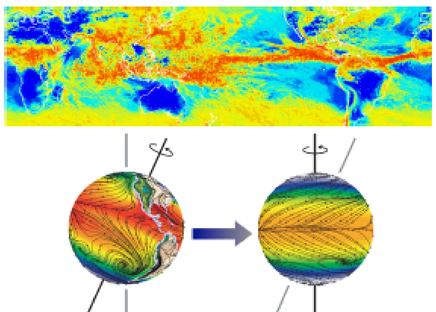
Cloud Feedback Model Inter-comparison Project CFMIP3/CMIP6
http://www.cfmip.net

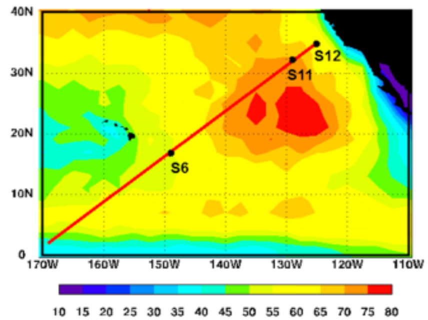
Objective 1: Inform improved assessments of climate change cloud feedbacks by:
a) Improving our understanding of cloud-climate feedback mechanisms.
b) Improving evaluation of clouds and cloud feedbacks in climate models.

CFMIP3/CMIP6 Hierarchy
T/q budgets, cfSites



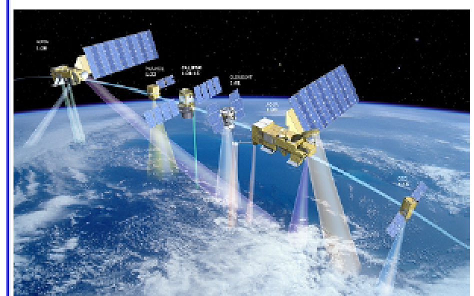
CMIP6/CFMIP3

CFMIP Intercomparison
of SCM/LES



CGILS

Exploitation of Sat Obs
via Simulators in CMIP



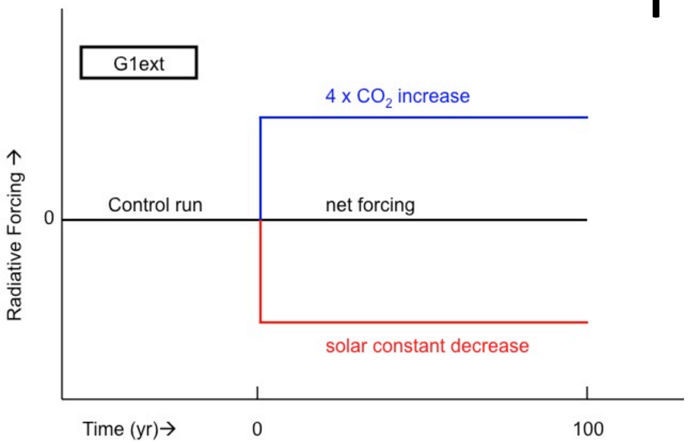
COSP

Objective 2: To use the CFMIP experimental hierarchy and process diagnostics to better understand other aspects of the climate response, such as changes in circulation, regional-scale precipitation and non-linear change.

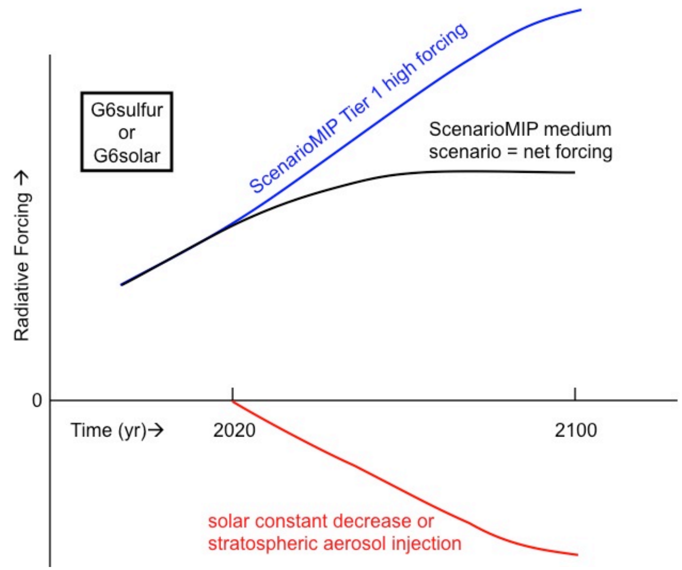
CFMIP is most relevant to the CMIP question ”How does the Earth System respond to forcing?” although it is also strongly relevant to ”What are the origins and consequences of systematic model biases?”

CFMIP is most relevant to the Grand Challenge on Clouds, Circulation and Climate Sensitivity.

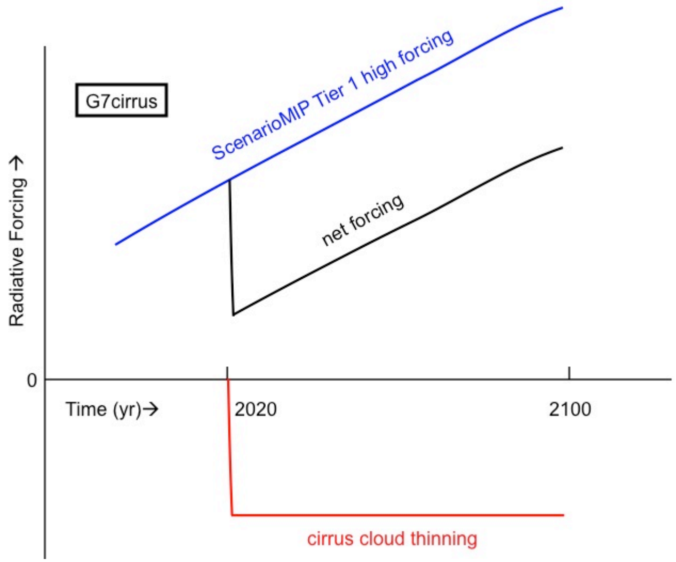
The Geoengineering Model Intercomparison Project Phase 6 (GeoMIP6)



G1ext: How would geoengineering affect changes in less easily detectable climate features, such as extreme events, modes of natural variability, and regional impacts?



G6sulfur/G6solar: What are common model responses if geoengineering is used to partially offset climate change? What are robust differences between solar reduction and stratospheric aerosols?



G7cirrus: What are commonalities and differences among model responses to cirrus cloud thinning? How do cirrus thinning responses, particularly on the hydrological cycle, compare to those from solar radiation reduction?

This newest phase of GeoMIP is designed to address the emergent gaps in geoengineering research while providing complementary information about the climate system's response to forcing.

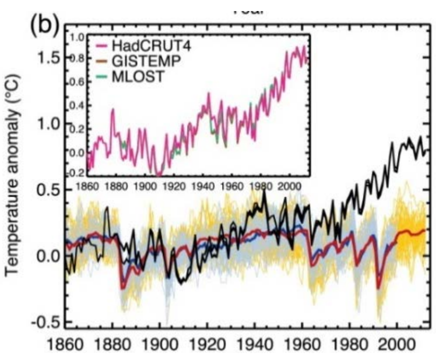
More information can be obtained from the GeoMIP website http://climate.envsci.rutgers.edu/GeoMIP or by emailing Ben Kravitz (ben.kravitz@pnnl.gov)

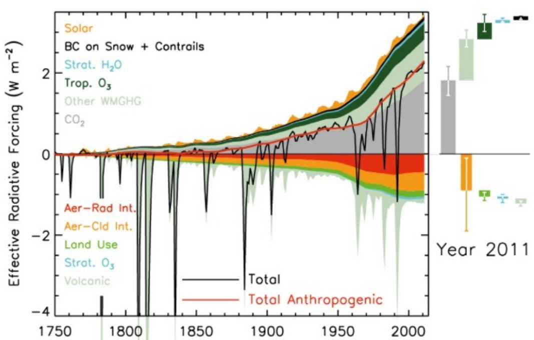
AerChemMIP

Quantifying chemistry and aerosols in the CMIP6 models

CMIP6: "How does the Earth system respond to forcing?".

- How have short-lived species and ODS emissions contributed to global ERF and affected regional climate over the historical period?
- How have WMGHGs forced climate (including through their chemical impacts) over the historical period?
- How will future policies (on climate and air quality) affect short-lived species and their climate impacts.

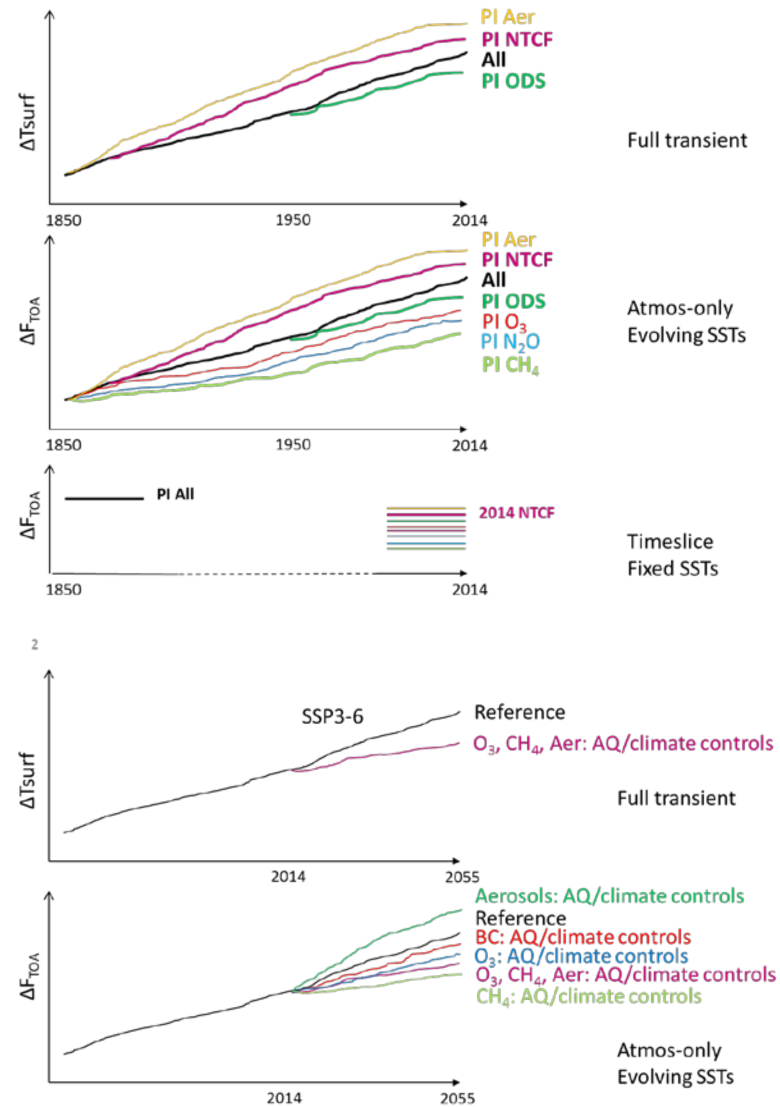




Diagnostics

Additional output need for CMIP DECK, AerChemMIP and associated MIPs (RFMIP, SCENARIOMUP, LUMIP)

- Column burdens of aerosols and chemical tracers,
- Forcing diagnostics
- Aerosol and reactive gas diagnostics
  - Assess model performance
  - Air quality impacts.



