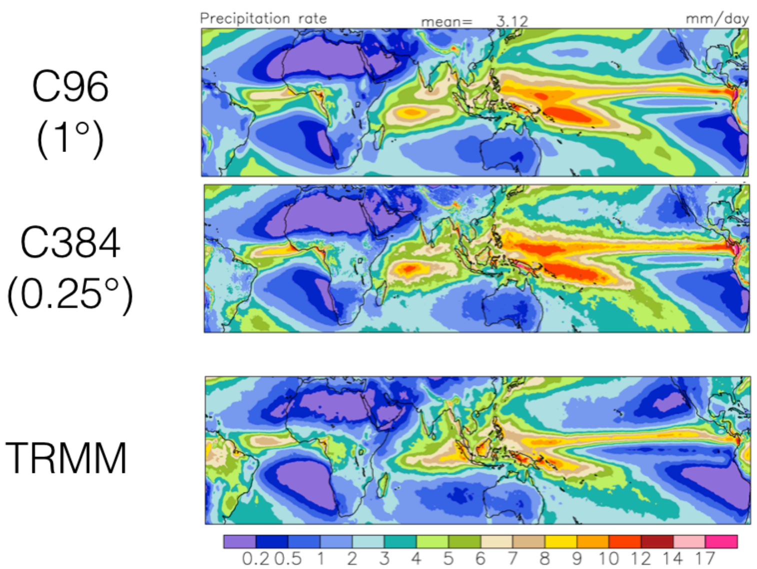
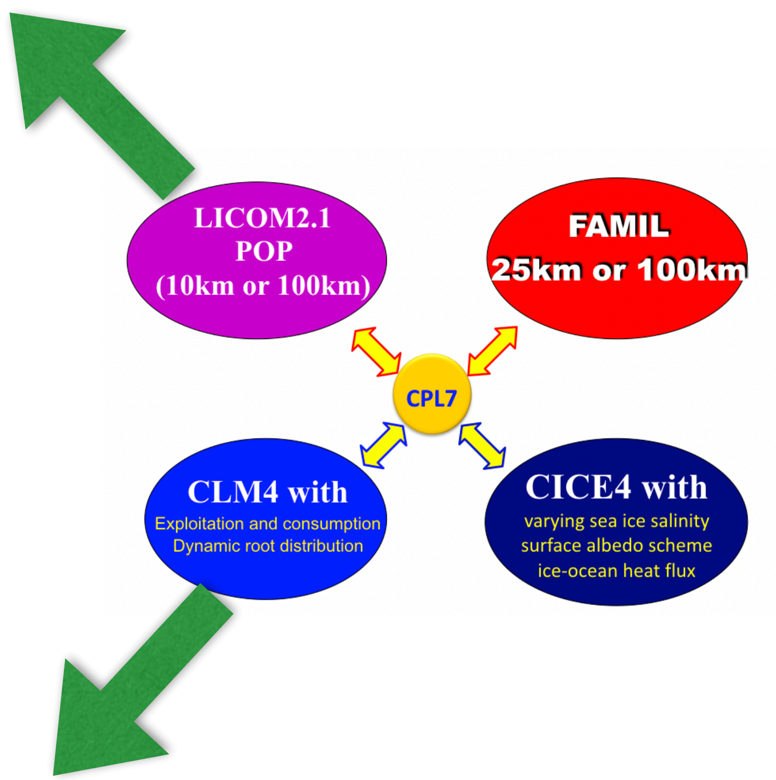
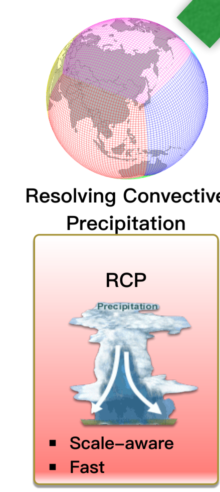
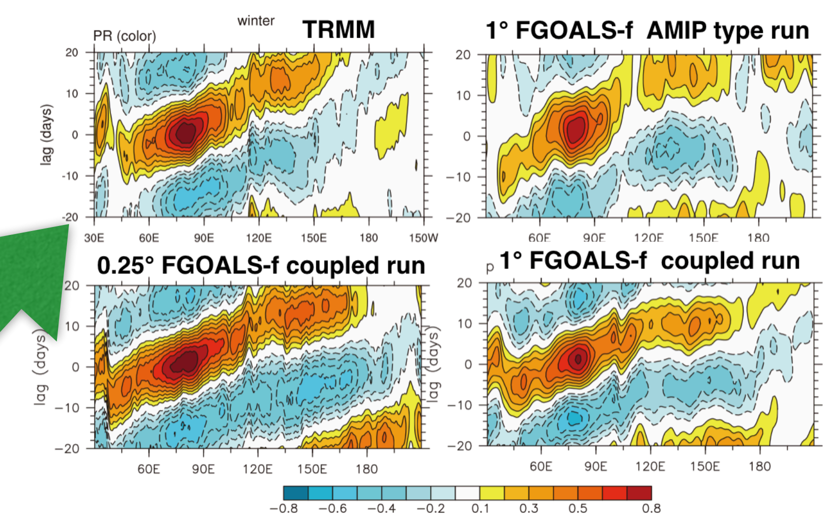
Tropical Precipitation Variability In the CAS FGOALS-f3-H

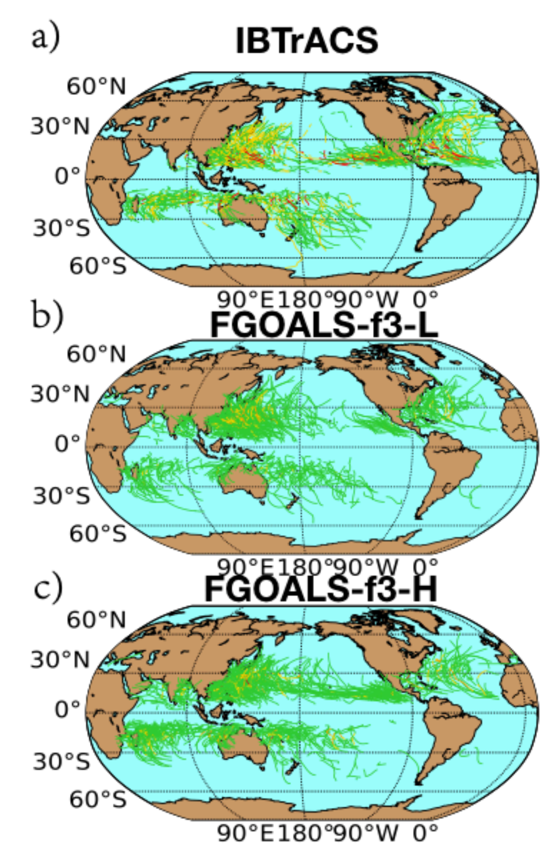
Qing Bao et al. IAP

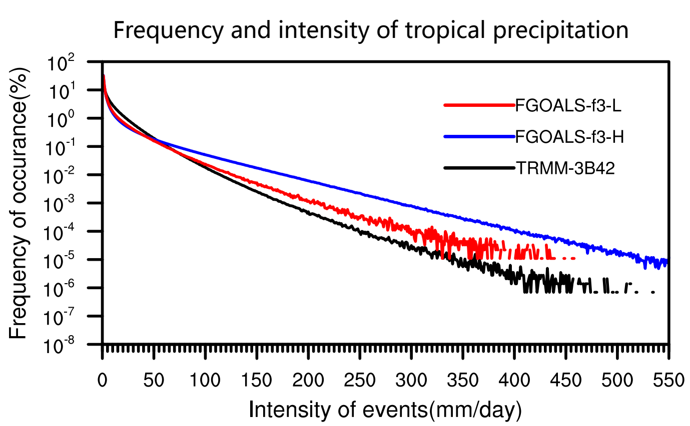












The scale-aware and effective computational convection scheme RCP used in FGOALS-f3

- **mitigates the double ITCZ problem**
- **improves simulation of MJO**
- **maintains a competitive simulation of TC and extreme precipitation**

CMIP6 Evaluation with the ESMValTool

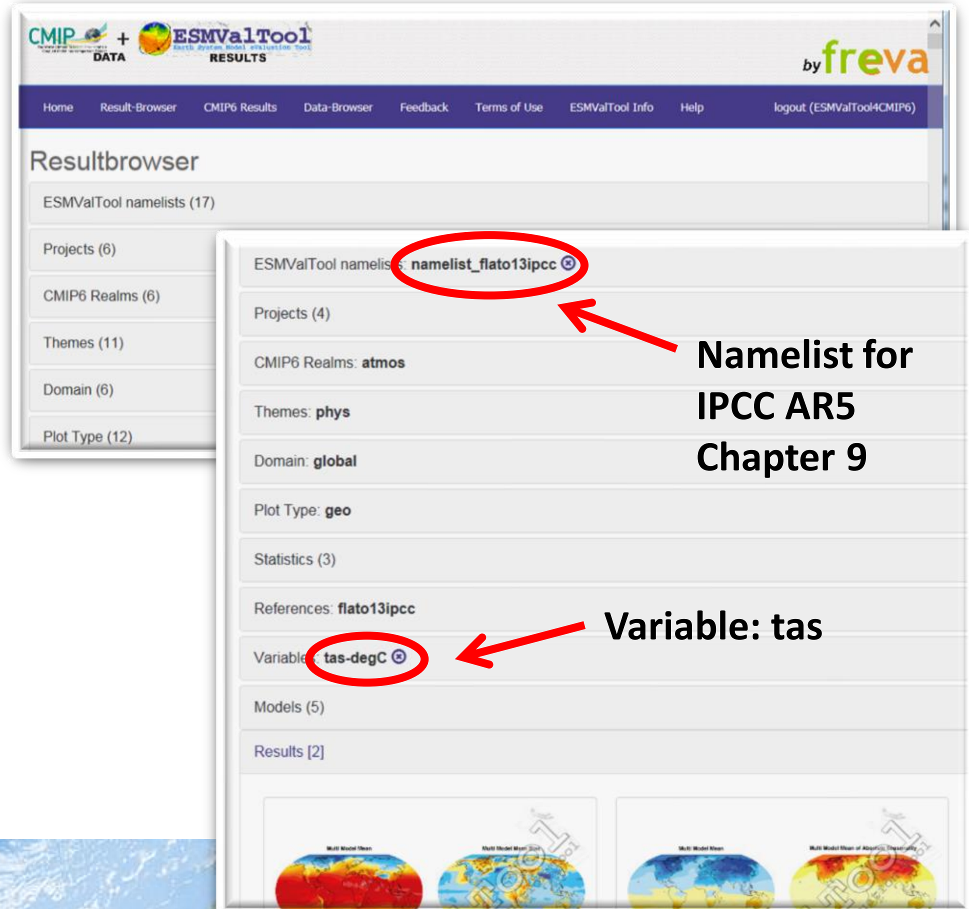
L. Bock, V. Eyring, A. Lauer, M. Righi, B. Andela, L. deMora, B. Little, V. Pedroi, J. Vegas-Regidor, B. Brötz, B. Hassler, M. Schlund and the ESMValTool Development Team

ESMValTool
Earth System Model eValuation Tool

- **Community diagnostics and performance metrics tool** for the evaluation of Earth System
- **Standardized model evaluation** can be performed against observations, against other models or to compare different versions of the same model
- Many diagnostics and performance metrics covering **different aspects of the Earth System** (dynamics, radiation, clouds, carbon cycle, chemistry, aerosol, sea-ice, etc.) and their interactions
- Well-established analysis based on **peer-reviewed literature**
- Currently ≈ **110 scientist** from >30 institutions part of the development team on **GitHub**

ESMValTool Result Browser at DKRZ

http://cmip-esmvaltool.dkrz.de

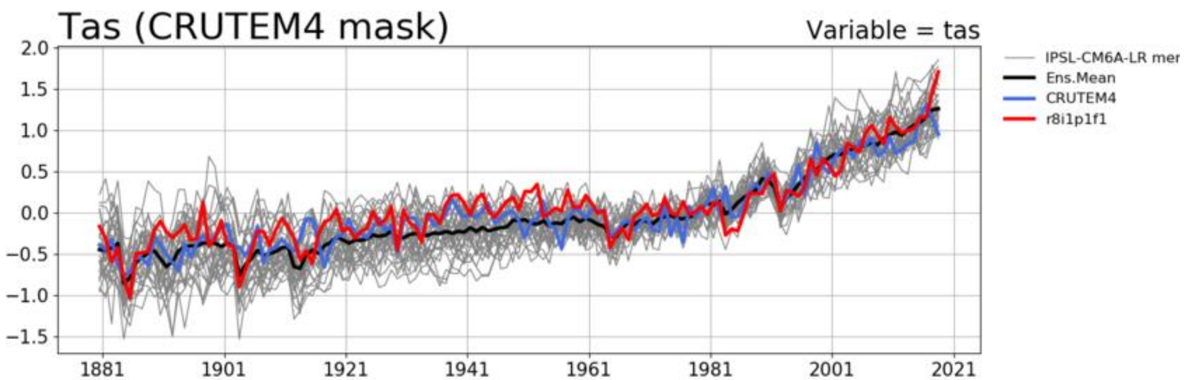


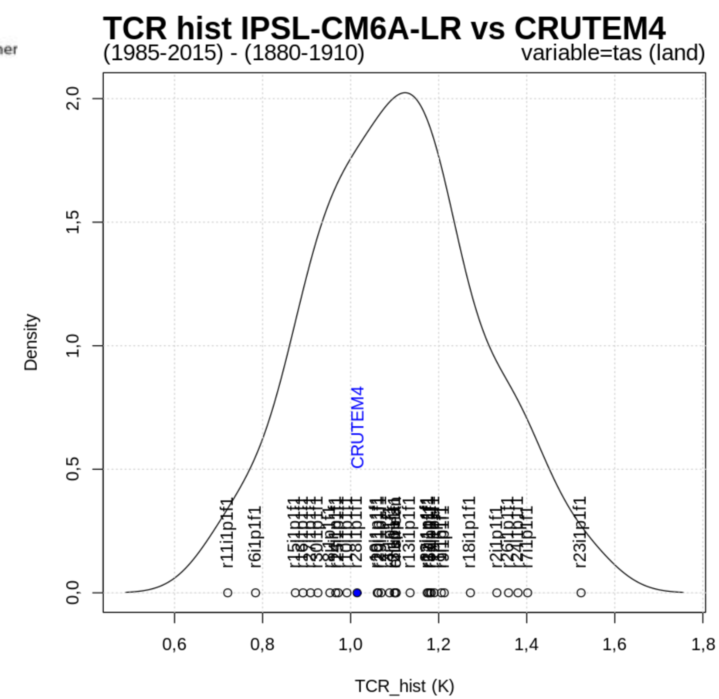
DLR

P03 Forced and natural variability in the IPSL-CM6 ensemble of *historical* simulations

J. Servonnat, **O. Boucher** and the rest of the **IPSL CMC modeling team**

Ensemble of 32 members of *historical* simulations with IPSL-CM6A-LR
Some warm too little, some warm ok, some wam too much….
Yet model ECS is 4.7 K for a doubling and aerosol forcing is smallish





Why is so? Can we learn from the members that fit the obs best? Can we learn from the members that reproduce the observed internal variability best? Can this constrain TCR in some way? Should we forget about our archaic (non) way of initialising historical simulations?

