP	1	2	3
VolMIP	1	2	3
CORDEX	3	2	1
DynVar	2	1	2
GDDEX	1	2	2
SIMIP			
VIAAB	1	3	2

Contribution of MIPs to the six WCRP Grand Challenges and the theme of collaboration (with AIMES) on biospheric forcings and feedbacks

Short Name of MIP	It is proposed to use as the scientific backdrop for CMIP6 the six WCRP Grand Challenges (GC), and an additional theme encapsulating questions related to biospheric forcings and feedbacks. Could you please rank the WCRP GCs and theme of collaboration in order of importance for and input from your MIP (from 1-7 with 1 being most important and 0 for not relevant at all)						
	Clouds, Circulation and Climate Sensitivity	Changes in Cryosphere	Climate Extremes	Regional Climate Information	Regional Sea-level Rise	Water Availability	Theme for collaboration: biospheric forcings and feedbacks
AerChemMIP	2	5	3	4	0	0	1
C4MIP	0	3	0	0	0	2	1
CFMIP	1	4	6	2	7	3	5
DAMIP	4	3	2	1	6	5	7
DCPP	3	3	3	1	3	2	3
ENSOMIP	1	7	3	2	6	4	5
FAFMIP	3	4	0	2	1	0	0
GeoMIP	1	3	4	2	0	5	6
GMMIP	2	0	4	1	0	3	0
HighResMIP	1	5	3	4	6	2	7
ISMIP6	5	1	6	4	2	3	7
LS3MIP	0	2	3	4	5	1	6
LUMIP	0	0	4	2	0	3	1
OCMIP6	2	7	1	3	7	7	2
OMIP	4	3	0	2	1	0	5
PDRMIP	1	0	2	4	0	3	0
PMIP	2	3	5	4	6	7	1
RFMIP	1	7	4	2	5	6	3
ScenarioMIP	7	6	3	1	4	5	2
SolarMIP	2	3	4	1	3	0	0
VolMIP	1	4	5	3	6	7	2
CORDEX	5	4	2	1	0	3	6
DynVar	1	3	2	2	0	7	3
GDDEX	5	5	1	1	3	3	5
SIMIP							
VIAAB	7	6	2	1	4	3	5