Ocean Model Inter-comparison Project (OMIP)

Co-chairs

Gokhan Danabasoglu (NCAR, USA), Stephen M. Griffies (NOAA/GFDL, USA), and James Orr (IPSL, France)

- OMIP addresses the CMIP6 science question on investigating the origins and consequences of systematic model biases.
- Among the WCRP Grand Challenges (GCs), OMIP directly contributes to the decadal climate variability and prediction topic which is being considered as a new GC.
- OMIP is independent of any CMIPX.

OMIP includes the previously separate Ocean Carbon Model Inter-comparison Project (OCMIP). This merging of ocean physical, chemical, and biogeochemical efforts into a single project allows for efficient communication across these communities participating in CMIP6.

Schematic of OMIP Overview

OMIP

PART I
Diagnostic analysis of CMIP6 ocean components
- Physics
- Inert chemistry
- Biogeochemistry (BGC)

PART II
Forced ocean – sea-ice hindcast simulations following the CORE-II protocol

TIER 1 (OMIP-A)
One 310-year simulation forced with the inter-annually varying CORE-II atmospheric datasets for the 1948-2009 period (5 repeat forcing cycles):

Path I: physics + chemistry

Path II: physics + chemistry + BGC

BGC fields are initialized from observations

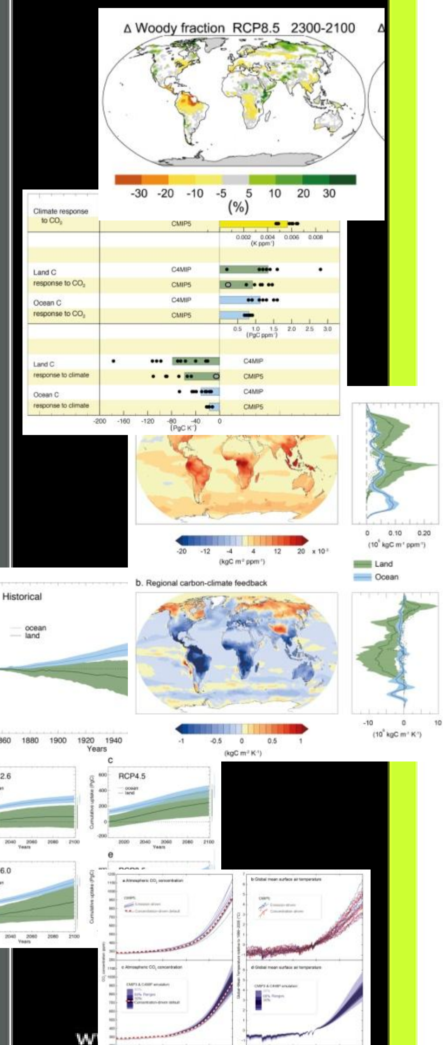
TIER 2 (OMIP-B)
Same as Path II of Tier 1, except that BGC fields are initialized from spun-up fields

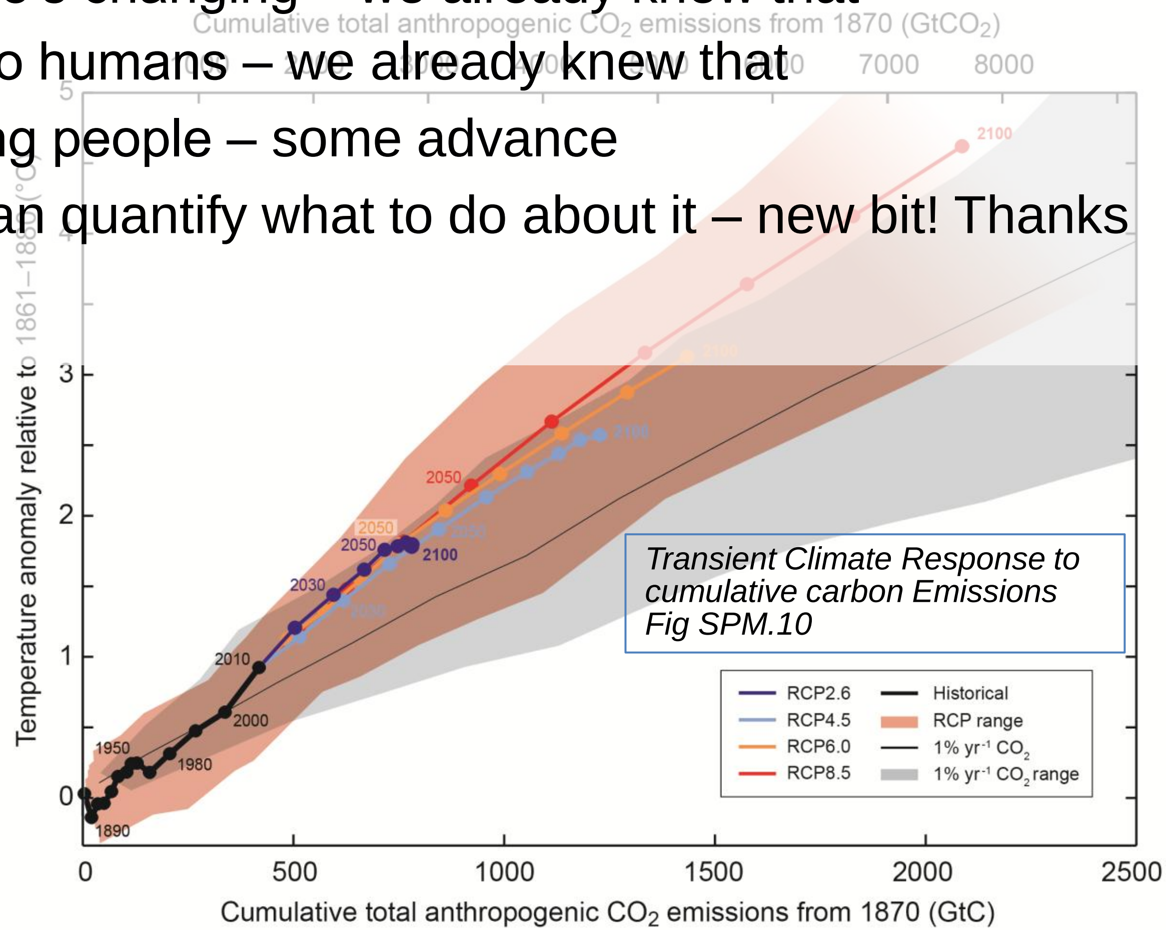
C4MIP 1. what we did

Contributed strongly to AR5 WG1: carbon cycle (Ch.6), projections (Ch.12), evaluation (Ch.9) and TCRE (SPM)

AR5 WG1 said:

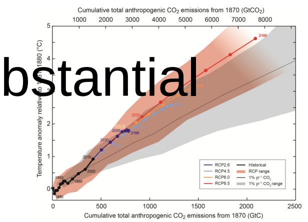
- The climate's changing – we already knew that
- It's down to humans – we already knew that
- It's affecting people – some advance
- Now we can quantify what to do about it – new bit! Thanks to C4MIP





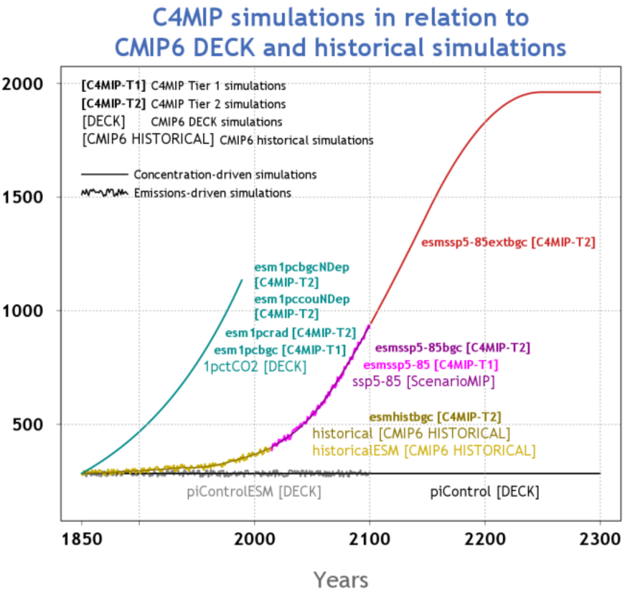
Met Office
Hadley Centre

C4MIP 2. what we're going to do



TCRE was a defining aspect of AR5, but has substantial uncertainty which hinders usefulness

The primary aim of C4MIP is to understand and quantify future (century-scale) changes in the global carbon cycle and its feedbacks on the climate system, making the link between CO_2 emissions and climate change. This objective is obtained through idealized, historical and future scenario experiments



Cycle of:

- process development/analysis (1%DECK with BGC/RAD coupled, +new N-cycle options)
- evaluation (E-driven CMIP6 HIST, +PICTL)
  NOTE – part of DECK requirement!
- projection (E-driven high scenario, SSP 5-8.5; C-driven BGC-coupled SSP5-8.5 plus extension)

PMIP: Paleoclimate Modelling Intercomparison Project

Proposal for CMIP6: 5 key periods. ★ Entry cards, all other runs Tier 1

Interests

Last Millenium
850-1850 AD

- Observed multidecadal (and more) variability
- Internal variability vs external forcings

Mid-Holocene ★
6000 yrs ago

- Enhanced hydrological cycle (monsoons)
- Warmer climate in NH

Last Glacial Maximum ★
21000 years ago

- Extreme cold climate (low CO_2, ice-sheets)
- Constraints on climate sensitivity?