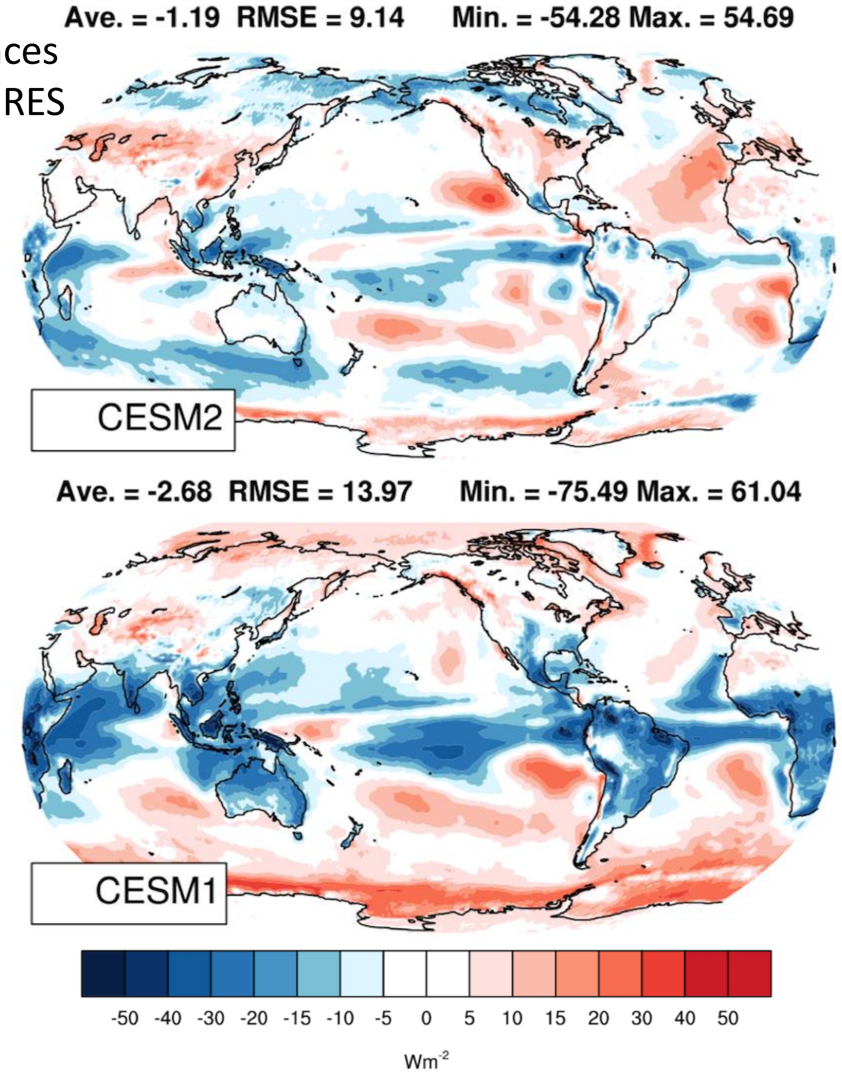
Sciences de l'environnement Institut Pierre Simon Laplace
CMC Climate Modelling Center
cnrs
cea
SCIENCES SORBONNE UNIVERSITÉ

The Community Earth System Model version 2 (CESM)

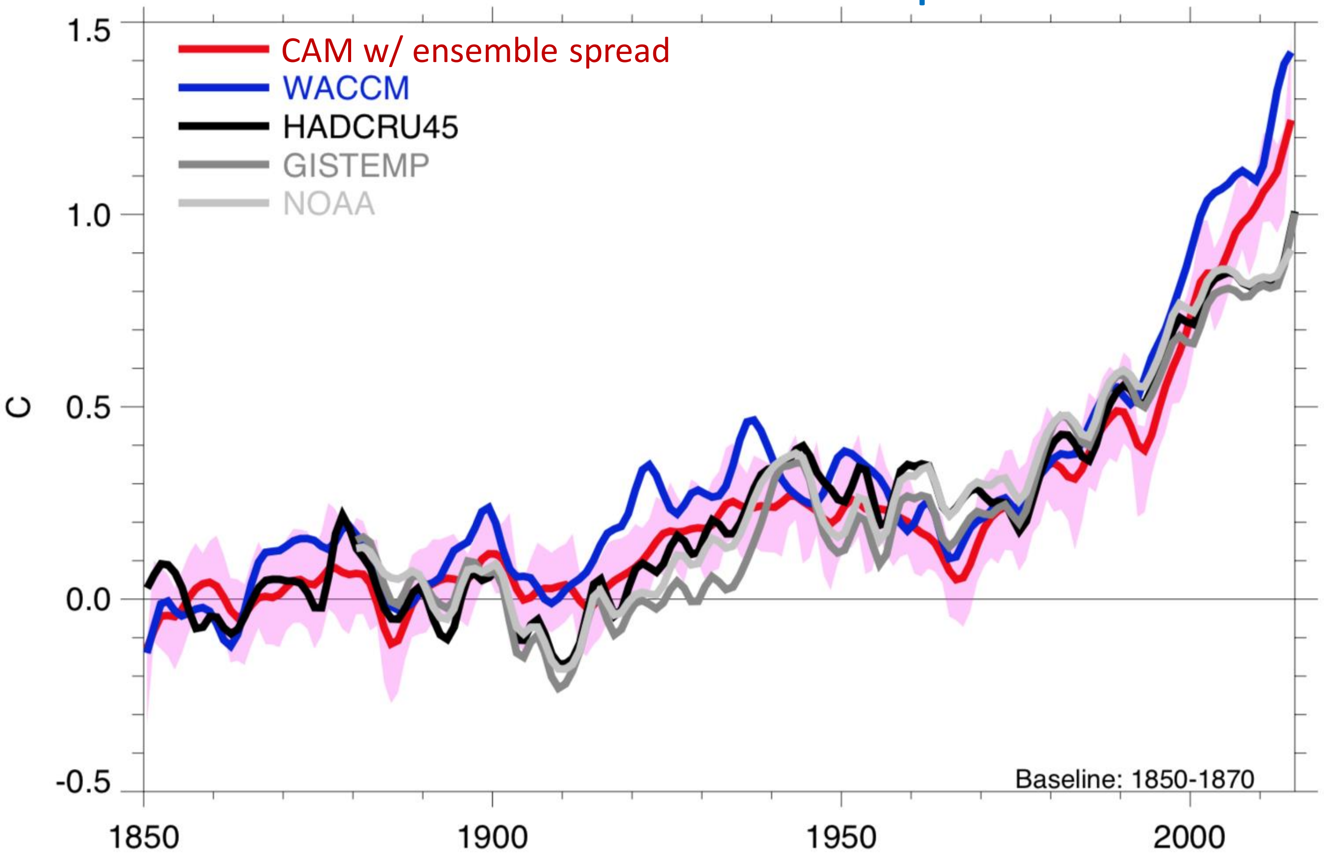
Gokhan Danabasoglu, Jean-Francois Lamarque, and CESM Collaborators
National Center for Atmospheric Research, Boulder, CO USA

Short-Wave Cloud Forcing

Differences from CERES



Global-Mean Surface Temperature

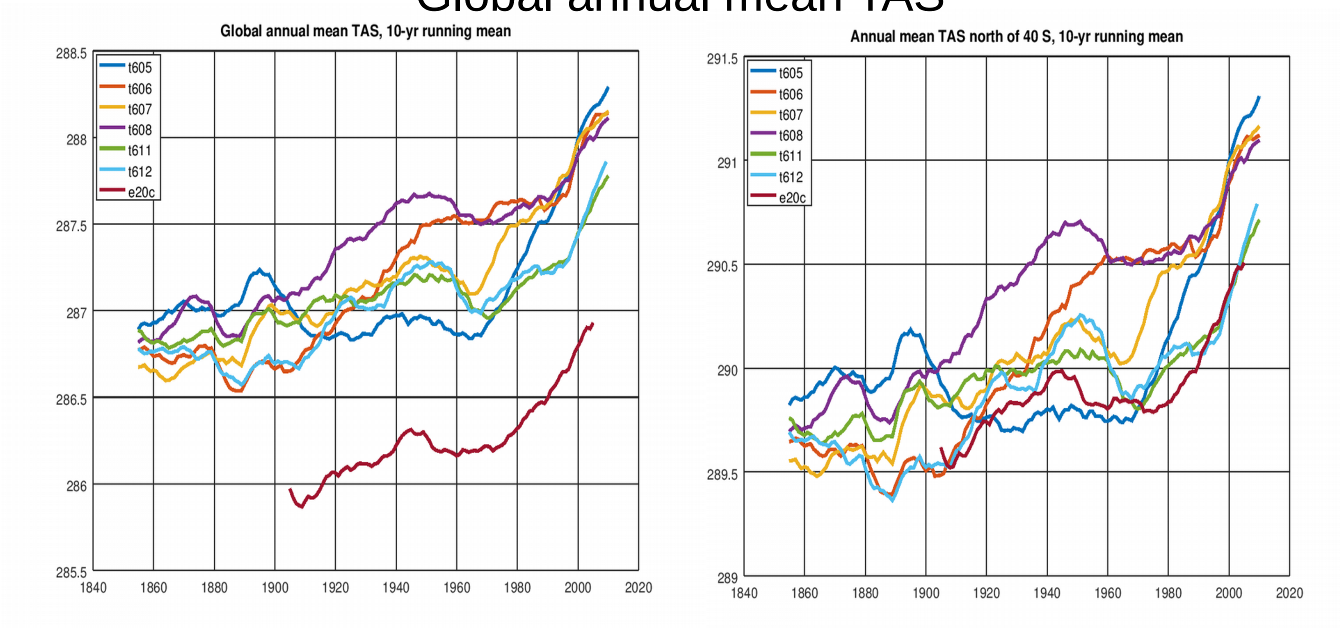


Equilibrium Climate Sensitivity (ECS) = 5.3^{o}C

EC-Earth transient simulation ensemble for CMIP6

Ralf Döscher, Klaus Wyser, Uwe Fladrich, Ramon Fuentes Franco, Klaus Zimmermann, Torben Königk, Shiyu Wang, Pasha Karami and the EC-Earth community

Global annual mean TAS

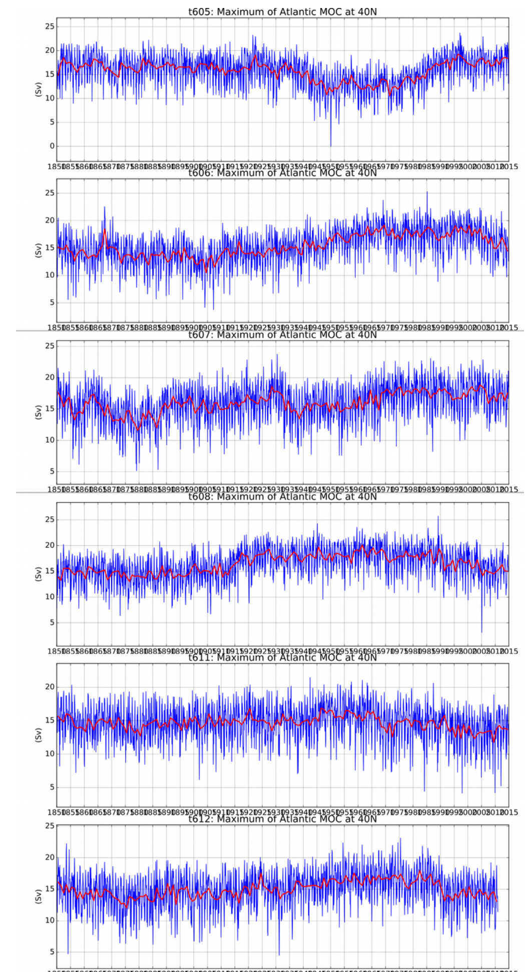


The global annual mean TAS shows a warm bias for all ensemble members, that can be explained largely by the typical southern ocean warm bias. The ensemble shows substantial natural variability that includes members with and without "early warming" episodes. e20c = ERA20C reanalysis. Six ensemble members t6xx, started from initial states from the PI control run with 40 years interval.

The model spread is rather large for a 6-member ensemble, compared to few CMIP5 ensembles. It is unclear though if CMIP5 ensembles were representative due to the small number of models. Our variability in global mean temperature is often reflected by AMOC variability, which in turn is linked to interaction with Arctic sea ice cover, most of all in the Labrador See. This behaviour is mirroring features of a 600 y PI control run (not shown here)

The EC-Earth 3 model for CMIP6 has been developed and tuned in several Earth System Model configurations, with the Global Climate Model (GCM) and an interactive dynamic vegetation module LPJ-GUESS (= EC-Earth3-veg), as core physical configurations, supplemented by configurations with/without atmospheric composition, ocean biogeochemistry and Greenland glacier. We document the first ensemble of CMIP6 transient simulations with EC-Earth3-veg .

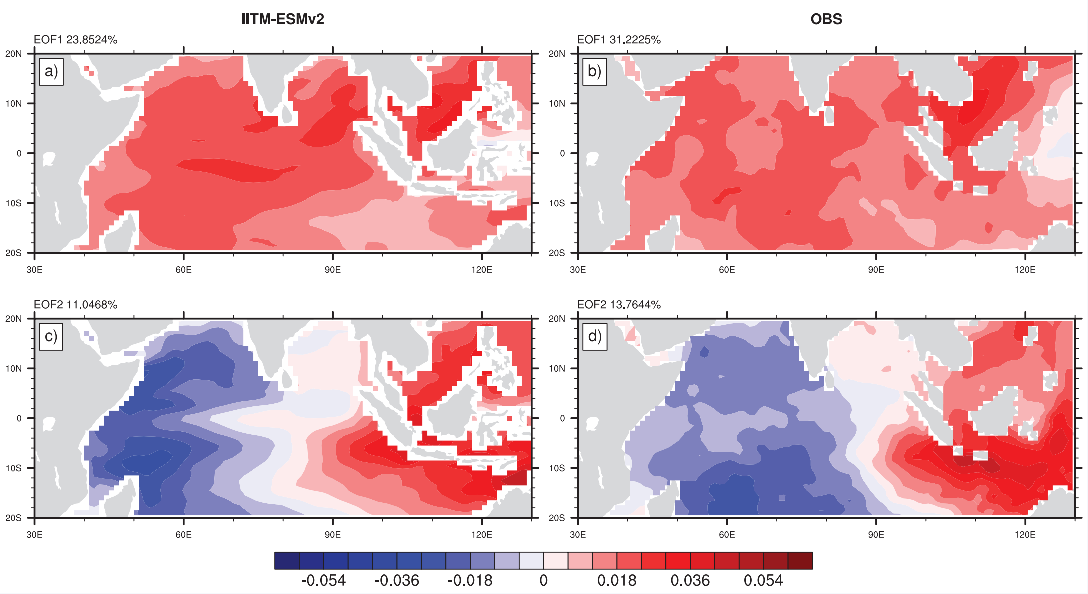
AMOC



Indian Ocean Dipole and its linkage to South Asian Monsoon in IITM-ESM

Prajeesh A G, Swapna P, Krishnan R
CCCR, IITM, India

- The fidelity in reproducing tropical Indian Ocean (IO) variability and its linkages to South Asian Monsoon Rainfall (SAMR) is investigated in the historical simulations of the IITM Earth System Model (IITM-ESM)
- Realistic representation of Indian Ocean Mean state and seasonal cycle. SST are 1K cooler than observed. Thermocline is deeper than observed.
- Leading modes of variabilities of Indian ocean (IOBM, IOD) are well represented in the model. Realisitic Wind-SST-Thermocline coupling.
- IITM-ESM simulates a realistic IOD-SAMR relationship.



WCRP CORDEX: A Diagnostic MIP for CMIP6 (1-P07)

W.J. Gutowski, I. Lake and the CORDEX Science Advisory Team

(Presented by G. Nikulin)

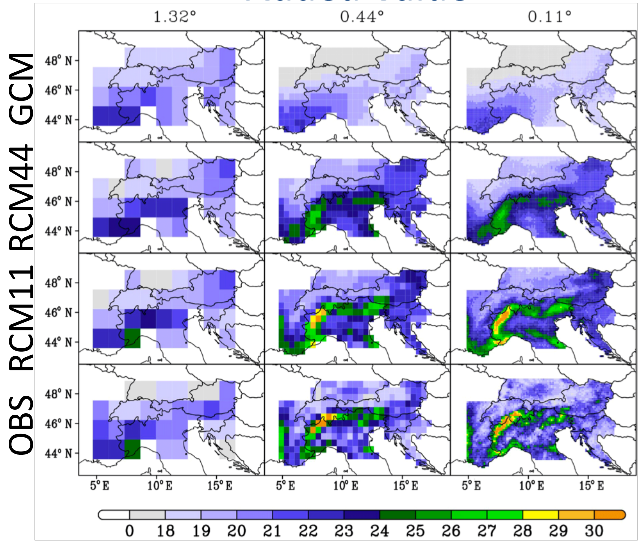
The COordinated Regional Downscaling Experiment (CORDEX):

- WCRP project to improve downscaling techniques and usage
- Diagnostic model intercomparison project (MIP) in CMIP6
- Coordinates with ScenarioMIP, HighResMIP, VIACS

Coordinated Output for Regional Evaluations (CORDEX CORE):

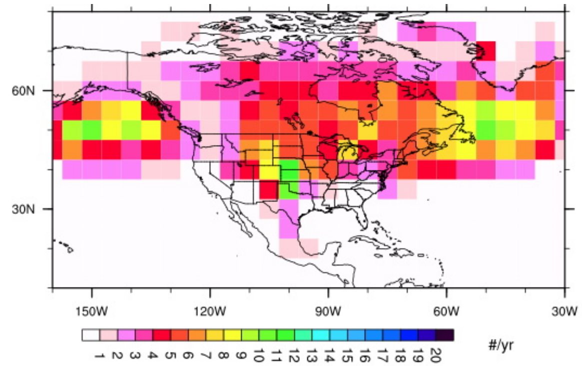
- Provide a core set projections across CORDEX domains
- Support IPCC AR6 assessments
- Include CMIP6 GCM driving

Added Value

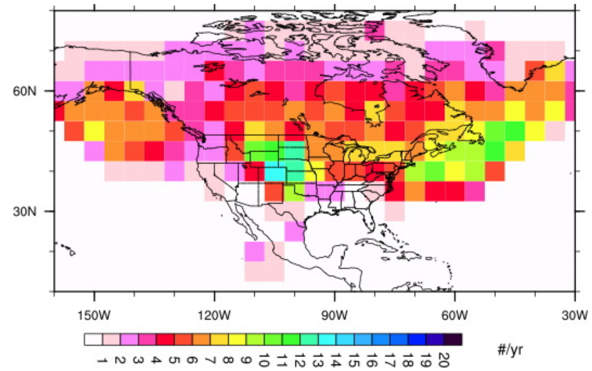


SON Precipitation Interpolated to Three Different Grids

Extratropical Cyclone Density



NARR (Sep-Oct)



WRF (Sep-Oct)

Potential Diagnoses

(CMIP5-based examples)

CORDEX SAT:	William Gutowski (Co-Chair)		Silvina Solman (Co-Chair)	
Jason Evans	Anne Frigon	José Manuel Gutierrez	Daniela Jacob	Sanjay Jayanarayanan
Chris Lennard	Grigory Nikulin	Tannecia Stephenson	Fredolin Tangang	Shuyu Wang

Partial support from U.S. Dept. of Energy grant DE-SC0016438

DOE-FACETS

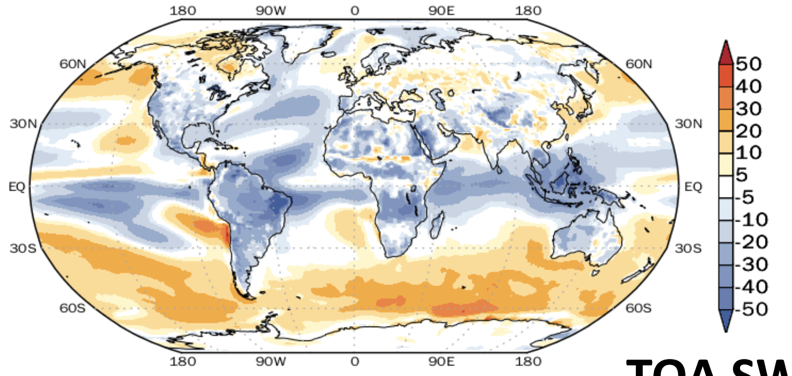
The MRI Earth System Model ver. 2.0 (MRI-ESM2.0): Basic evaluation of the physical component

Yukimoto, S., H. Kawai, T. Koshiro, N. Oshima, K. Yoshida, S. Urakawa, H. Tsujino, M. Deushi, T. Tanaka, M. Hosaka, S. Yabu,
H. Yoshimura, E. Shindo, R. Mizuta, A. Obata, Y. Adachi, and M. Ishii
Meteorological Research Institute, Tsukuba, Japan

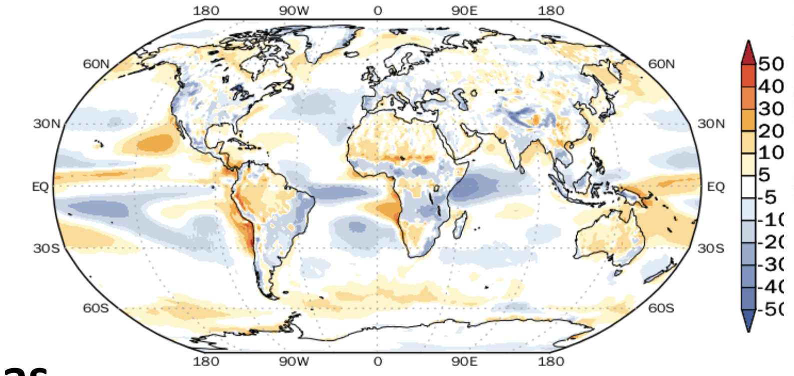
Yukimoto et al. (2019, JMSJ, in revision)

- ✓ AGCM vertical resolution enhanced from 48 (MRI-CGCM3) to 80 (MRI-ESM2).
- ✓ Physics updated: cloud process, GWD, subgrid-scale ocean physics, etc.

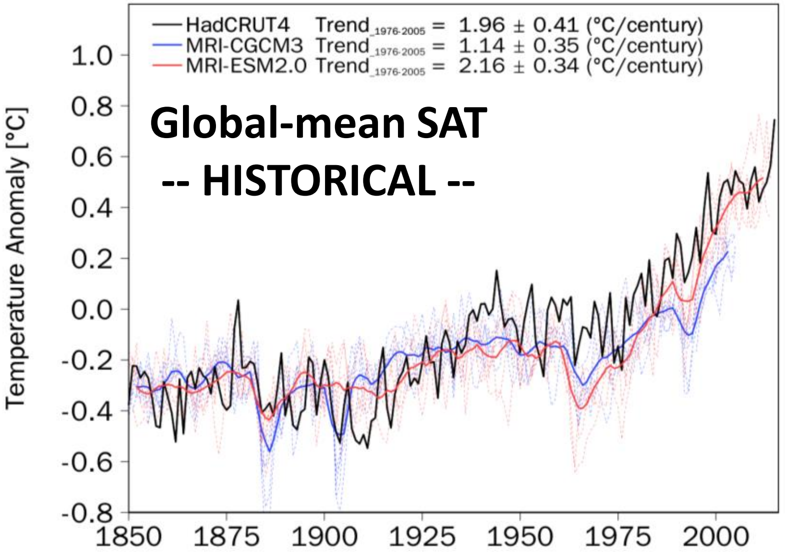
MRI-CGCM3

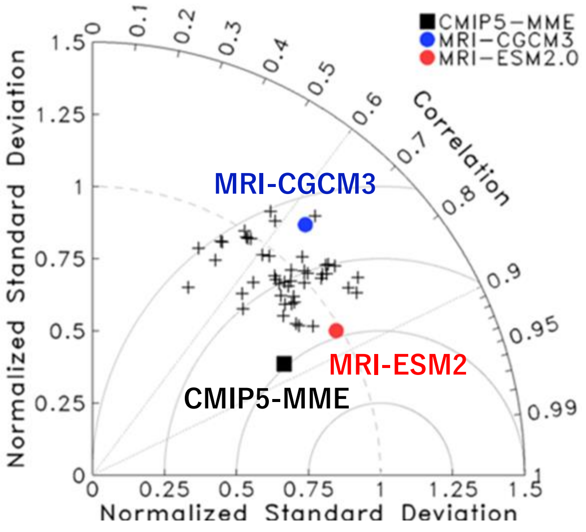


MRI-ESM2

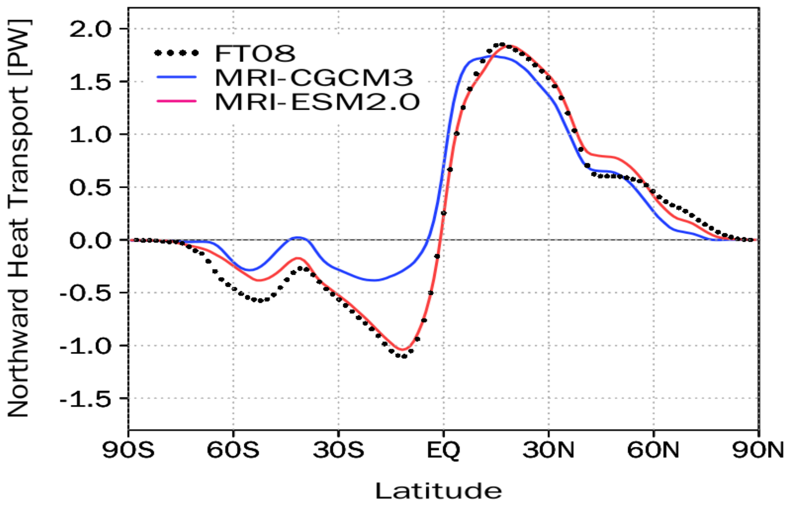


TOA SW bias

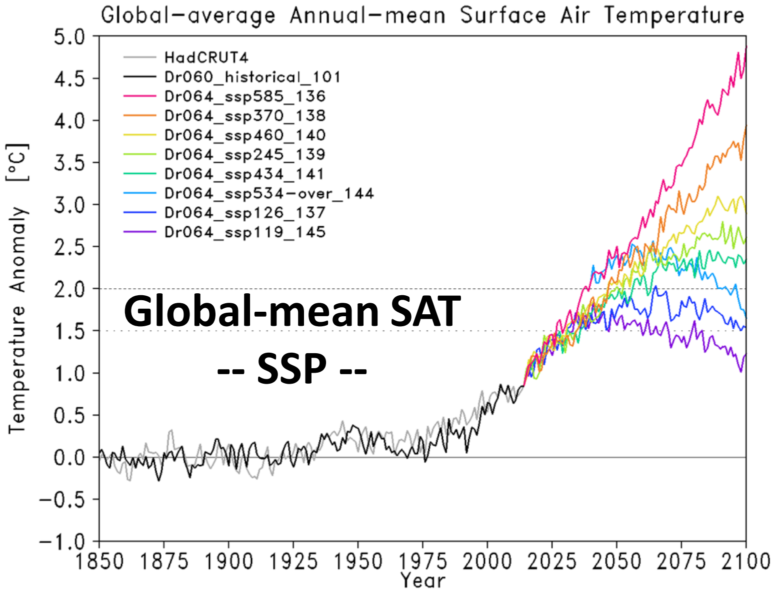




TOA SW among CMIP5



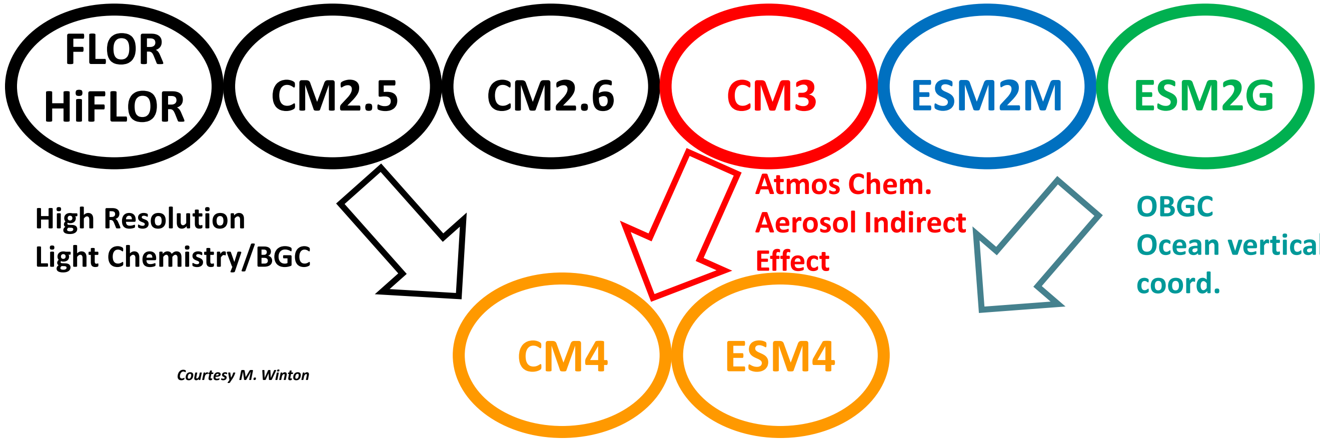
Meridional heat transports

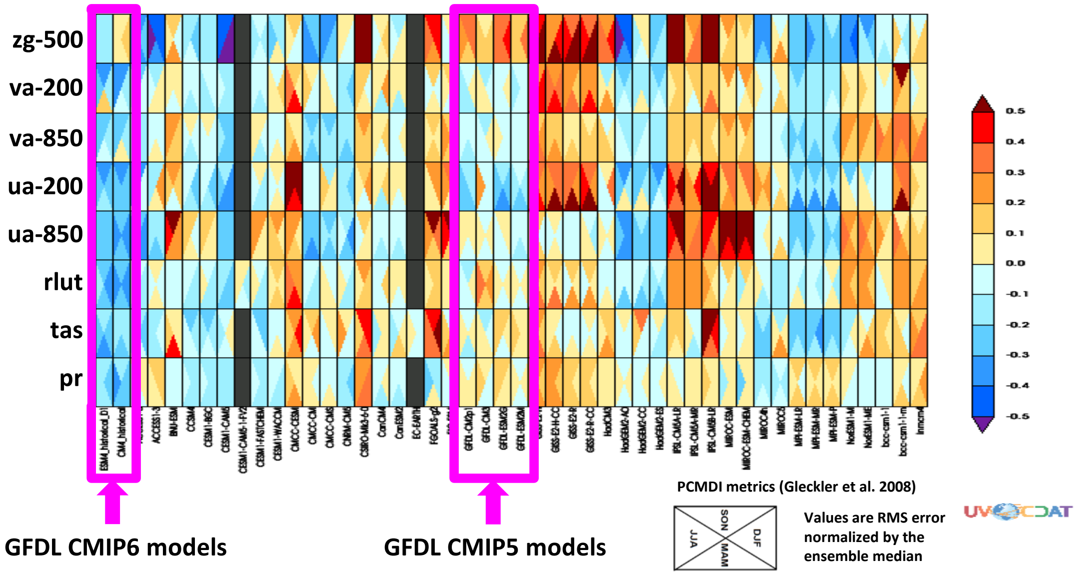


GFDL's contributions to CMIP6 – highlights from GFDL CM4 and ESM4

Jasmin John and GFDL's Model Development Teams

Origins of GFDL CM4/ESM4 for CMIP6





Improved climatology compared to previous GFDL models

Poster: P09

Additional GFDL posters: 1_P15 (Krasting), 2_P08 (Ginoux), 7_P08 (Malyshev)

The UK Earth system model contribution to CMIP6: 1st results

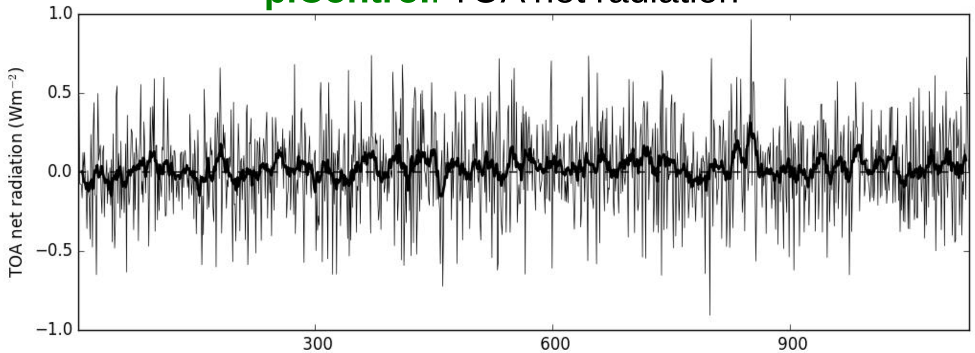
UKESM

Met Office

NERC SCIENCE OF THE ENVIRONMENT

- UKESM1 uses HadGEM3-GC31 as its physical core +
- interactive carbon cycle
- intermediate complexity ocean biogeochemistry
- dynamic vegetation, terrestrial N-limitation scheme
- stratosphere-troposphere chemistry and aerosols

piControl: TOA net radiation

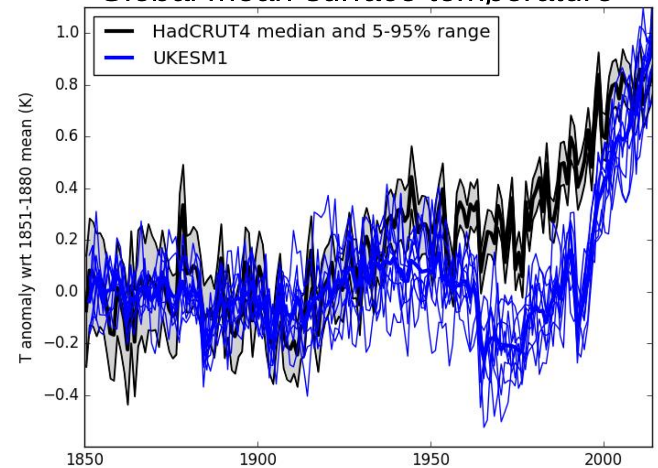


The poster also includes

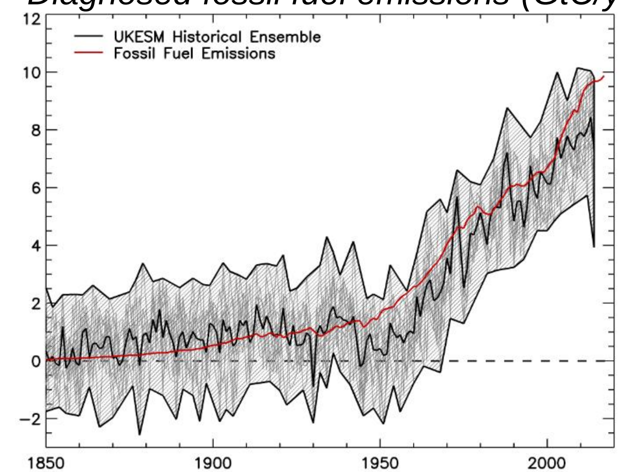
- 1st Tier 1 scenarioMIP results
- UKESM1 Equilibrium Climate Sensitivity
- UKESM1 Transient Climate Response

Historical ensemble

Global mean surface temperature



Diagnosed fossil fuel emissions (GtC/yr)



Overview of US DOE's efforts on Model Diagnostics and Metrics for Understanding and Quantifying Model Biases