Last Interglacial
~127000 years ago

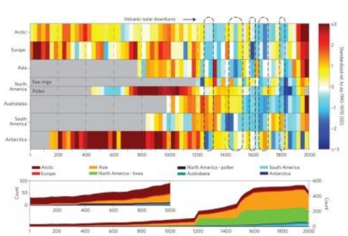
- Warm period
- Smaller ice-sheets/ high sea-level stand

Mid-Pliocene Warm Period
~3.2 milllion years ago

- Long-term response to 400ppm CO_2
- High sea-level stand

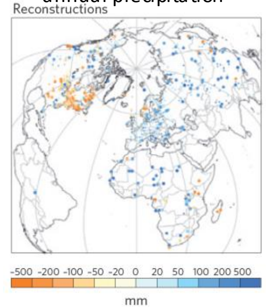
All simulations are basis for additional sensitivity of transient experiments in PMIP

Paleodata

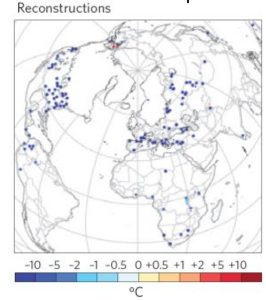


PAGES2K, Nature Geosicence 2013

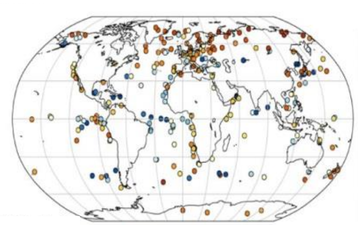
annual precipitation

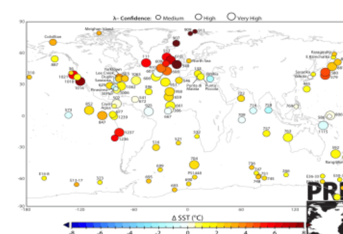


coldest month temperature



maximum annual warmth





(Dowsett et al., Nature Climate Change, 2012)

Data: Bartlein et al, 2011
Figure from Braconnot et al, Nature Climate Change 2012

PMIP will address all CMIP6 science questions:
Earth system response to forcings, origins/consequences of systematic model biases, assessment of simulated future climate changes given climate variability

Land-Use Model Intercomparison Project (LUMIP)

Co-chairs: David Lawrence[1] and George Hurtt[2]
SSG: Almut Arneth, Victor Brovkin, Kate Calvin, Nathalie de Noblet-Ducoudré, Andrew Jones, Chris Jones, Peter Lawrence, Julia Pongratz, Sonia Seneviratne, Elena Shevliakova
https://cmip.ucar.edu/lumip
[1] National Center for Atmospheric Research, USA [2] University of Maryland, USA

LUMIP
Land Use Change

Goals

Develop updated historic and future harmonized land use dataset and execute series of idealized and realistic simulations designed to address the following questions and topics:

Main Questions

- What are the effects of land use and land-use change on climate and biogeochemical cycling (past-future)?
- Are there regional land management strategies with promise to help mitigate and/or adapt to climate change?
- (What are the effects of climate on land-use and land-use change?)

Additional focal topics

- Assess relative contribution of fossil fuel vs. land use change to climate and BGC
- Isolate biogeochemical vs. biogeophysical impacts of land use
- Explore land cover change vs. land management change impacts
- Assess how land use impact is modulated by land-atmosphere coupling strength
- Determine extent that global CO_2 fertilization is modulated by land use change

Major Activities

Model metrics and diagnostics

- Develop metrics to assess/quantify model performance with respect to land use impacts on climate

Data standardization

- Repeat and mature land use harmonization process with enhanced land-use data set passing maximum amount of common information between relevant communities
- Provide additional required land management data
- Data output standardization: new variables, subgrid/tile variables

Model experiments

Phase 1 - Idealized model experiments:

- Improve process understanding/assessment of how models represent impact of changes in land state on climate
- Quantify sensitivity to potential land cover and land management changes

Phase 2 - Realistic model experiments:

- Isolate impact of LULCC on climate relative to other forcings

Land Use Harmonization Dataset (LUHv2)

Years: 850 to 2100
Resolution: 0.25°

New Land Use History

Hyde 4- based Landsat F/NF
Updated Forest Biomass
Shifting Cultivation update

New Management Layers

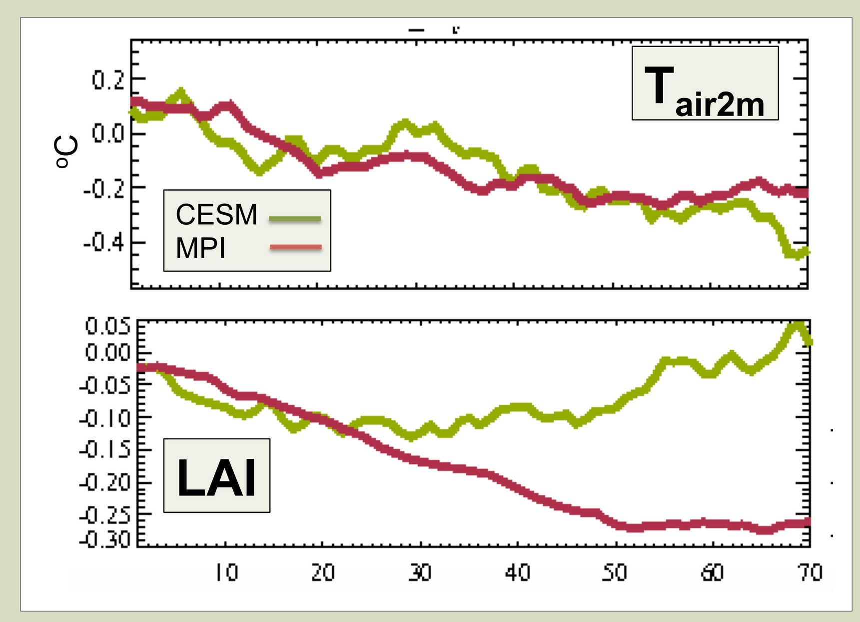
Agriculture
Fraction of cropland irrigated
Fraction of cropland flooded
Fraction of cropland fertilized
Fertilizer application rates
Fraction of cropland tilled
Fraction of cropland for biofuels
Wood Harvest
Fraction used for industrial products
Fraction used for commercial biofuels
Fraction used for fuelwood

	Pri F	Pri NF	Sec F	Sec NF	C3 Ann	C4 Ann	C3 per	C4 per	C3 N-Fix	Pasture	Rangeland	Urban
Pri F												
Pri NF												
Sec F												
Sec NF												
C3 Ann												
C4 Ann												
C3 Per												
C4 Per												
C3 N-Fix												
Pasture												
Rangela nd												
Urban												

New Future Scenarios

Six futures, SSP-based

Idealized Experiments



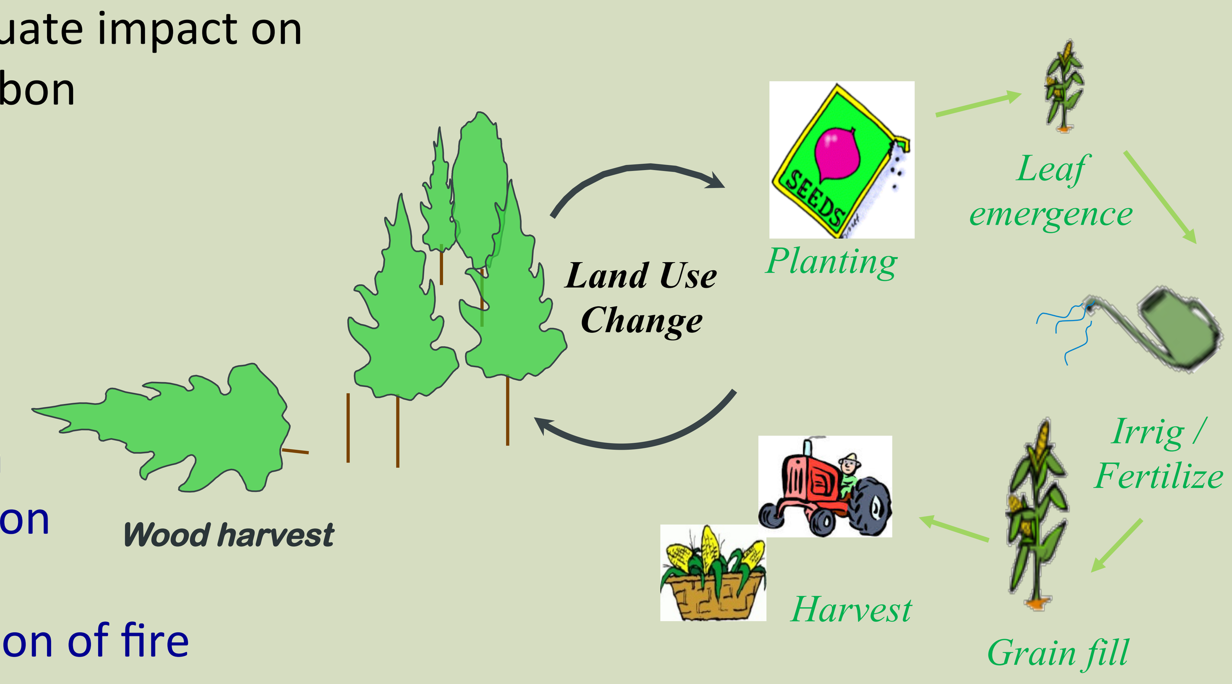
Global deforestation:

Remove 20 million km² of forest over 50 years and examine mean and transient response

Land Management Experiments

Set of expts with incrementally more comprehensive treatment of land cover and land management change; Evaluate impact on fluxes of water, energy, and carbon

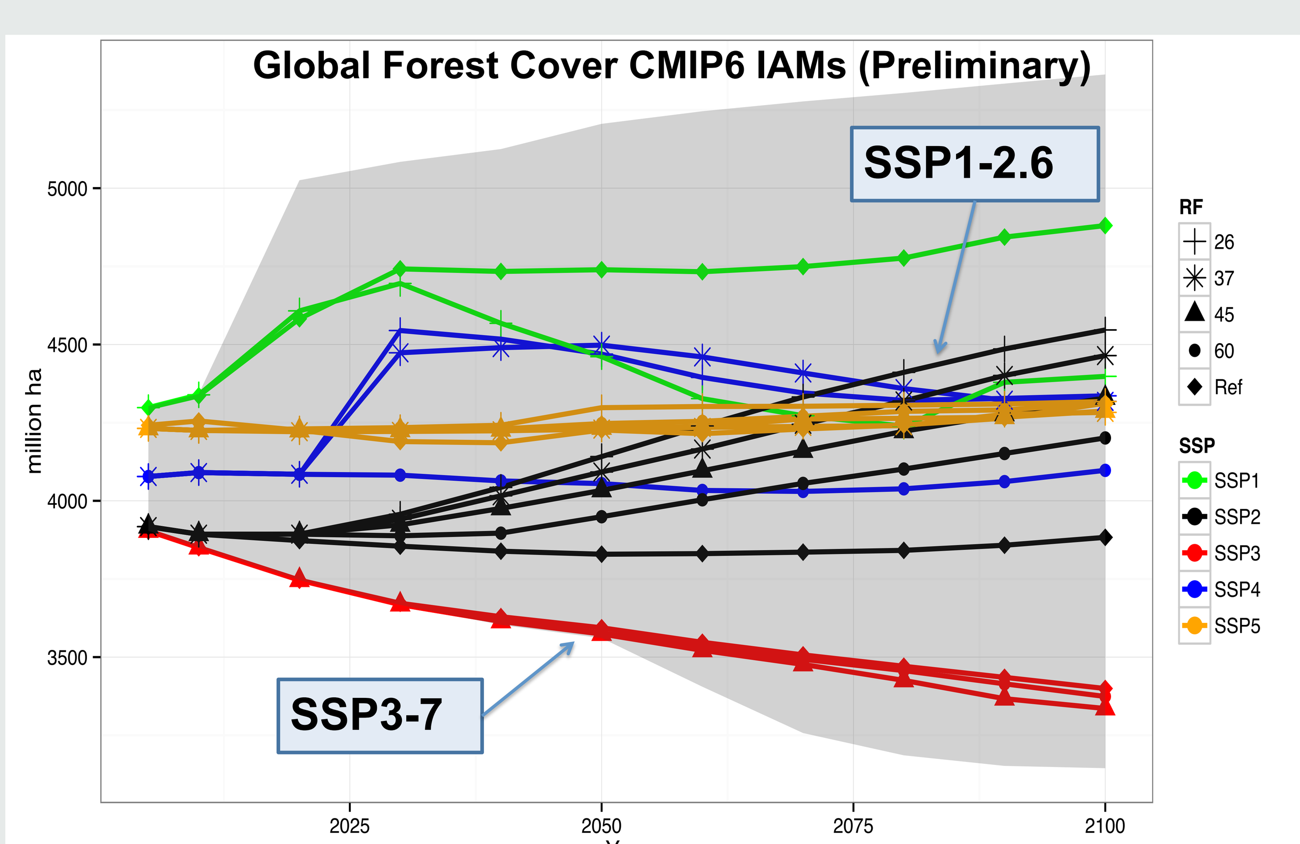
- LULCC (equiv to LMIP-H)
- No LULCC
- Grassland crop
- Prognostic crop model
- Prognostic crop, no irrigation
- Prognostic crop, no fertilization
- No Wood harvest
- No human ignition/suppression of fire



Historic and Future Experiments

- **Historic expt:** No LULCC experiment to compare to CMIP6 historical to assess LULCC impact on temperatures, water, and carbon cycle
- **Future expts:** Assess how targeted land management could contribute to climate change mitigation and reductions in CO_2 emissions

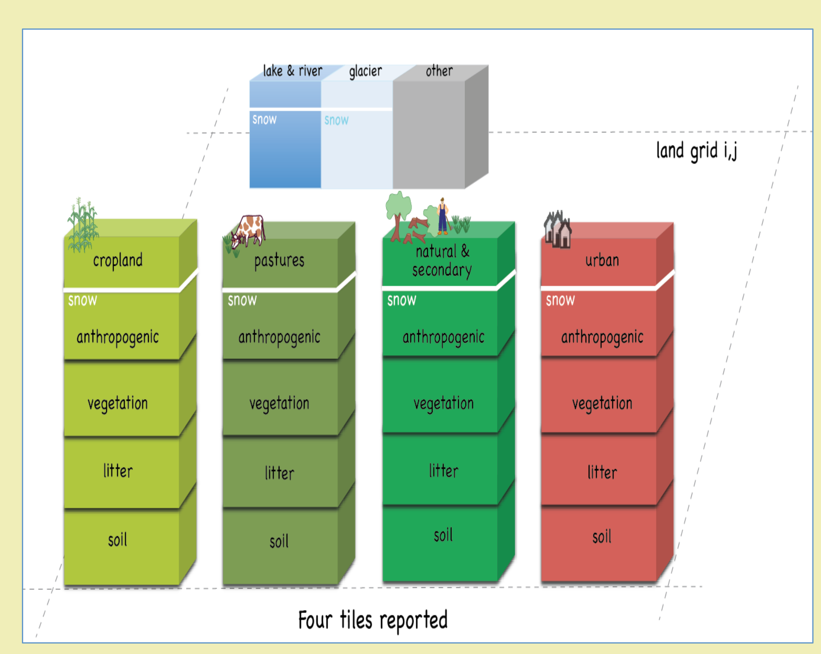
ScenarioMIP C4MIP	SSP3-7 (T1, LE, conc)	SSP1-2.6 (T1, conc)	SSP5-8.5 (T1, emis)
LUMIP	Afforest_sens (T1, conc) w/ SSP1-2.6 land use	Deforest_sens (Tier 1, conc) w/ SSP3-7 land use	Afforest_mitigation (Tier 1, emis) w/ SSP1-2.6 land use

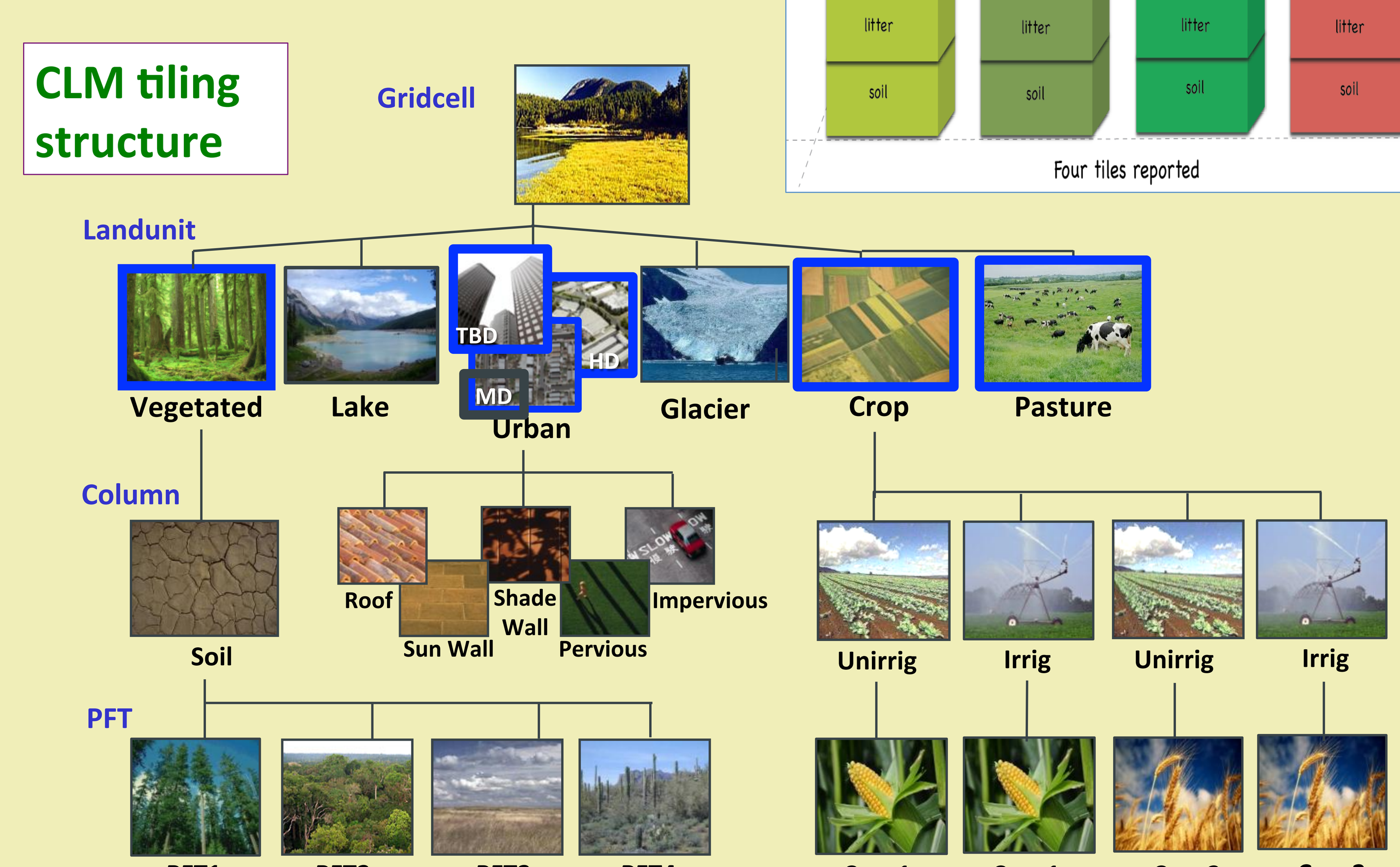


Subgrid data request

LUMIP is requesting sub-grid information for four sub-grid categories (i.e., tiles)for selected variables to permit more detailed analysis of land-use induced surface heterogeneity. The four categories are:

(1) Primary and secondary land
(2) Cropland
(3) Pastureland
(4) urban

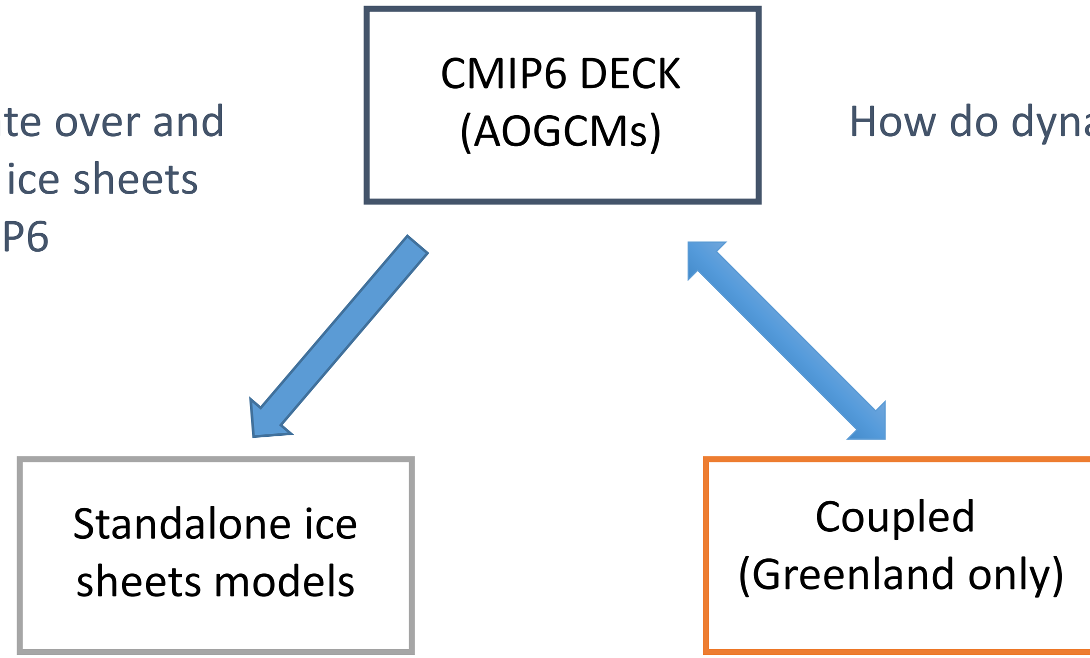




Ice Sheet Model Intercomparison Project for CMIP6 (ISMIP6)
Experimental framework

Forcing
Analysis of climate over and surrounding the ice sheets for selected CMIP6 experiments

Feedbacks
How do dynamic ice sheets affect climate?



Projections
Sea level change due to ice sheets, along with associated uncertainty due to ice physics and climate forcing

ISMIP6
Ice Sheet Model Intercomparison Project for CMIP6

CliC
Climate and Cryosphere

Radiative Forcing Model Intercomparison Project (RFmip)

Robert Pincus, Piers Forster, Björn Stevens

Our goal is to disentangle variability in radiative forcing from variability in response in CMIP models

Activity 1: Characterize effective radiative forcing using *fixed SST* atmos. model integrations

- Tier 1:180 y to diagnose present-day forcing in detail
- Tier 2: ~750 y to diagnose time-varying forcing, 60 y to diagnose aerosol linearity
- Lightweight specialized diagnostics to help diagnose adjustments (especially clouds)

Activity 2: Assess the accuracy of clear-sky forcing against reference calculations

- Offline radiative transfer calculations to assess parameterization accuracy in clear, clean skies
- Provide highly-detailed snapshots for assessment of aerosol radiative transfer
- RFMIP will provide reference line-by-line calculations

Activity 3: Enable D+A of aerosol RF using simulations with specified aerosol forcing

- Tier 1: ~500 y coupled all-forcing simulations
- Tier 2: ~1100 y coupled to isolate impacts of aerosol forcing
  - ~1100 y atmos.-only to assess effective forcing, biases

RFMIP informs CMIP6 historical simulations (secondarily, 4xCO_2)

RFmip directly addresses all CMIP questions

- *response to forcing* because accurate forcing is needed to scale response
- *systematic biases* because assessments will uncover such biases
- *future changes* because errors in forcing impact response

HighResMIP

Rein Haarsma KNMI (lead)
Malcolm Roberts Met Office (co-lead)

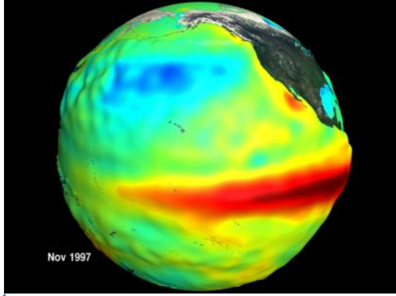
- Important weather and climate processes emerge at sub-50km resolution
- They contribute significantly to both large-scale circulation and local impacts, hence vital for understanding and constraining regional variability
- How robust are these effects?
- Is there any convergence with resolution across models?

Need coordinated, simplified experimental design to find out

CMIP6 main question: Origins and consequences of model biases

Experimental protocol:
Global models – ForcedAtmos and Coupled
Physical climate system only
Integrations: **1950-2014/2050**
Ensemble size: >=1 (ideally 3)
Resolutions: **<25km HI and ~60-100km STD**
Aerosol concentrations specified
19 models confirmed for Tier 1 (ForcedAtmos)

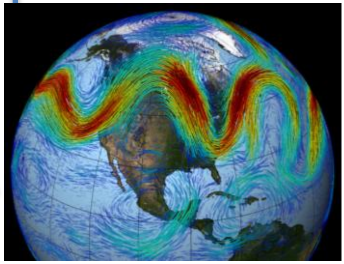
e.g. Zhao et al, 2009; Haarsma et al, 2013; Demory et al, 2014

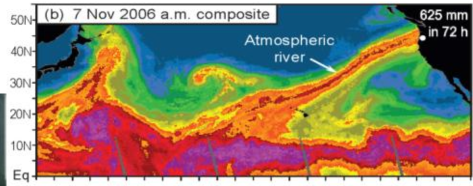


Global drivers

Regional variability

Feedbacks to large scale



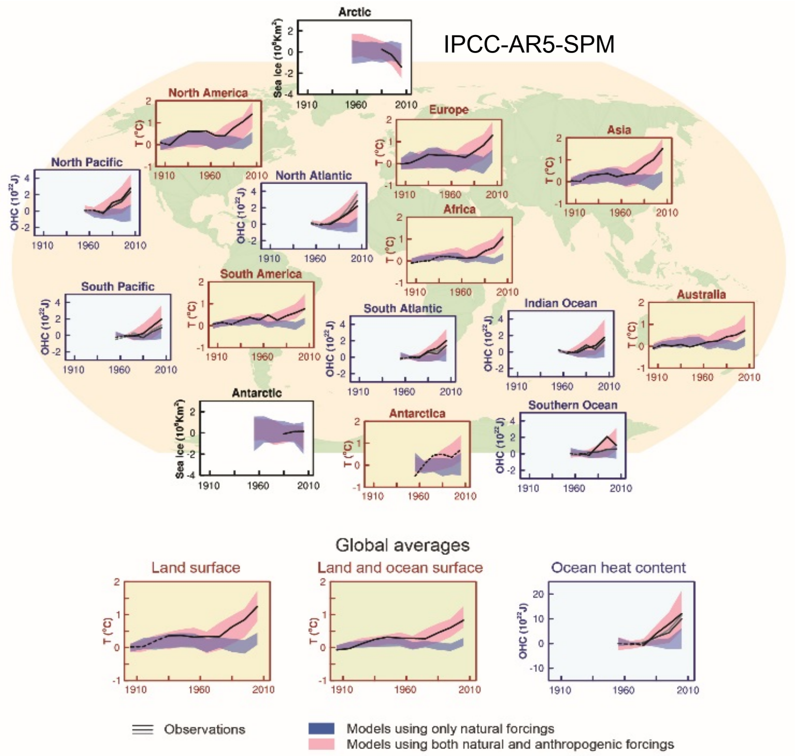


Local processes

Impacts, extremes

Detection and Attribution Model Intercomparison Project (DAMIP)

Hideo Shiogama (National Institute for Environmental Studies, Japan)



The primary goal of DAMIP is D&A of climate changes.

Tier 1	Tier 2	Tier 3
All (3 members)	GHG-only	Volcanic-only
Natural-only	Stratospheric Ozone Only	Solar-only
well-mixed GHG-only	Stratospheric Ozone Only	Anth-Aerosols-only
Anth-Aerosols-only		ALL with alternate estimates of aerosols
		ALL with alternate estimates of natural forcing

Historical (1850-2020, 3 members)
SSP2-4.5 (2021-2100, 1 members)

These DAMIP experiments and synergies with other MIPs are important to understand “the Earth system respond to forcing (CMIP6-1)”, “the origins and consequences of systematic model biases (CMIP6-2)” and assess “future climate changes (CMIP6-3)”.

Decadal Climate Prediction Project (DCPP)

Component A: hindcasts

- How skilful are decadal predictions?
- Also needed for bias correction

Component B: forecasts

- Will the AMOC continue to decline?
- What are the climate impacts?