Renu.Joseph@science.doe.gov

Water Cycle and Climate Extremes Modeling (WACCEM)

- MIPs: MPAS-CAM participation in HiResMIP
- Finite Amplitude Wave Activity (FAWA) metrics; FLEXTRKR for tracking MCSs

Calibrated and Systematic Characterization, Attribution, and Detection of Extremes (CASCADE)

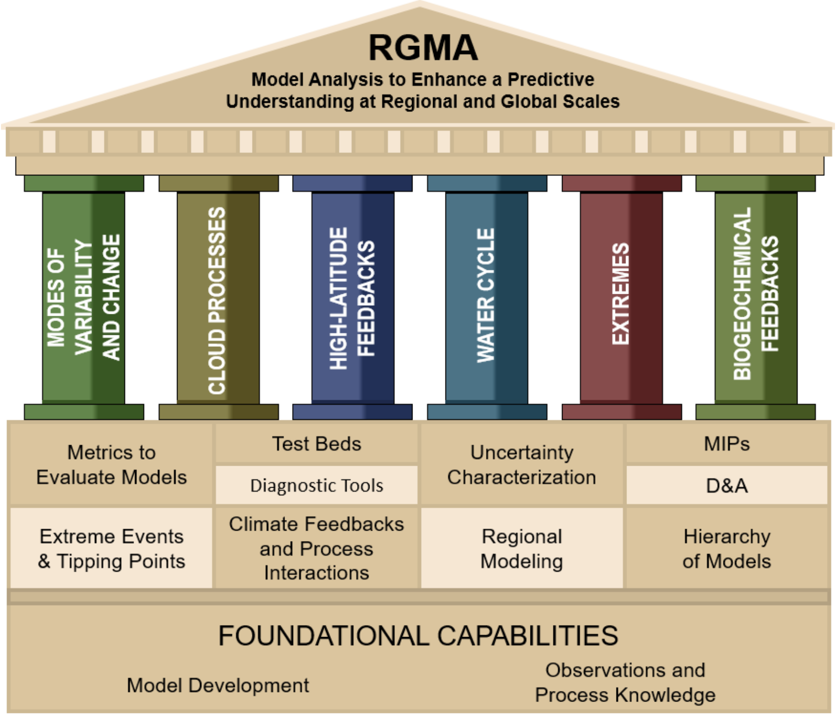
- MIPs: HiResMIP analysis; RFMIP
- Tools: climextRemes, fastKDE, TECA

Reducing Uncertainty in Biogeo-chemical Interactions Through Synthesis and Computation (RUBISCO)

- MIPs: C4MIP SSC; LUMIP; LS3MIP
- Benchmark development: ILAMB & IOMB

High-Latitude Application and Testing (HiLAT)

- MIPs: ISMIP6; Polar Cordex; Collaboration on analysis of PAMIP; high-lat metrics



Program for Climate Model Diagnosis & Intercomparison – Cloud Process Research (PCMDI-CPR)

- MIPs: CFMIP; DAMIP; Metrics panel leadership; input4MIPs; OMIP (data sets)
- Metrics: PMP; ARM diagnostics

Cooperative Agreement To Analyze variability, change and predictability in the earth SysTem (CATALYST)

- MIPs: Conduct CFMIP; DAMIP; DCPP; RFMIP; simulations with CESM for CMIP6; analysis for FAMIP & ScenarioMIP
- Metrics: Precipitation benchmarking with PCMDI

An Integrated Evaluation of the Simulated Hydroclimate System of the Continental US

- Metrics for the continental US focusing on meteorological, hydrologic and use-inspired quantities; TempestExtremes

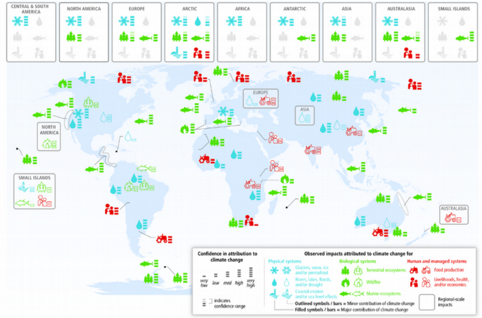
Hierarchical Evaluation Framework for Assessing Climate Simulations Relevant to Energy-Water-Land Nexus

- CORDEX contributions; hierarchical metric framework

The role of the IPCC Data Distribution Centre in supporting assessments of climate change

Martin Juckes, Martina Stockhause, Bob Chen, Charlotte Pascoe, Sarah Callaghan, Rorie Edmunds

www.ipcc-data.org



- Curation: of key datasets;
- Collaboration: with other data centres;
- Support: for IPCC authors;

NEW in AR6:
Access to multi-petabyte UK and German climate data archives for IPCC authors via cloud services.

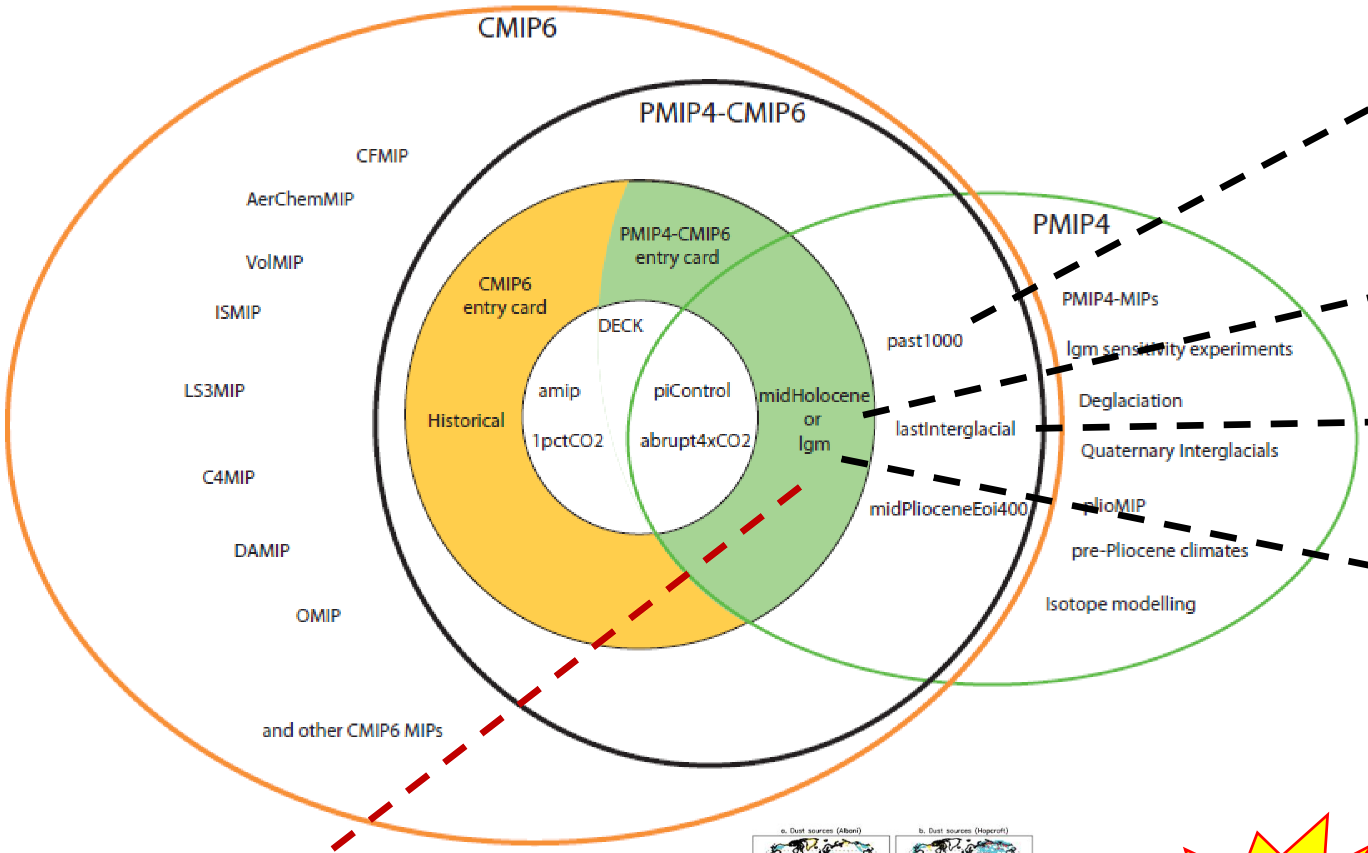
Centre for Environmental Data Analysis
SCIENCE AND TECHNOLOGY FACILITIES COUNCIL
NATURAL ENVIRONMENT RESEARCH COUNCIL

DKRZ
DEUTSCHES KLIMARECHENZENTRUM

Center for International Earth Science Information Network
EARTH INSTITUTE | COLUMBIA UNIVERSITY

PMIP4-CMIP6 simulations of the Last Glacial Maximum climate: first results

Paleoclimate Modelling Intercomparison Project 4



Kageyama et al, GMD, 2018

Johann Jungclaus's poster on Thursday: Transient simulations of the common era

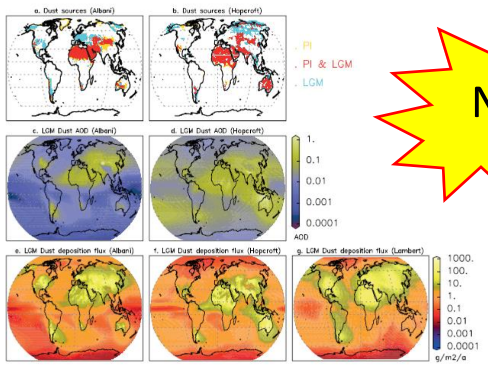
Pascale Braconnot's poster on Thursday Mid-Holocene and Last Interglacial results

Chris Brierley's poster on Thursday: changes in variability in PMIP4-CMIP6

Sandy Harrison's poster on Thursday: evaluating PMIP4-CMIP6 simulations

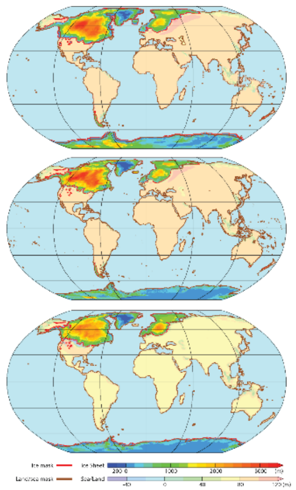
LGM poster: today !!
CMIP5/AR5 results
+ very preliminary
PMIP4-CMIP6 results:

dust



New

Ice sheets

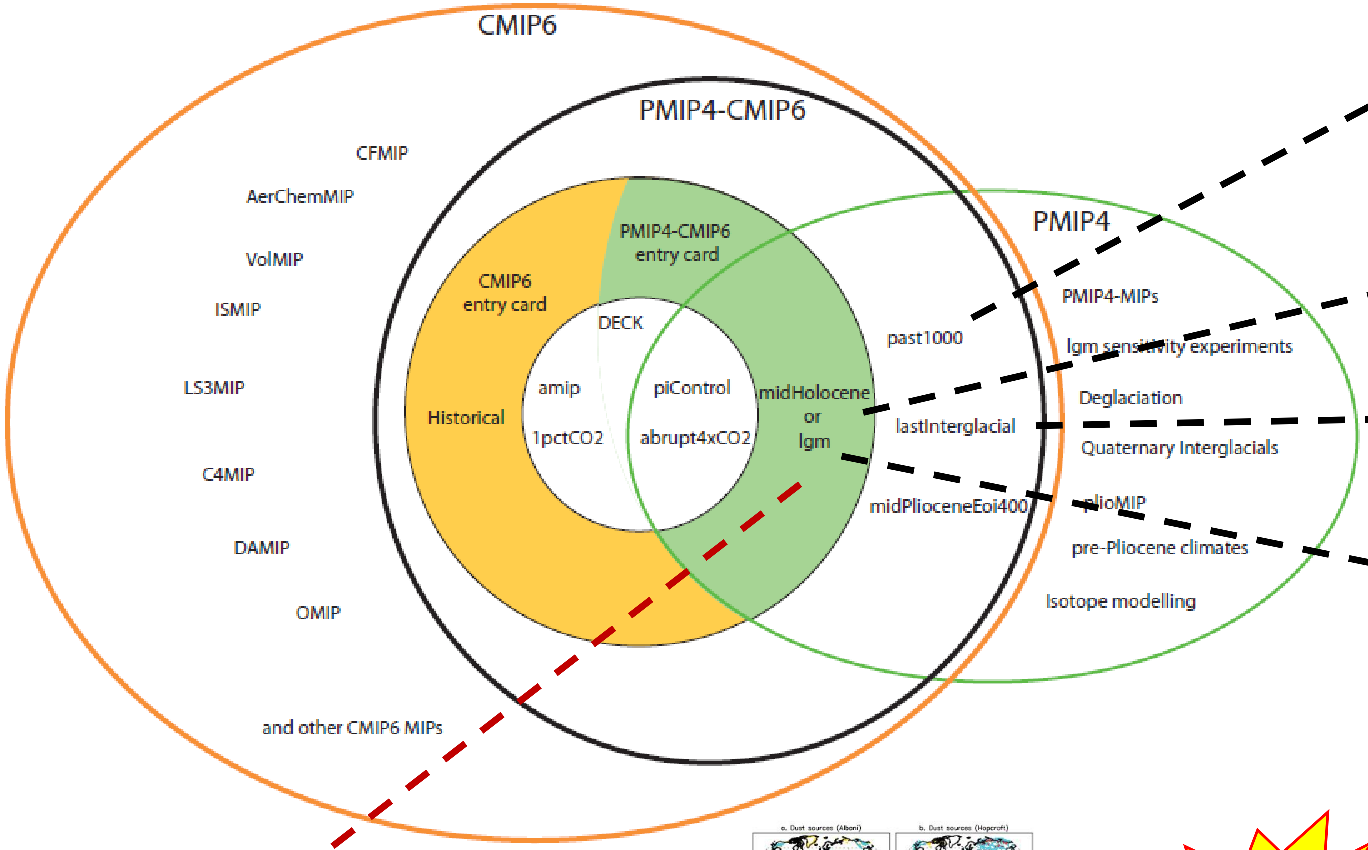


Compared to previous PMIP phases, uncertainties related to boundary conditions will be investigated

Paleoclimate Modelling Intercomparison Project PMIP4

PMIP4-CMIP6 simulations of the Last Glacial Maximum climate: first results

Kageyama et al, GMD, 2018



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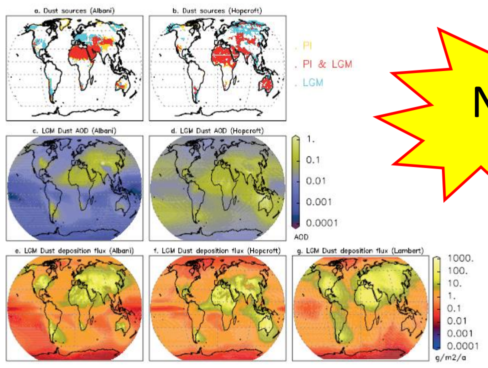

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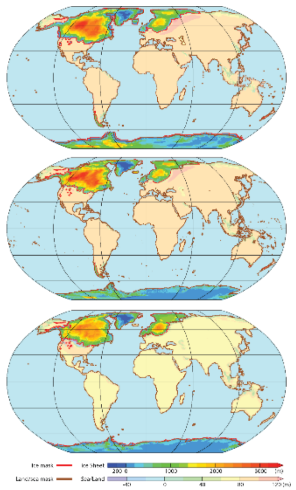


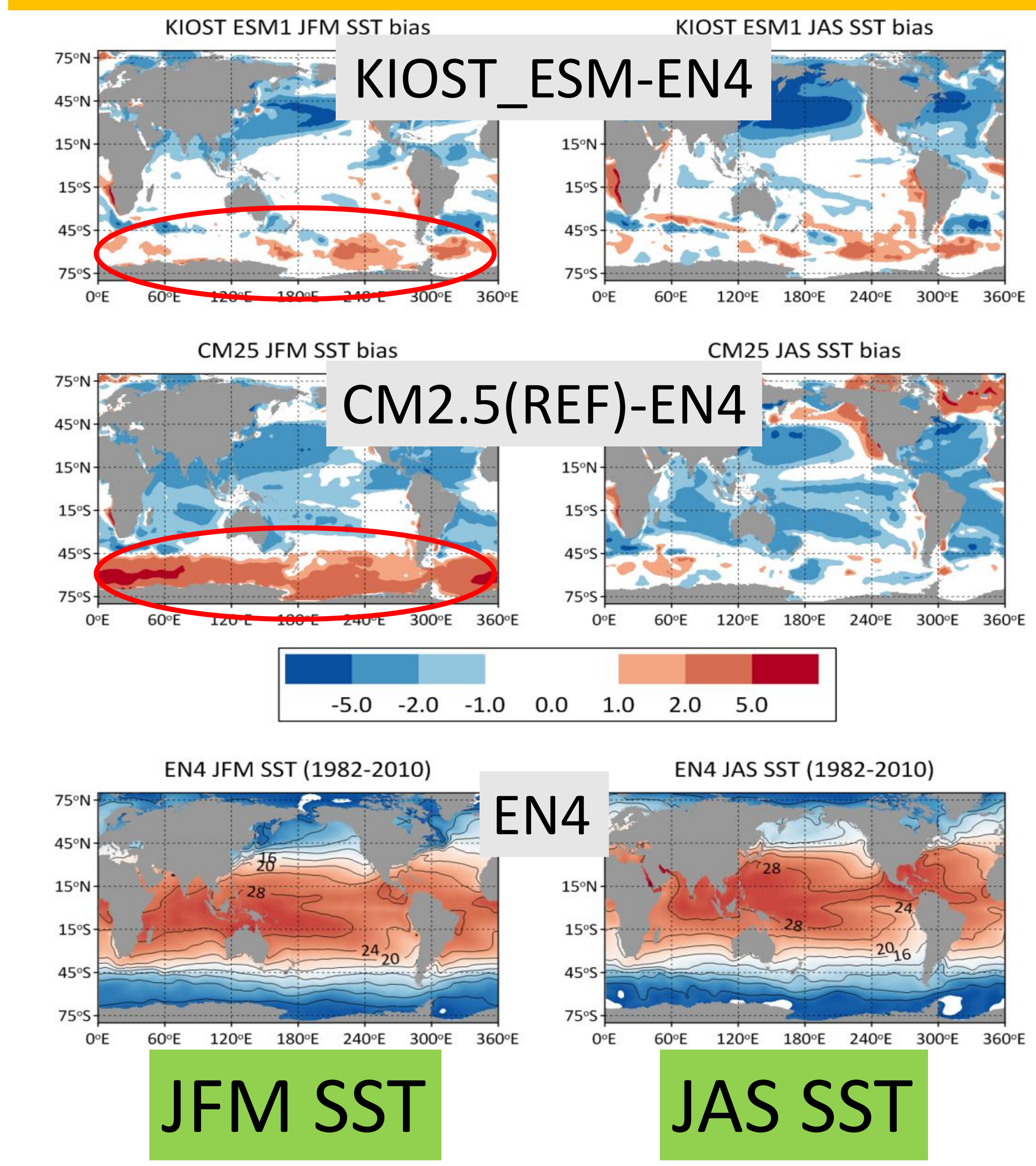
Compared to previous PMIP phases, uncertainties related to boundary conditions will be investigated

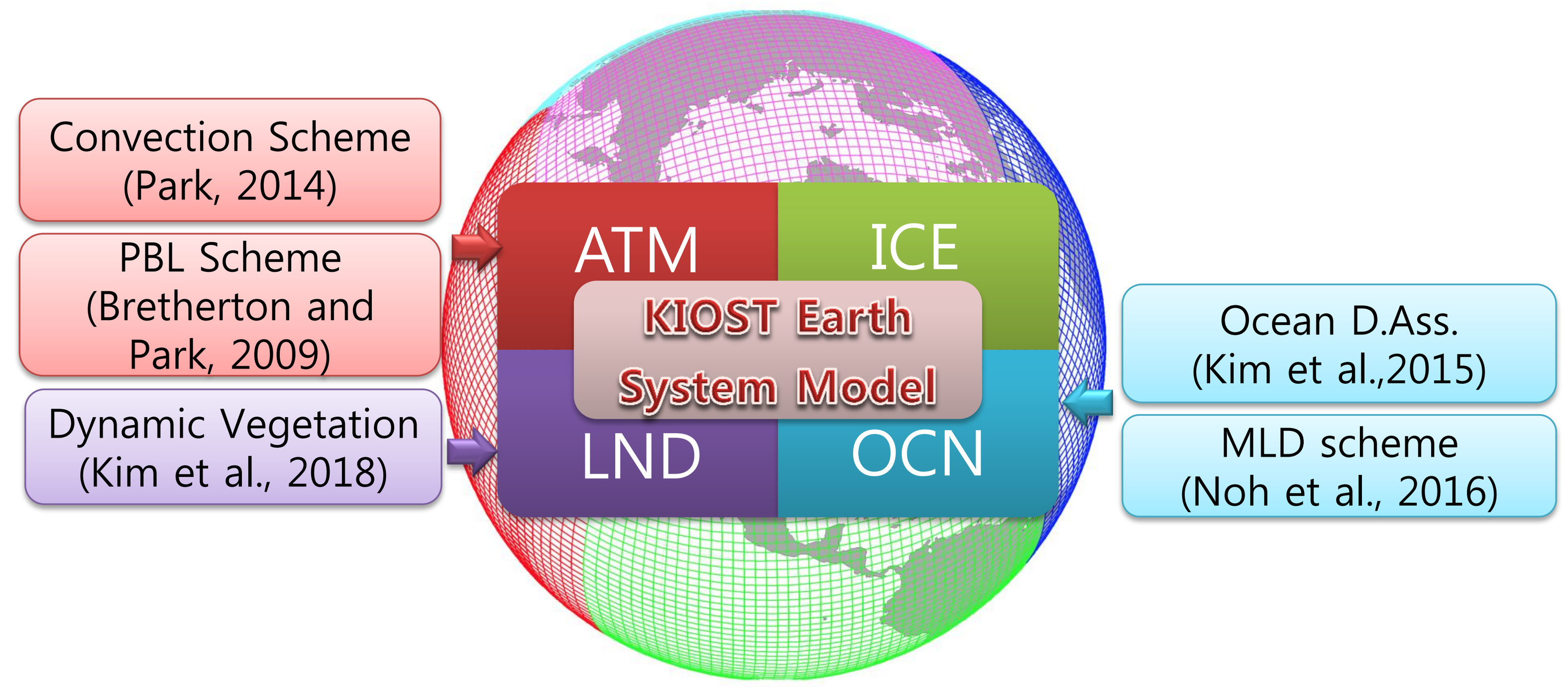
Diagnosis of model bias improvement of KIOST Earth System Model

YoungHo Kim*, Yign Noh, Myong-In Lee, Ho Jin Lee, Daehyun Kim

*yhkim@kiost.ac.kr

South. Ocn. Warm Bias

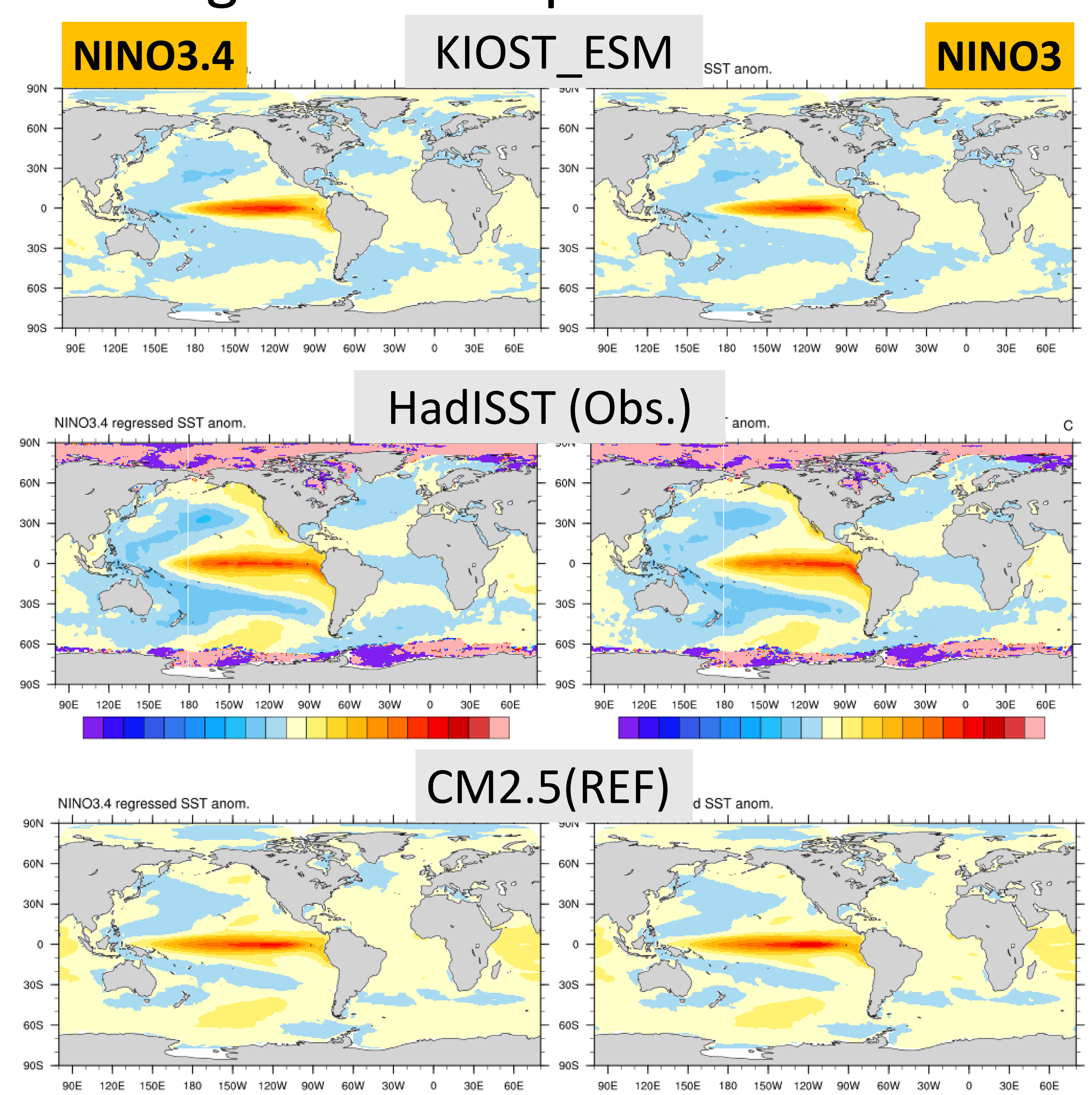




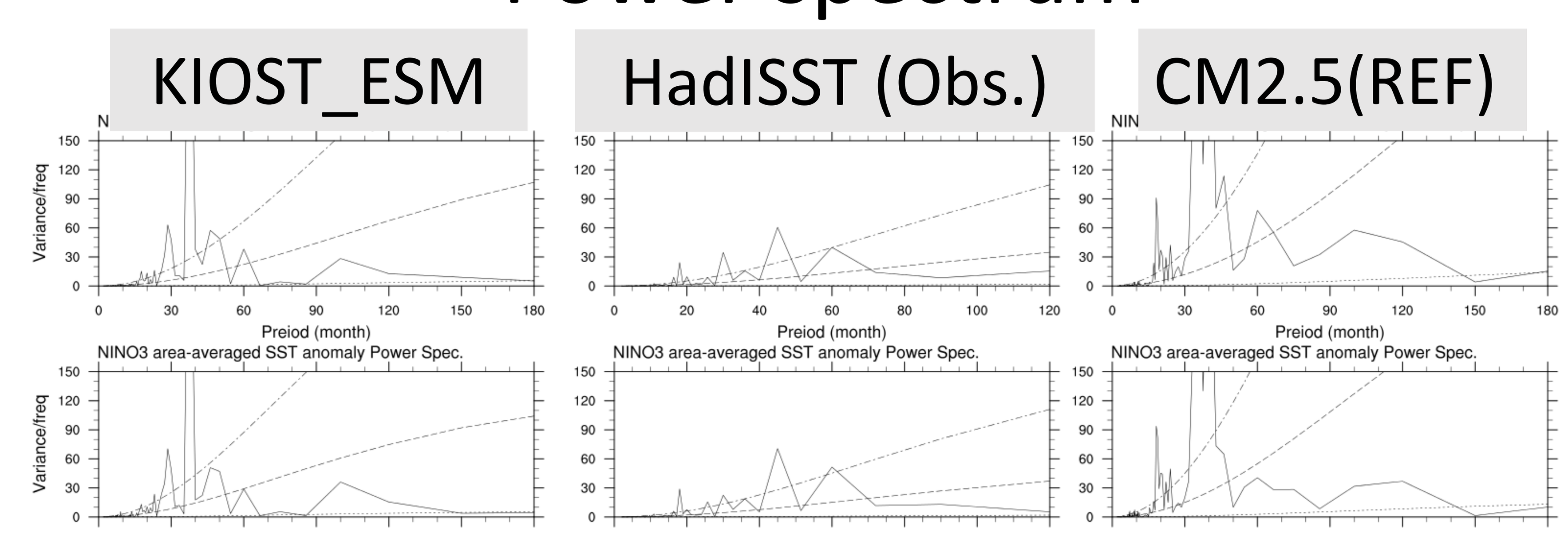
		GFDL CM2.5 (Reference Model)	KIOST_ESM (New Feature)
Base Model		CM2.5 (Delworth et al., 2012)	CM2.5
Land Component		LM3.0	LM3.0 New soil respiration scheme by UNIST (Kim et al., 2018)
Atm Component		AM2	AM2
	grid	Cubed-sphere	Cubed-sphere
	PBL	Lock, 2001	PBL scheme by Bretherton and Park (2009)
	Convection	Relaxed Arakawa/Schubert (Moorth & Suarez, 1992)	UNICON (Park, 2014)
Ocn Component		MOM5	MOM5
	MLD	KPP (Large et al., 1994)	New MLD scheme by Yonsei Univ. (Noh et al., 2016)
	Ocean Data Assimilation		Applying Ensemble Optimal Interpolation by KIOST (Kim et al., 2015)