Component C: mechanisms

- What are the mechanisms giving rise to skill?
- Focus on the warming slowdown...
- ...and the impact of volcanoes

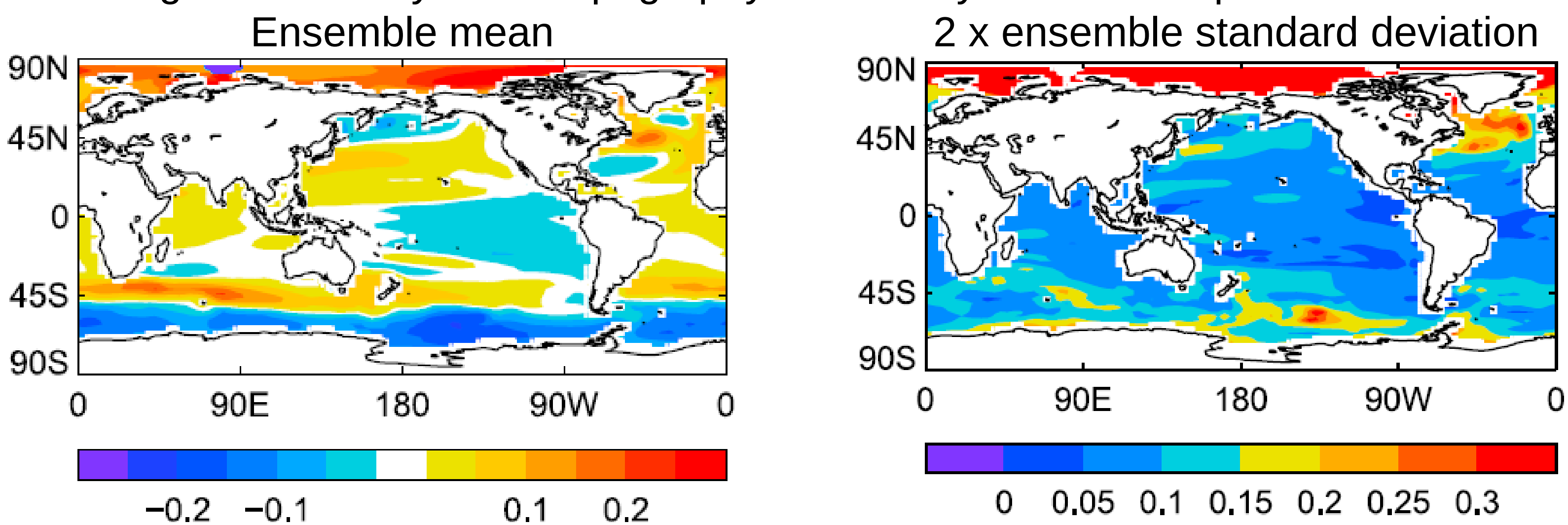
Flux-anomaly-forced model intercomparison project

Steering committee: Jonathan Gregory (Univ. of Reading, and Met Office); Stephen Griffies (GFDL); Detlef Stammer (CEN, Univ. of Hamburg)

Participating groups: ACCESS CanESM CNRM/CERFACS GFDL GISS IPSL MIROC6 MPI-ESM MRI-ESM UKESM

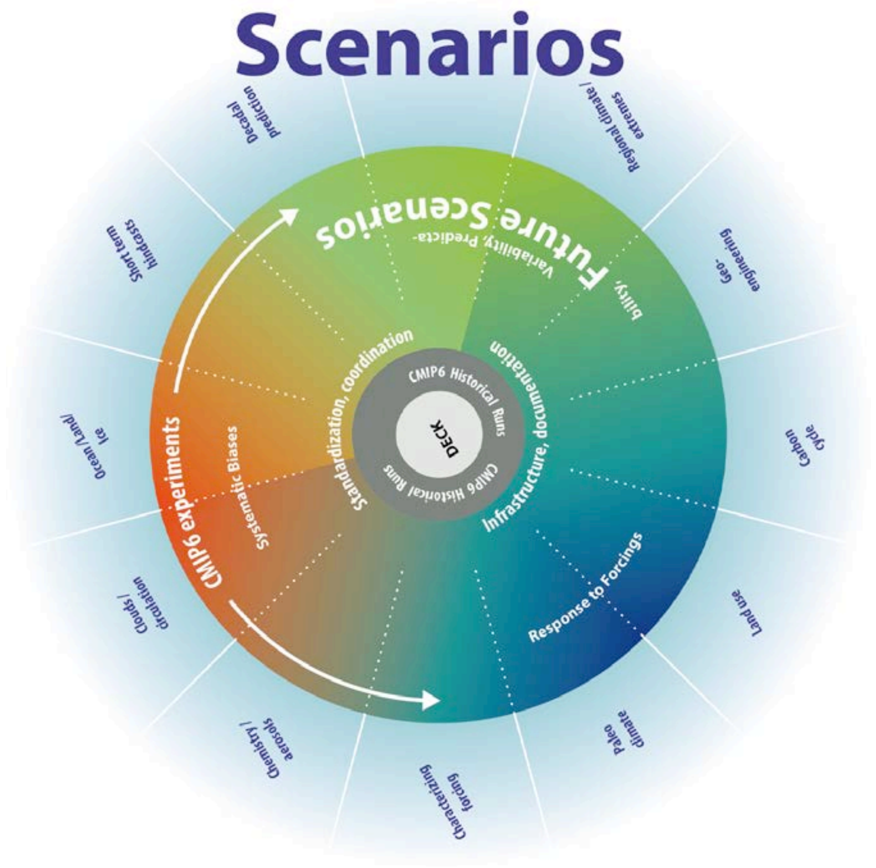
- AOGCM intercomparison project aiming to account for spread in simulated ocean response to changes in surface fluxes resulting from CO_2 forcing.
- Targets the CMIP6 science question on the Earth system response to forcing, and of particular relevance to the WCRP Grand Challenge on sea level rise and regional impacts.
- Prescribed set of surface flux perturbations (of momentum, heat and freshwater), applied separately to the ocean water surface, obtained from the ensemble-mean changes simulated at time time of doubled CO_2 by CMIP5 AOGCMs under the 1pctCO2 scenario.

Change in ocean dynamic topography after 100 years under 1pctCO2 in CMIP5



ScenarioMIP: Key Goals and Experimental Design

Co-chairs: Brian O'Neill, Claudia Tebaldi, Detlef van Vuuren
SSC: Veronika Eyring, Pierre Friedlingstein, George Hurtt, Reto Knutti, JF Lamarque, Jason Lowe, Jerry Meehl, Richard Moss, Ben Sanderson
Collaborators: Keywan Riahi, Elmar Kriegler, Kate Calvin



ScenarioMIP coordinates a set of climate model runs based on alternative **plausible future scenarios** in order to:

- **Facilitate integrated research** across climate science, adaptation and mitigation research communities.
- Provide a basis for **addressing targeted science questions** regarding the climate effects of particular aspects of forcing.
- Facilitate research and development of methods **quantifying projection uncertainties based on multi-model ensembles**.

Three tiers of experiments:

- Providing **continuity with CMIP5**;
- Filling **gaps in Radiative Forcing** levels;
- Characterizing **internal variability**;
- Exploring **changes beyond 2100**;
- Tracing an **overshoot** pathway.

Land Surface, Snow 3 MIP Soil moisture

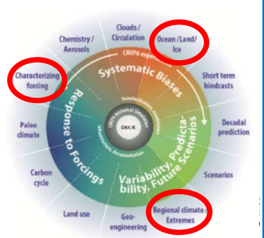
Land Surface, Soil moisture and Snow Model Intercomparison Project

Bart van den Hurk (hurkvd@knmi.nl)
Hyungjun Kim (hjkim@rainbow.iis.u-tokyo.ac.jp)
Gerhard Krinner (krinner@ujf-grenoble.fr)
Chris Derksen (Chris.Derksen@ec.gc.ca)
Sonia Seneviratne (sonia.seneviratne@ethz.ch)
Taikan Oki (taikan@iis.u-tokyo.ac.jp)

Land Surface, Snow and Soil Moisture MIP (LS3MIP)

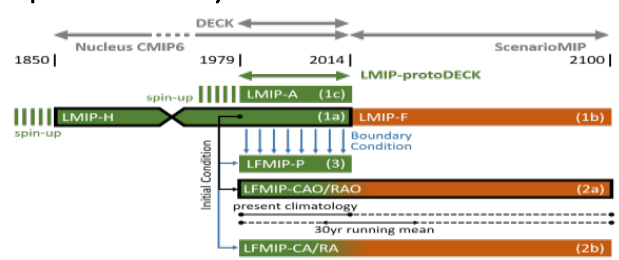
Overview and scientific goal

- Multi-model based **reanalysis of land surface** (from early 20th century)
- Explore **land-atmosphere coupling** and its impacts (for climate trends, water resources, predictability)
- Link patterns and trends of ECVs to **model properties and biases**



Experimental design

- **Offline land model simulations** (LMIP): historic and future, for climate analyses and boundary conditions
- Coupled simulations with **prescribed land surface states** (LFMIP): for diagnosing land surface role and coupling strength
- **Potential predictability** experiments (LFMIP-P): for detecting trends in predictability



Participating models

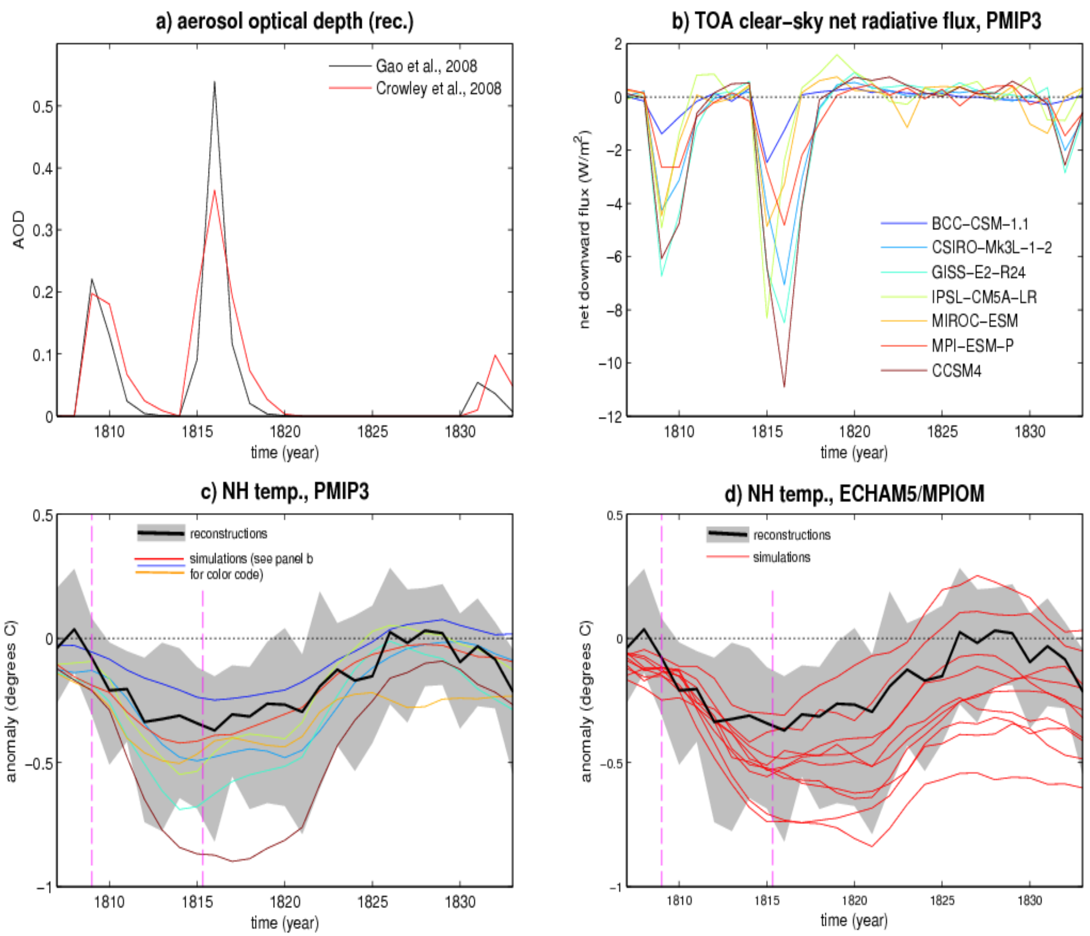
ACCESS
BCC-CSM2-MR
CanESM
CESM
CMCC
CNRM-CM
EC-Earth
FGOALS
GFDL
GISS
IPSL-CM6
MIROC6-CGCM
MPI-ESM
MRI-ESM1.x
NorESM
UKESM

Toward a coordinated modeling assessment of the climate response to strong volcanic eruptions (VolMIP)

Davide Zanchettin, Claudia Timmreck, Myriam Khodri, Graham Mann, Angelo Rubino, Matthew Toohey

Simulating volcanically-forced climate variability is a challenging task for climate models.

The model intercomparison project on the climate response to volcanic forcing (VolMIP) defines a protocol for idealized volcanic-perturbation experiments to improve comparability of results across different climate models.



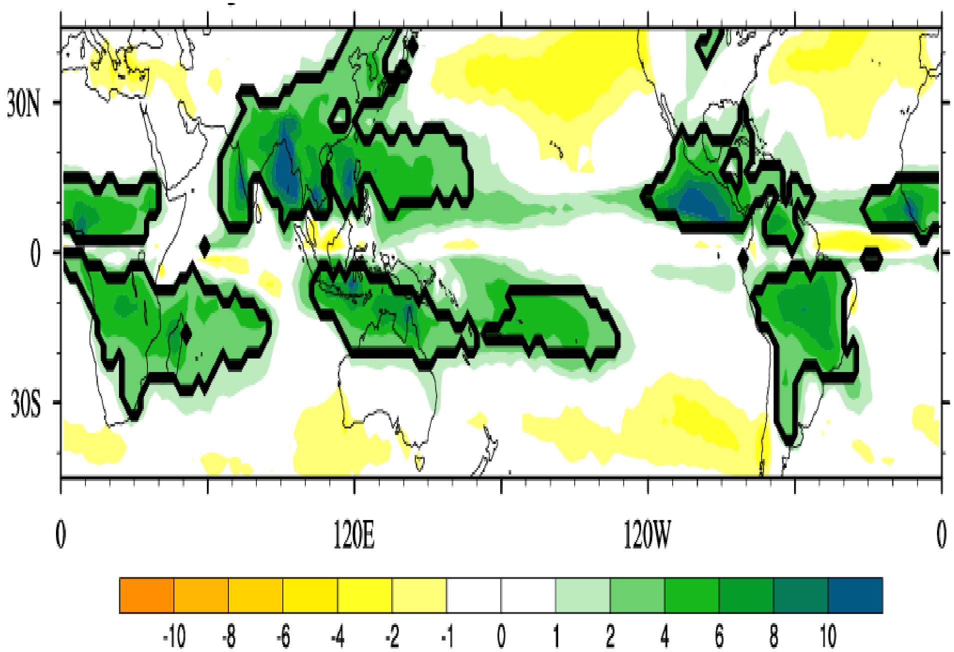
Uncertainty in radiative forcing and climate response for the early-19th-century eruptions.

VolMIP – Experimental design

VolShort	VolLong
seasonal-to-interannual atmospheric response to a 1991 Pinatubo-like volcanic eruption	decadal climate response to very strong volcanic eruptions (Tambora, Laki)
disentangling the role of surface cooling and stratospheric warming for the short-term atmospheric dynamical response	signal propagation pathways of volcanic perturbations within the coupled atmosphere-ocean system
impact of volcanic forcing on seasonal-to-interannual climate predictability (with DCPP)	

Global Monsoons Model Inter-comparison Project: GMMIP

1. What are the relative contributions of internal processes and external forcings that have driven evolution of global monsoons over the CMIP historical period?
2. To what extent and how does ocean-atmosphere interaction affect the interannual variability and predictability of monsoons?
3. How well can high-resolution models with improved dynamics and physics help to reliably simulate monsoon precipitation and its variability and change?



Tier-1: AMIP simulation over 1870-2014
Tier-2: Pacemaker Exps of fully coupled model, 20th century historical climate simulation with observed SST nudging in the IPO/AMO domains, respectively.
Tier-3: AMIP-type sensitivity simulation over 1979-2014 by reducing the altitude and sensible heating of the Tibetan – Iranian Plateau and other highlands.

A least 3 members are required to estimate uncertainty.

Sea Ice MIP

The philosophy behind SIMIP is very simple.

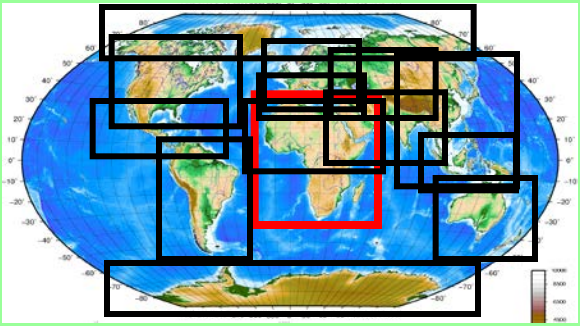
We want to get prepared now
for the sea-ice related questions
that we will be asking tomorrow.

Contact this week: Dirk Notz, dirk.notz@mpimet.mpg.de

CORDEX: Plans for future directions

F. Giorgi (ICTP), W. Gutowski (Iowa State U.) and the CORDEX SAT

Proposed common framework



Minimum core sets of RCMs and driving GCMs
Target resolution: dx ~ 12 km
Selection of driving GCMs based on objective criteris
Interactions with Scenario-MIP
Comparison with HIghRes-MIP
Enhanced input in the next IPCC cycle

Flagship pilot studies

Added value to scale down to convection permitting scales
Effects of regional forcings (landuse,aerosols)
Comparison of different techniques (RCM,ESD)
Study of phenomena relevant for regional climate through targeted experiments
HIgh quality, high resolution observations
Development of regional Earth System models models
Interaction with other WCRP programs (e.g.GEWEX)
End-to-end, climate-> VIA studies

SPARC DynVar Diagnostic MIP

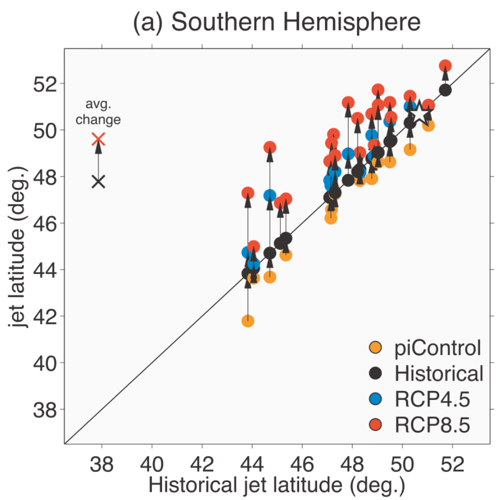
SPARC Stratosphere-troposphere Processes And their Role in Climate

On the Dynamics and Variability of the Stratosphere-Troposphere System

DynVarMIP proposes a set of diagnostics (variability, atmospheric momentum and heat balances) to enable a mechanistic approach to confront model biases and understand the underlying causes behind circulation changes.
DynVarMIP focuses on the DECK experiments.