ENSO

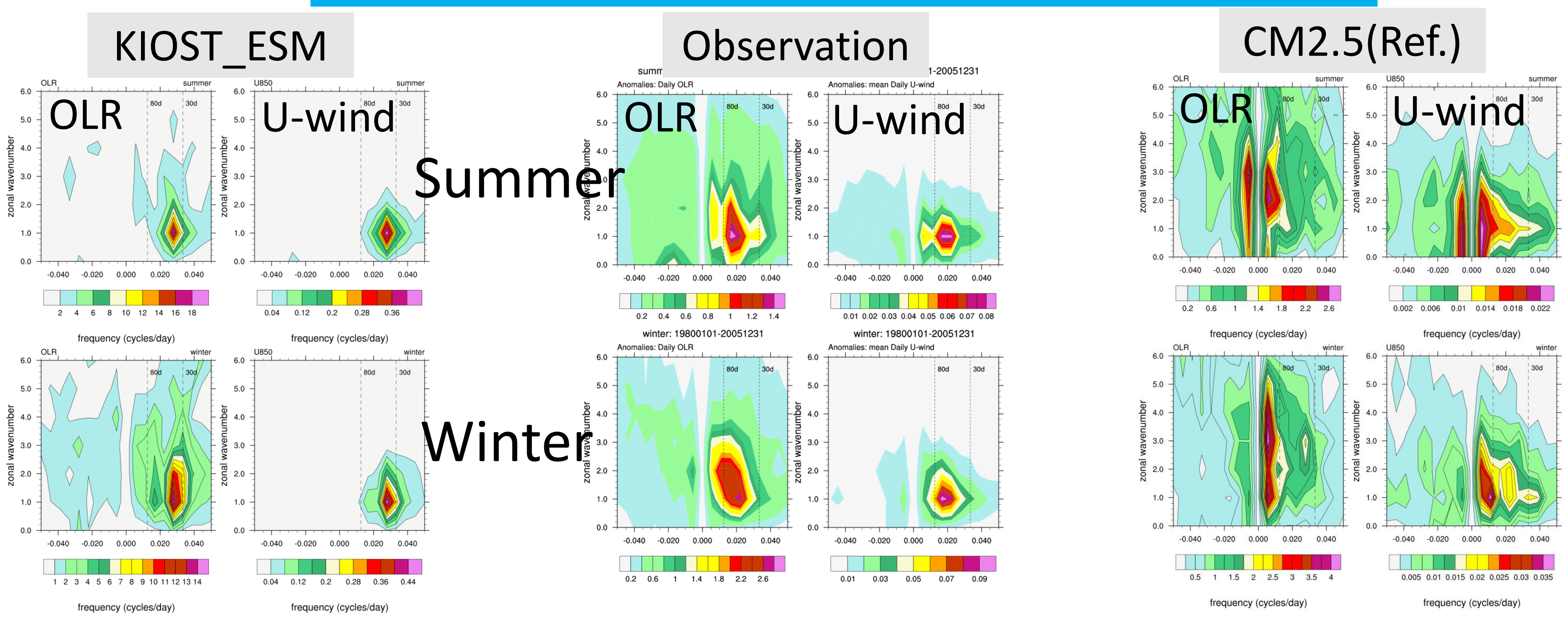
Regression map to ENSO indices



Power spectrum

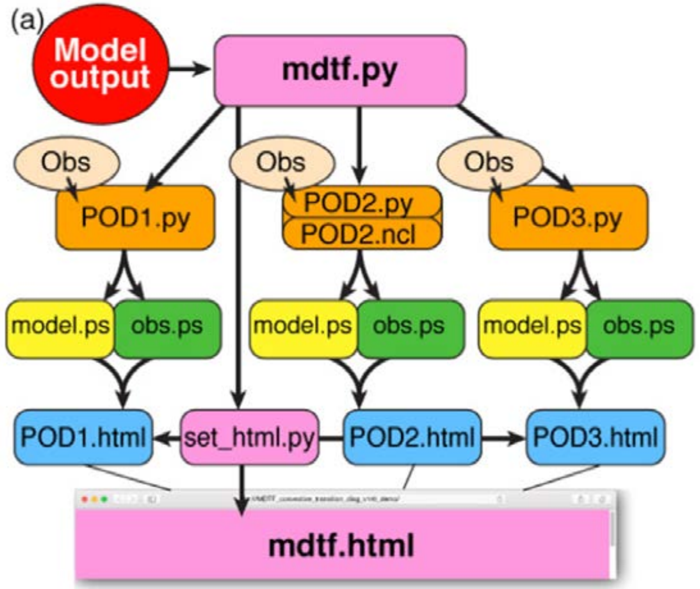


MJO Wavenum-freq-spectrum



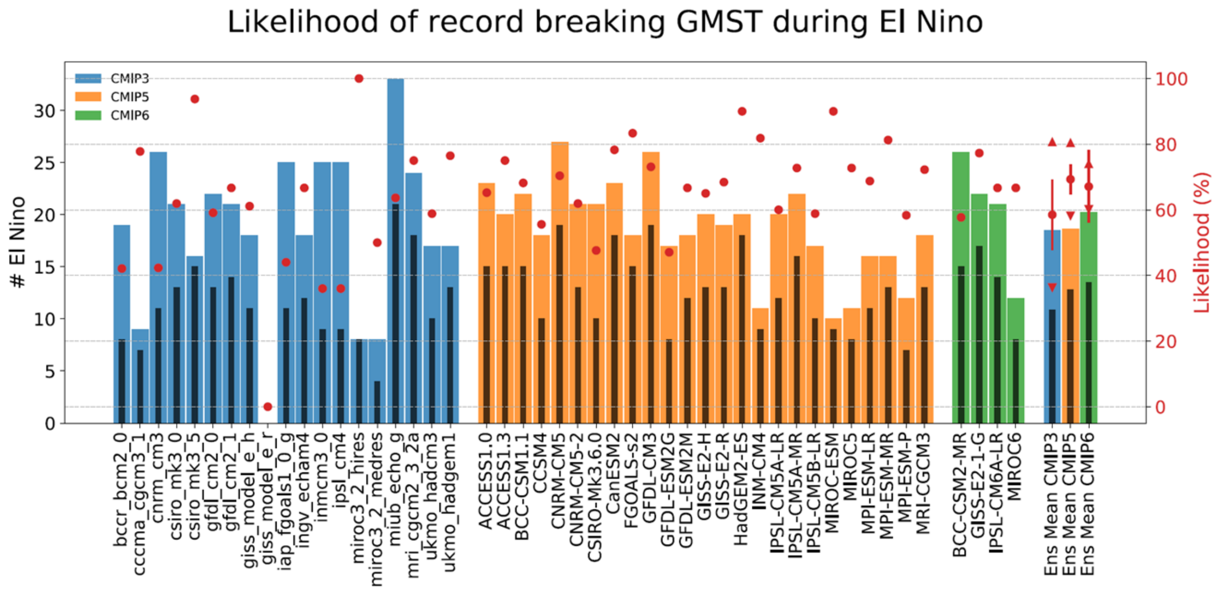
Development of Process-Oriented Diagnostics Through NOAA's Model Development Task Force

John P. Krasting, J. David Neelin, Daniel Barrie, Andrew Gettelman, Eric Maloney, Yi Ming, Allison Wing



Open-source, proposal-driven effort to develop **process-oriented diagnostics** that will inform model development and help reduce systematic biases

Phase 2 (2018-2021) will focus on additional diagnostics and will leverage the CMIP6 ensemble of simulations



New diagnostic showing the relationship between record-breaking global annual mean temperature events and the occurrence of El Niño. *(Chia-Wei Hsu and Jianjun Yin – U. Arizona; Stephen Griffies – NOAA-GFDL).*

MAPP Modeling, Analysis, Predictions, and Projections

UCLA

NCAR NATIONAL CENTER FOR ATMOSPHERIC RESEARCH

Florida State University 1851

Colorado State University

Advancing our understanding of the impacts of historic and projected land use: The Land Use Model Intercomparison Project (LUMIP)

Co-chairs: David Lawrence and George Hurtt

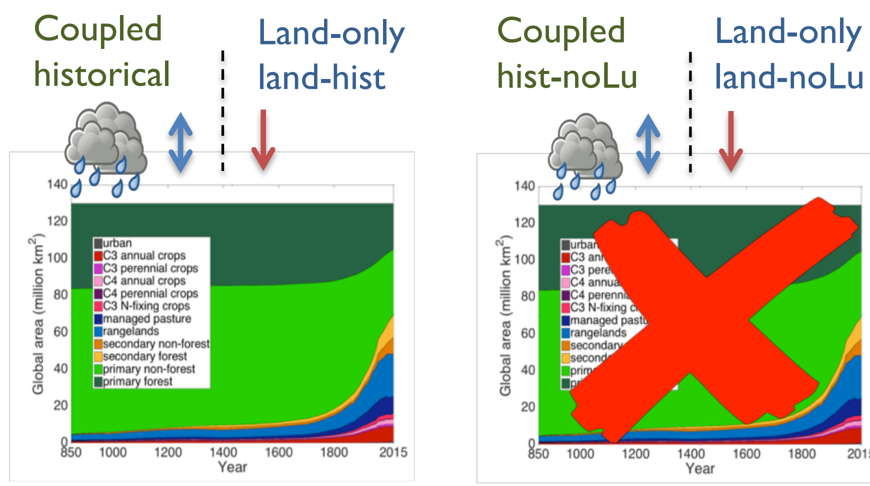
Main Questions

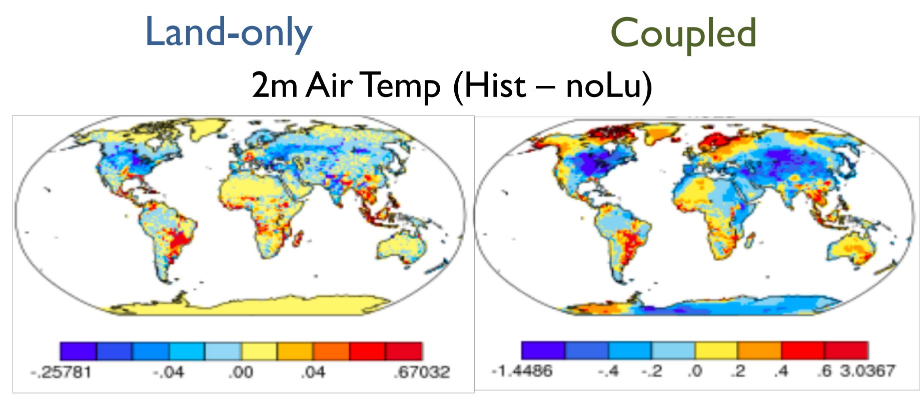
- What are effects LULCC and land management on climate, water cycling, and biogeochemical cycling?
- Are there regional land-management strategies with promise to help mitigate against climate change?

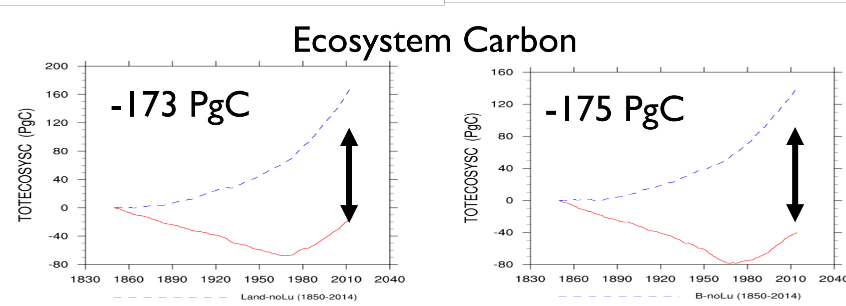
Additional focal topics

- Coupled vs uncoupled responses
- Biogeochemical vs. biogeophysical impact
- Land cover vs. land use change
- Modulation of LULCC impacts by land-atmosphere coupling strength
- Modulation of CO_2 fertilization by LULCCC

- > 12 registered plans for manuscripts
- Aspen Global Change Institute meeting in September (?)







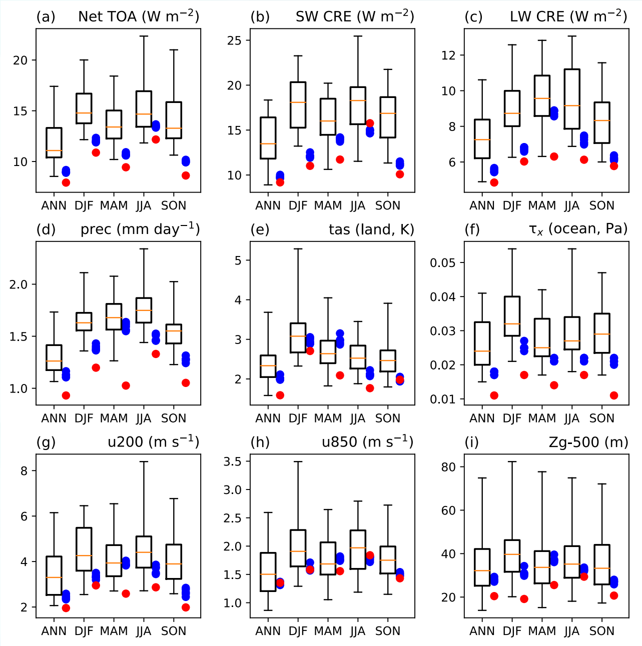
The Energy Exascale Earth System Model (E3SM) v1: Evaluation and Analysis of Climate Sensitivity

Chris Golaz, Peter Caldwell, Luke Van Roekel, L. Ruby Leung , and many others

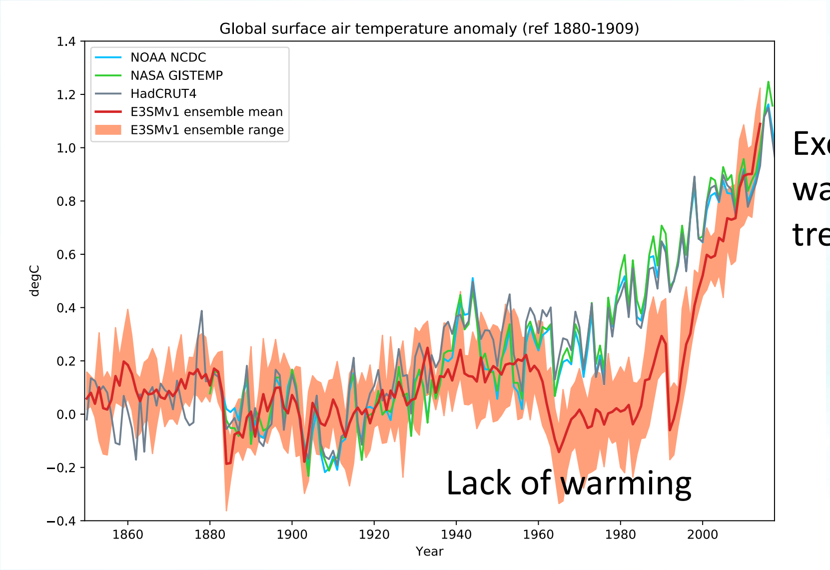
- **E3SMv1** is the first major release of DOE's **Energy Exascale Earth System Model**.
- E3SMv0 started as a fork of CESM1.
- New components include MPAS-Ocean, MPAS-Seaice, and MOSART (river).
- Standard resolution: 1 deg atm, 72 levels (top ~0.1 hPa); 60 to 30 km ocean, 60 levels.

Comparison of RMSE with CMIP5 (1981-2005)

historical
AMIP



Surface air temperature



Excessive warming trend

E3SM Energy Exascale Earth System Model

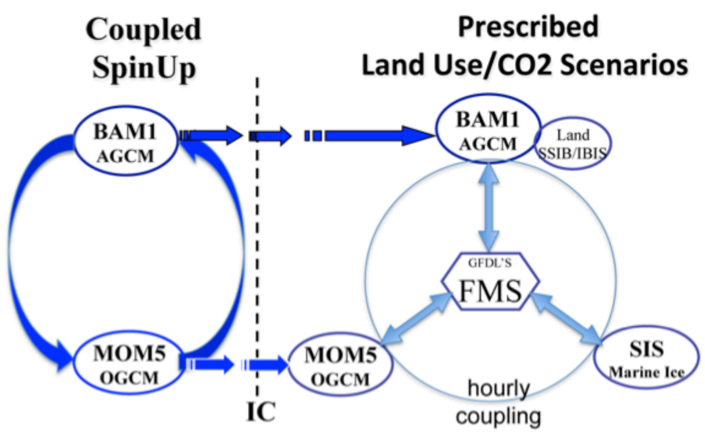
U.S. DEPARTMENT OF ENERGY

Brazilian Earth System Model – BESM-OA2.9
Developments Towards CMIP6

P.Nobre, M.B.da Silva Jr, S.Veiga, M.Bottino, P.Kubota, A.L.Marquez, H.Cachanhuk, S.N.Figueroa, E.Giarolla
National Institute for Space Research – INPE, Brazil

How does the Earth system respond to forcing scenarios?

BESM2.9 Coupled Suite for CMIP6



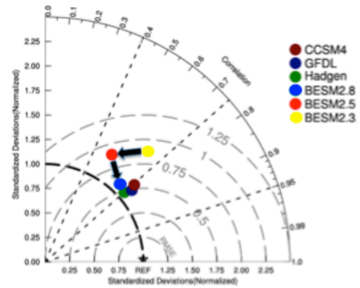
Model Grids: **Atmos:** T062L28 & T126L42;
Ocean: 50 zlevs **Lon:** 1° **Lat:** 0.25° Trop. 2° Poles

Model Characteristics

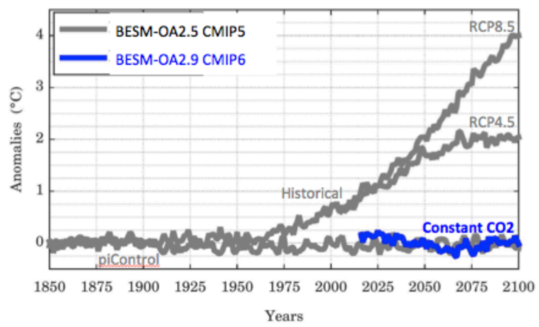
BESM2.5 ➡ BESM2.9

- Enhanced grid resolution
- Improved atmospheric physics
- Included dynamical vegetation
- Upgraded ocean model

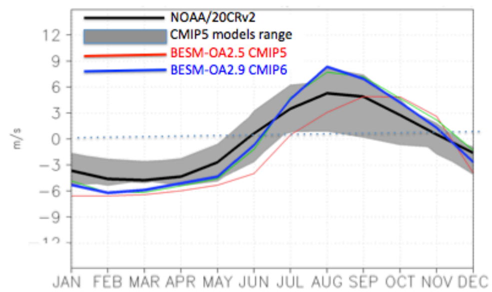
Model Skill



Global Ave SAT



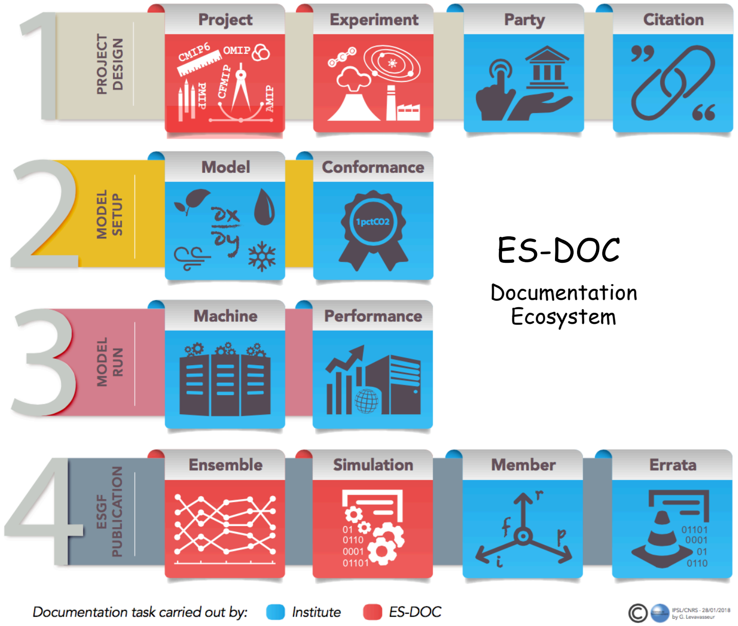
Atlantic ITCZ Index



Acknowlegements: This work was supported by the National Institute of Science and Technology for Climate Change Phase 2 under CNPq Grant 465501/2014-1, FAPESP Grant 2014/50848-9 and the National Coordination for High Level Education and Training (CAPES) Grant 16/2014.

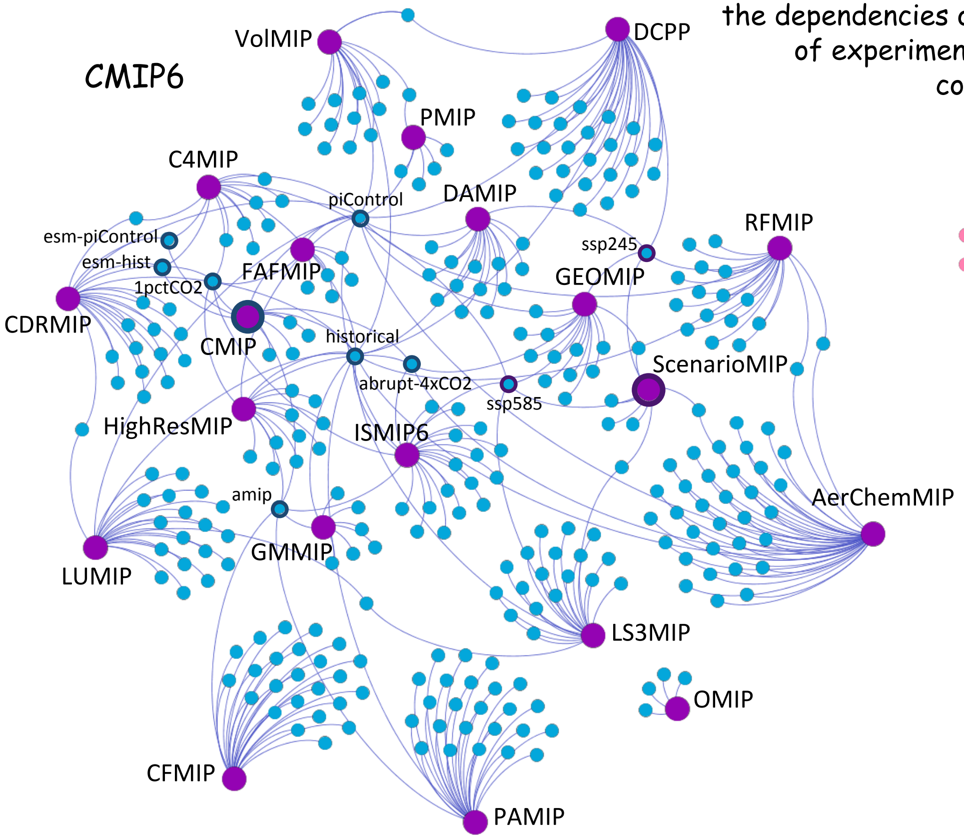
Comparison of Earth System Models through Effective Documentation of Models and Insight about the Implementation of Forcings

Presented by Charlotte Pascoe [charlotte.pascoe@ncas.ac.uk]



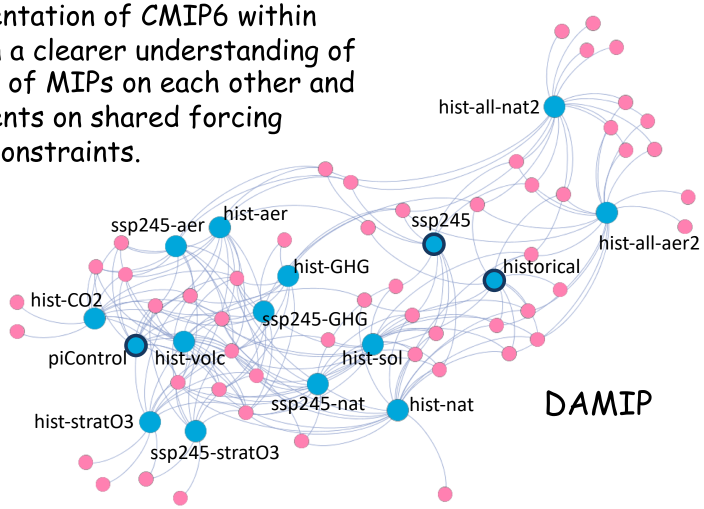
The ES-DOC Realms for CMIP6

Top Level	
Atmosphere	Atmospheric Chemistry
Land	Sea Ice
Atmospheric Aerosols	Ocean Bio-Geochemistry
Ocean	Land Ice



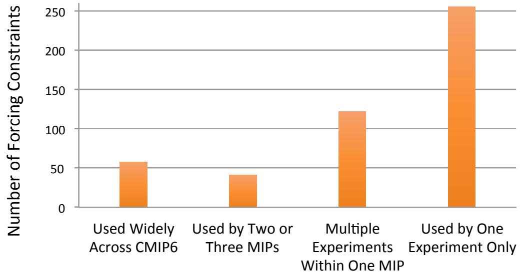
The sharing of experiments between the CMIP6 MIPs.

One of the beneficial outcomes of the formal documentation of CMIP6 within ES-DOC has been a clearer understanding of the dependencies of MIPs on each other and of experiments on shared forcing constraints.



The interdependence of the DAMIP (Detection Attribution MIP) experiments on common forcing constraints.

Re-use of CMIP6 forcing constraints



100 of the CMIP6 forcing constraints are used by at least 2 MIPs

Further information can be found by visiting https://es-doc.org and in Pascoe et. al. Designing and Documenting Experiments in CMIP6 (in preparation for GMD)

es-doc Earth System Documentation · is-enes Infrastructure for the European Network for Earth System Modelling · National Centre for Atmospheric Science, Natural Environment Research Council · Science & Technology Facilities Council · University of Reading · Institut Pierre Simon Laplace · NOAA

Objective Performance Summaries across CMIP generations

Peter Gleckler, Charles Doutriaux, Jiwoo Lee, Paul Durack, Yuying Zhang, and many others
Lawrence Livermore National Laboratory, California, USA

PCMDI Program for Climate Model Diagnosis and Intercomparison

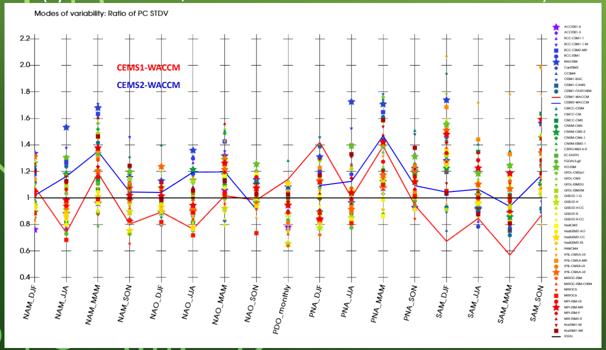
AS MODELERS FOCUS ON TARGETED IMPROVEMENTS, ARE ALL CHARACTERISTICS IMPROVING OR ARE SOME NOT CHANGING OR EVEN DETERIORATING IN THEIR AGREEMENT WITH OBSERVATIONS?

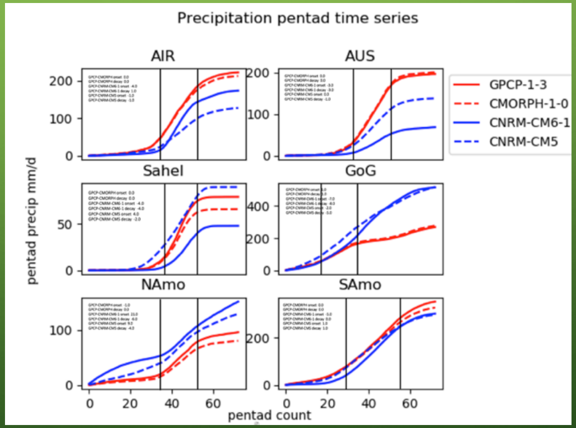
WE USE THE PCMDI METRICS PACKAGE (PMP) TO PRODUCE A DIVERSE SUITE OF ROBUST HIGH-LEVEL SUMMARY STATISTICS COMPARING MODELS AND OBSERVATIONS ACROSS REALMS, SPACE AND TIME SCALES.

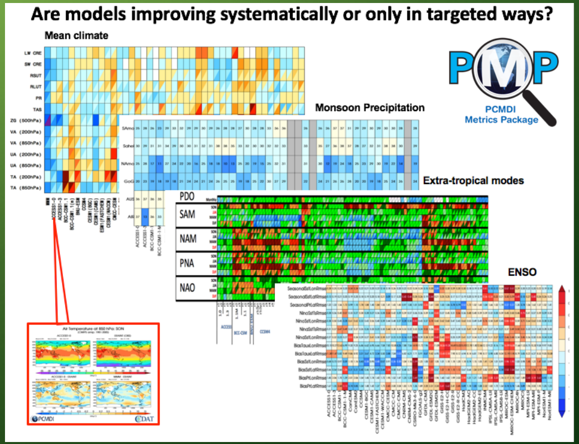
OUR SIMULATION SUMMARIES ARE BASED ON PCMDI RESEARCH AND

COLLABORATIONS WITH EXPERT TEAMS SUCH AS CLIVAR ENSO GROUP AND WGNE MJO TASK FORCE

Amplitude of Extra-tropical Modes
Simulated/ERA20C ratio
(symbols CMIP5; lines CMIP5 & CMIP6 for CESM WACCM)







The importance of data references in CMIP6 data usage and IPCC climate assessments

CMIP6 Model Analysis Workshop,
25-28 March 2019, Barcelona

M. Stockhause, M. Lautenschlager
German Climate Computing Center (DKRZ)

Why cite data?

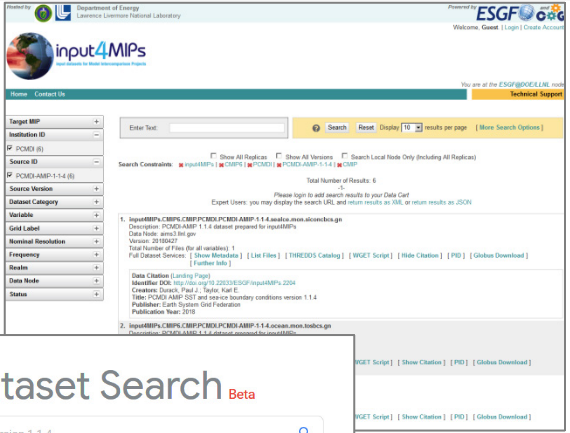
- Give credit to data providers
- Improve traceability of research findings

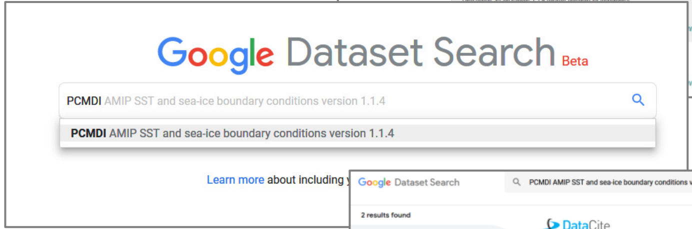
Three Steps for Data Citation

I. Find CMIP6 Data References

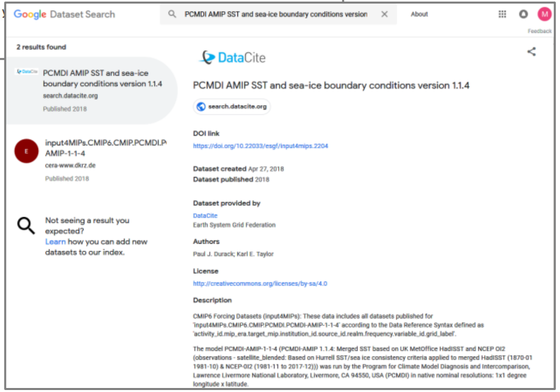
input4MIPs example:

- ESGF CoG portal
  https://esgf-node.llnl.gov/search/input4mips/





- Google Dataset Search
  https://toolbox.google.com/datasetsearch/



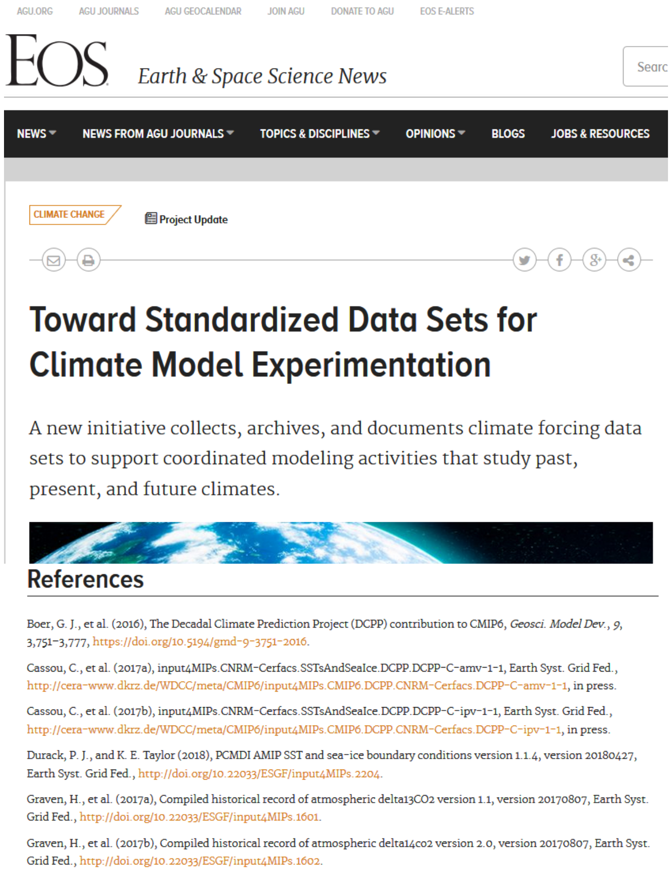
- NetCDF file → ES-DOC → DOI landing page

Three Steps for Data Citation

I. Find CMIP6 Data References

II. Cite Data

Include data references
in reference lists of articles,
e.g. https://doi.org/10.1029/2018EO101751
(according to the recommendation of
the "Enabling FAIR Data Project")



Boer, G. J., et al. (2016), The Decadal Climate Prediction Project (DCPP) contribution to CMIP6, *Geosci. Model Dev.*, *9*, 3,751–3,777, https://doi.org/10.5194/gmd-9-3751-2016.

Cassou, C., et al. (2017a), input4MIPs.CNRM-Cerfacs.SSTsAndSeaIce.DCPP.DCPP-C-amv-1-1, Earth Syst. Grid Fed., http://cera-www.dkrz.de/WDCC/meta/CMIP6/input4MIPs.CMIP6.DCPP.CNRM-Cerfacs.DCPP-C-amv-1-1, in press.

Cassou, C., et al. (2017b), input4MIPs.CNRM-Cerfacs.SSTsAndSeaIce.DCPP.DCPP-C-ipv-1-1, Earth Syst. Grid Fed., http://cera-www.dkrz.de/WDCC/meta/CMIP6/input4MIPs.CMIP6.DCPP.CNRM-Cerfacs.DCPP-C-ipv-1-1, in press.

Durack, P. J., and K. E. Taylor (2018), PCMDI AMIP SST and sea-ice boundary conditions version 1.1.4, version 20180427, Earth Syst. Grid Fed., http://doi.org/10.22033/ESGF/input4MIPs.2204.

Graven, H., et al. (2017a), Compiled historical record of atmospheric delta13CO2 version 1.1, version 20170807, Earth Syst. Grid Fed., http://doi.org/10.22033/ESGF/input4MIPs.1601.

Graven, H., et al. (2017b), Compiled historical record of atmospheric delta14co2 version 2.0, version 20170807, Earth Syst. Grid Fed., http://doi.org/10.22033/ESGF/input4MIPs.1602.

Three Steps for Data Citation

I. Find CMIP6 Data References

II. Cite Data

III. Credit and Reuse

- Impact of CMIP6 data reaches the data providers
  via services of the publishers (e.g. WoS) or via Scholix and data publisher services
- Article readers can reuse the data
  by resolving the DataCite DOI (part of the data reference),
  e.g. https://doi.org/10.22033/ESGF/input4MIPs.2204

WCRP World Climate Research Programme
PCMDI
British Atmospheric Data Centre
NATIONAL CENTRE FOR ATMOSPHERIC SCIENCE
NATURAL ENVIRONMENT RESEARCH COUNCIL
WDC CLIMATE

DOI for 'input4MIPs.CMIP6.CMIP.PCMDI.PCMDI-AMIP-1-1-4'
doi:10.22033/ESGF/input4MIPs.2204

General Information | Creators

General Information

Name input4MIPs.CMIP6.CMIP.PCMDI.PCMDI-AMIP-1-1-4

Abstract CMIP6 Forcing Datasets (input4MIPs).
These data includes all datasets published for 'input4MIPs.CMIP6.CMIP.PCMDI.PCMDI-AMIP-1-1-4' according to the Data Reference Syntax defined as 'activity_id.mip_era.target_mip.institution_id.source_id.realm.frequency.variable_id.grid_label'.