Motivation: Inter-model spread in the atmospheric circulation of CMIP5 modes is often larger than the response to climate change

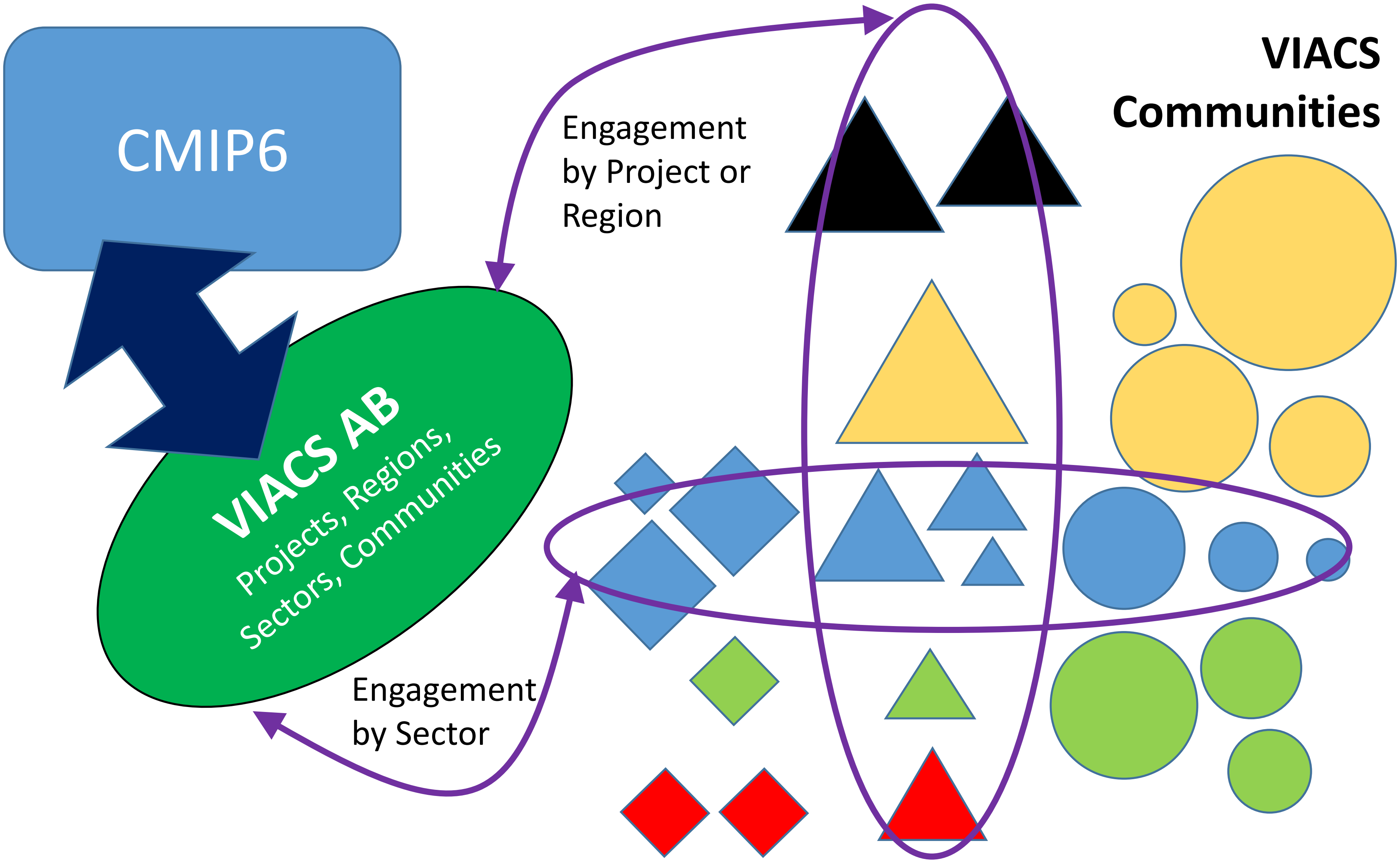
Mean jet position and its change (Barnes and Polvani JC 2013)



SPARC DynVar Workshop 2016:
Finnish Meteorological Institute
Helsinki, Finland
6-10 June 2016

Workshop theme:
The Large-Scale Atmospheric Circulation: Confronting Model Biases and Uncovering Mechanisms

VIACS Advisory Board – Allows for coordinated interaction between CMIP6 and VIACS Communities



Overview of the Earth System Model Snow Model Intercomparison Project (ESM-SnowMIP)

Gerhard KRINNER

Has been amalgamated into Poster 14 (LS3MIP)

obs4MIPS: Observations for CMIP6 Model Evaluation

https://www.earthsystemcog.org/projects/obs4mips/

WCRP Data Advisory Council (WDAC)

Task Team on observations for climate model evaluation

WDAC Task Team Members

Peter Gleckler, co-chair, PCMDI
Duane Waliser, co-chair, JPL
Sandrine Bony, IPSL
Mike Bosilovich, GSFC
Helene Chepfer, IPSL
Veronika Erying, DLR
Robert Ferraro, JPL
Pierre-Phillipe Mathieu ESA
Jerry Potter ,GSFC
Roger Saunders, UKMO
Jörg Schulz, EUMETSAT
Karl Taylor, PCMDI/DOE
Jean-Noël Thépaut, ECMWF

Overview

Products available via obs4MIPs are:

- Directly comparable to CMIP5 model output
- Documented, with traceability to track version changes
- Served through ESGF in parallel to CMIP data
- To date limited to satellite data but likely to expand

Guidelines for contributing data to obs4MIPs

Observationally-based products made available via obs4MIPs:

- Prepared with CMOR and structured like CMIP output
- Include a technical note conforms to obs4MIPs template
- Match a model variable in the CMIP5 protocol
- Have an estimate of the error or uncertainty
- Documented at some level in the peer reviewed literature
- Version controlled; reside in a long term archive
- Span a time period long enough to be of use for model comparison (5 years is advisable).

Related efforts for reanlayses

Ana4MIPS: A CoG "peer project" with obs4MIPs, providing a collection of fields from selected major reanalysis well suited for comparison with CMIP simulations (mostly dynamical fields).

CREATE-IP: A resource for reanalysis data in a centralized location on NASA's NCCS Advanced Data Analytics Platform (ADAPT), standardizing data formats, providing analytic and visualization capabilities, and overall improved access to many fields from reanalysis datasets.

Additional possibilities

- WDAC encourages a broader involvement
- Other observational communities have expressed interest in contributing to obs4MIPs
- Work needed to generalize infrastructure

obs4MIPs Governance Overview

WCRP has taken interest in broadening participation in obs4MIPs. To help guide this opportunity, the WCRP's Data Advisory Council (WDAC) has constituted an international task team to provide stewardship for the advancement of obs4MIPs.

Current status of completeness criteria

Criteria
Meets data technical requirements
Can be related to CMIP Standard Model Output
Includes obs4MIPs technical note
Documented use for model diagnosis
DOI issued for technical note
DOI issued for data set
Maturity Matrix of data processing/documentation (CORE CLIMAX)
Maturity Matrix of data quality (CEOS)

Required for inclusion in obs4MIPs
Strongly encouraged
Additionally desired criteria

obs4MIPs-CMIP6 Planning Meeting (NASA HQ, May 2014)

Consensus recommendations:

- Expand the inventory of included datasets.
- Include higher frequency datasets, and higher frequency model output.
- Reliable and defendable error characterization/estimation of observations
- Include datasets in support of off-line simulators.
- Include collocated observations, including sparser in-situ datasets
- Precise definitions of data products (what's actually being reported), including biases, and precise definitions of the model output variables are required.

Ferraro, R., D. Waliser, P. Gleckler, K. Taylor, and V. Eyring, 2015: Evolving obs4MIPs to Support the Sixth Coupled Model Intercomparison Project (CMIP6). Bull. Amer. Meteor. Soc. In Press, http://dx.doi.org/10.1175/BAMS-D-14-00216.1

Facilitating the CF/CMOR/ESGF preparation of obs data

- CMOR3 is currently developing at PCMDI for use in CMIP6. It is being generalized to be useful for preparing observational data. It will include:
  - A version of CMOR that is accessible via python
  - Templates for defining global attributes
  - Numerous examples (including data) to facilitate ease of use
- Task team with the help of others is developing a proposal for describing observational data (via the CF convention) in coordination with CMIP

Datasets Currently Hosted at obs4MIPs

(CF Variable Long Name)
*Contributions from CFMIP-OBS
http://climserv.ipsl.polytechnique.fr/cfmip-obs/

- Air Temperature
- Ambient Aerosol Optical Thickness at 550 nm
- CALIPSO 3D Clear fraction*
- CALIPSO 3D Undefined fraction*
- CALIPSO Clear Cloud Fraction*
- CALIPSO Cloud Fraction*
- CALIPSO High Level Cloud Fraction*
- CALIPSO Low Level Cloud Fraction*
- CALIPSO Mid Level Cloud Fraction*
- CALIPSO Scattering Ratio*
- CALIPSO Total Cloud Fraction*
- Cloud Fraction retrieved by MISR*
- CloudSat 94GHz radar Total Cloud Fraction*
- CloudSat Radar Reflectivity CFAD*
- Eastward Near-Surface Wind
- Eastward Wind
- Fraction of Absorbed Photosynthetically Active Radiation
- ISCCP Cloud Area Fraction (Joint histogram of optical thickness and cloud top pressure) *
- ISCCP Mean Cloud Albedo (Cloud-fraction weighted & daytime only) *
- ISCCP Mean Cloud Top Pressure (Cloud-fraction weighted & daytime only)*
- ISCCP Mean Cloud Top Temperature (Cloud-fraction weight & daytime only) *
- ISCCP Total Cloud Fraction (daytime only)*
- Leaf Area Index
- Mole Fraction of O3
- Near-Surface Wind Speed
- Northward Near-Surface Wind
- Northward Wind
- PARASOL Reflectance*
- Precipitation
- Sea Surface Height Above Geoid
- Sea Surface Temperature
- Specific Humidity
- Surface Downwelling Clear-Sky Longwave Radiation
- Surface Downwelling Clear-Sky Shortwave Radiation
- Surface Downwelling Longwave Radiation
- Surface Downwelling Shortwave Radiation
- Surface Upwelling Clear-Sky Shortwave Radiation
- Surface Upwelling Longwave Radiation
- Surface Upwelling Shortwave Radiation
- TOA Incident Shortwave Radiation
- TOA Outgoing Clear-Sky Longwave Radiation
- TOA Outgoing Clear-Sky Shortwave Radiation
- TOA Outgoing Longwave Radiation
- TOA Outgoing Shortwave Radiation
- Total Cloud Fraction
- Water Vapor Path

Science & Technology Facilities Council
Rutherford Appleton Laboratory

The CMIP6 Data Request

Martin Juckes
October 2015

Variable Lists

- Definition of physical quantities;
- Output specifications.

Recommendations for output and analysis

Output Requirements

- Experiments and time slices
- Objectives supported
- Priority of variable

CMIP6 Data Request

Experiment Specifications

- Duration of simulation
- Tier
- Number of ensemble members

XML
Python
Command line
Forum
Persistent identifiers
……

National Centre for Atmospheric Science
NATURAL ENVIRONMENT RESEARCH COUNCIL

Centre for Environmental Data Analysis
SCIENCE AND TECHNOLOGY FACILITIES COUNCIL
NATURAL ENVIRONMENT RESEARCH COUNCIL