The model PCMDI-AMIP-1-1-4 (PCMDI-AMIP 1.1.4: Merged SST based on UK MetOffice HadISST and NCEP OI2 (observations - satellite_blended: Based on Hurrell SST/sea ice consistency criteria applied to merged HadISST (1870-01 to 1981-10) & NCEP-0I2 (1981-11 to 2017-12))) was run by the Program for Climate Model Diagnosis and Intercomparison, Lawrence Livermore National Laboratory, Livermore, CA 94550, USA (PCMDI) in native nominal resolutions: 1x1 degree longitude x latitude.

Project: The forcing datasets (and boundary conditions) needed for CMIP6 experiments are being prepared by a number of different experts. Initially many of these datasets may only be available from those experts, but over time as part of the 'input4MIPs' activity most of them will be archived by PCMDI and served by the Earth System Grid Federation (https://esgf-node.llnl.gov/search/input4mips/). More information is available in the living document: http://goo.gl/r8up31 .

Subjects input4MIPs.CMIP6.CMIP.PCMDI.PCMDI-AMIP-1-1-4
forcing data
climate
CMIP6

Rights Creative Commons Attribution 4.0 International License (CC BY-SA 4.0)

License input4MIPs forcing data for CMIP6 is evolving in the sense that altered datasets might be added as new versions. The author list and the title are not final, either. Cite this data collection including the latest dataset version according to the Data Citation Guidelines (http://bit.ly/2gBCuqM). Individuals using the data must abide to the terms of use for CMIP6 data (https://pcmdi.llnl.gov/CMIP6/TermsOfUse). Details on any license restrictions are recorded as global attributes in the files.

Contacts Durack, Paul J.

Cite this data

Citation Durack, Paul J.; Taylor, Karl E. **(2018)**. *PCMDI AMIP SST and sea-ice boundary conditions version 1.1.4*. Version *YYYYMMDD*[1].Earth System Grid Federation. https://doi.org/10.22033/ESGF/input4MIPs.2204

BibTeX RIS

[1] Please use the latest dataset version or if not available the latest data download date as version in your data citation.

Data Access

http://esgf-data.dkrz.de/search/esgf-dkrz/?mip_era=CMIP6&activity_id=input4MIPs&institution_id=PCMDI&target_mip=CMIP&source_id=PCMDI-AMIP-1-1-4
http://esgf-node.llnl.gov/search/input4mips/?mip_era=CMIP6&activity_id=input4MIPs&institution_id=PCMDI&target_mip=CMIP&source_id=PCMDI-AMIP-1-1-4

Metadata Export

XML JSON

책임운영기관
National Institute of Meteorological Sciences

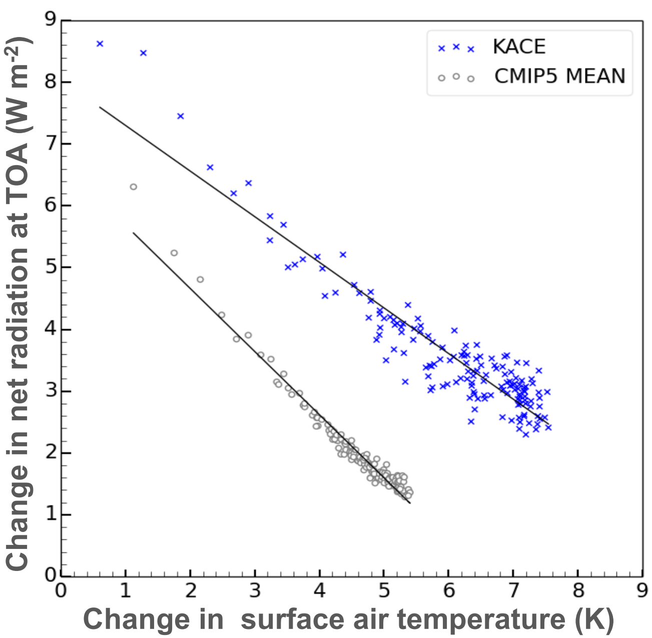
Diagnosing climate sensitivity and radiative feedback in idealized experiments of K-ACE

***Minah Sun*[1*]**, **Hyun Min Sung[1], Byeonghyeon Kim[1], Jisun Kim[1], Johan Lee[2], Jinwon Kim[1], Sungbo Shim[1], Yoon-jin Lim[1], and Young-Hwa Byun[1]**

[1]Climate Research Division, [2]Earth System Research Division, NIMS/KMA, Jeju, Korea (E-mail: masun@korea.kr)

- The **K-ACE (K**MA's **Ad**vanced **Cl**imate **E**arth System model**) has been developed by NIMS/KMA** *(Lee et al., 2019)* to **contribute to the CMIP6 experiments**
- The objective of this study is **to analyze the climate sensitivity** and **its feedback to CO_2 changes** in idealized experiment of K-ACE

Climate sensitivity



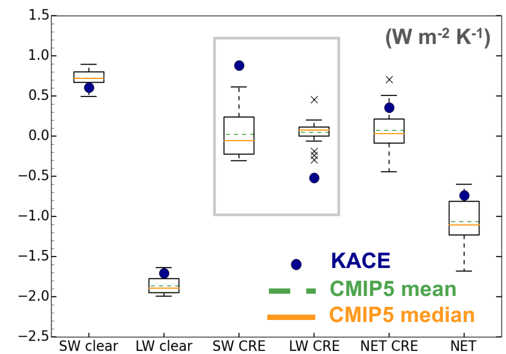
ECS: 5.44 K

[CMIP5: **2.1~4.7** (3.37 ± 0.29) K]

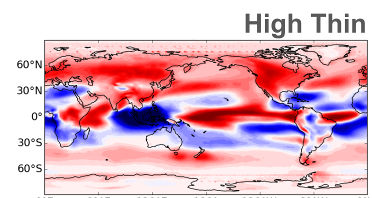
TCR: 3.05 K

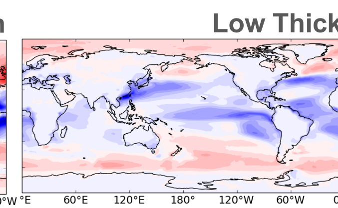
[CMIP5: **1.1~2.6** (1.8 ± 0.6) K]

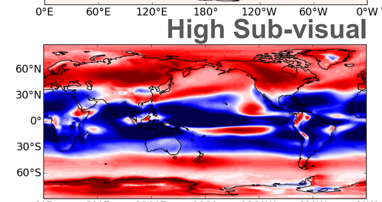
Climate feedback

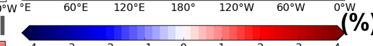


Radiative feedback parameter









Cloud area changes (4CO_2-PI)

- High Thin ↓ across maritime continent
- High Sub-visual ↓ across low latitude
  → **negative LW CRE**
- Low Thick ↓ → **positive SW CRE**

Input Datasets for Model Intercomparison Projects

input4MIPs
input datasets for Model Intercomparison Projects

Paul J. Durack, Karl E. Taylor, Sasha K. Ames, and Jiwoo Lee

- Purpose: to collect and curate CMIP6 forcing datasets
- Status: All DECK/historical and ScenarioMIP datasets in place
  - 14 other MIPs served
- Datasets accessible at: https://esgf-node.llnl.gov/projects/input4mips/
- Data description and history: http://goo.gl/r8up31
- Established elements:
  - Full version control implemented
  - Helpful metadata follows CMIP6 standards
  - ES-DOC errata service in place
  - Slack collaboration site enabled

An Overview of the First Results from ScenarioMIP Experiments

Claudia Tebaldi & co.

CNRM, IPSL, INM, MRI and UKESM

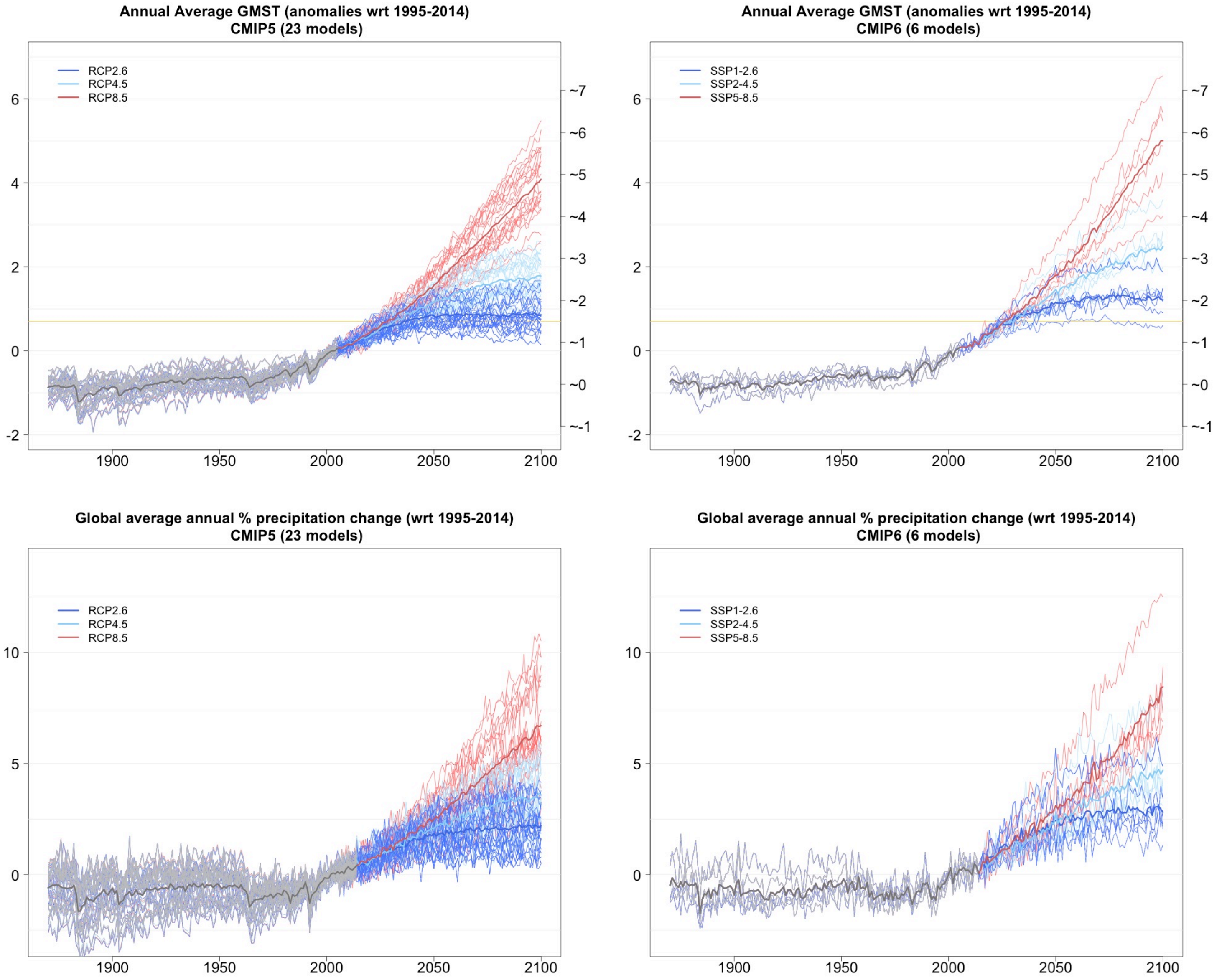
6 models

4 scenarios from Tier 1:
SSP1-2.6, **SSP2-4.5**,**SSP3-7.0**, **SSP5-8.5**

TAS and **PR** results as **global time series** and **normalized patterns of change**

Focus on **ensemble averages** and **comparison with CMIP5 for the 3 'common scenarios'**:

SSP1-2.6 <-> RCP2.6
SSP2-4.5 <-> RCP4.5
SSP5-8.5 <-> RCP8.5

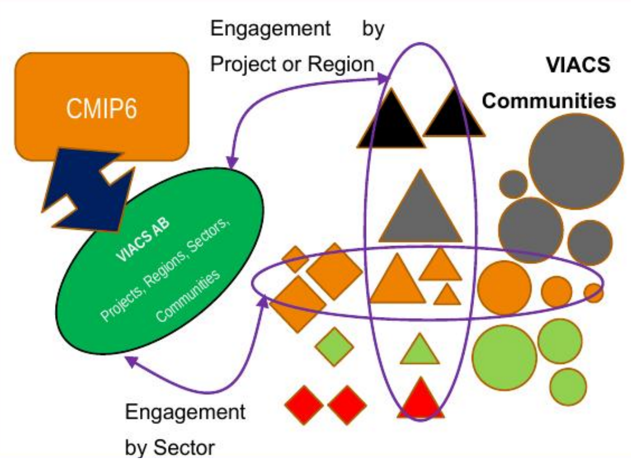


Building Bridges between Modeling and Applications Communities

The Vulnerability, Impacts, Adaptation and Climate Services (VIACS) Advisory Board for CMIP6

Phase I (2016-2018)
Establishing the VIACS Advisory Board and informing the design of CMIP6 simulations

Phase II (2019-2021)
Initial evaluation of CMIP6 models using DECK experiment outputs and the application of broader CMIP6 outputs



Key challenges for VIACS/ESM connection
- Improved VIACS models and analyses to make use of improved outputs
- Practical use of huge variety of models, ensemble members, and MIP experiments
- Incorporation of offline VIA results and VIA-oriented diagnostics for ESM development
- ESM expert guidance and technical facilitation for VIACS translation and application

Practical ideas to enhance communication:
- Create working groups on selected topics, (e.g., guidance on model output usage and model performance, FAQ, etc.)
- One VIACS/ESM contact person per participating modelling-group
- “Consumer reports” for ESMs listing known, VIACS-relevant biases
- Demonstration papers for CMIP6 MIPs: VIACS leader and MIP leader model application
- VIACS participation in major CMIP (and related) workshops and conferences

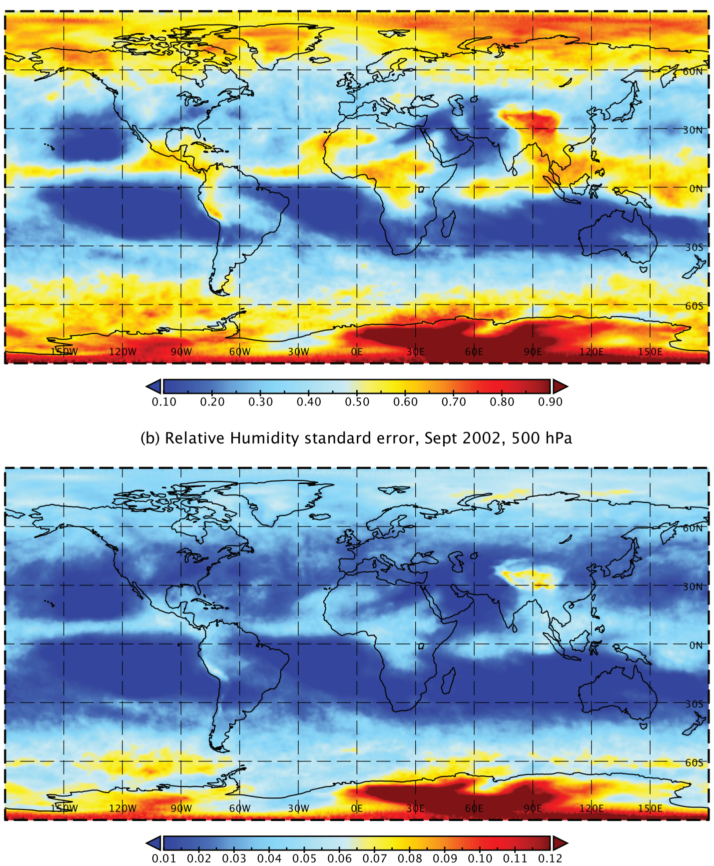
VIACS AB
Mailinglist:

The AIRS Obs4MIPs Version 2 Data Set

National Aeronautics and Space Administration
Jet Propulsion Laboratory
California Institute of Technology

Baijun Tian

(a) Relative Humidity, Sept 2002, 500 hPa



Example of monthly mean relative humidity (a) and its standard error (b) at 500 hPa for Sep 2002 from the AIRS Obs4MIPs V2 data set

Science Question:

The Atmospheric Infrared Sounder (AIRS) Obs4MIPs (Observations for Model Intercomparison Projects) V1 data set was published in 2011 and is one of the most frequently downloaded Obs4MIPs data sets for climate model evaluation. However, it has three limitations: 1) A short period (September 2002 to May 2011); 2) Based on an older version of AIRS data; 3) No relative humidity.

Data & Results:

The AIRS Obs4MIPs V2 data set, a new data set containing the latest version of AIRS observations, aiming to remove the limitations of the AIRS Obs4MIPs V1 data set, and designed for climate model evaluation, has been published. This data set includes monthly mean gridded tropospheric air temperature, specific humidity and relative humidity for each calendar month from September 2002 to September 2016 on eight vertical pressure levels from 1000 to 300 hPa. The standard error and number of observations, for an estimate of data uncertainty, along with three technical notes are also provided.

Significance:

The AIRS Obs4MIPs V2 data set adds new monthly mean tropospheric relative humidity data to Obs4MIPs, and updates and extends the monthly mean tropospheric air temperature and specific humidity data in the AIRS Obs4MIPs V1 data set.

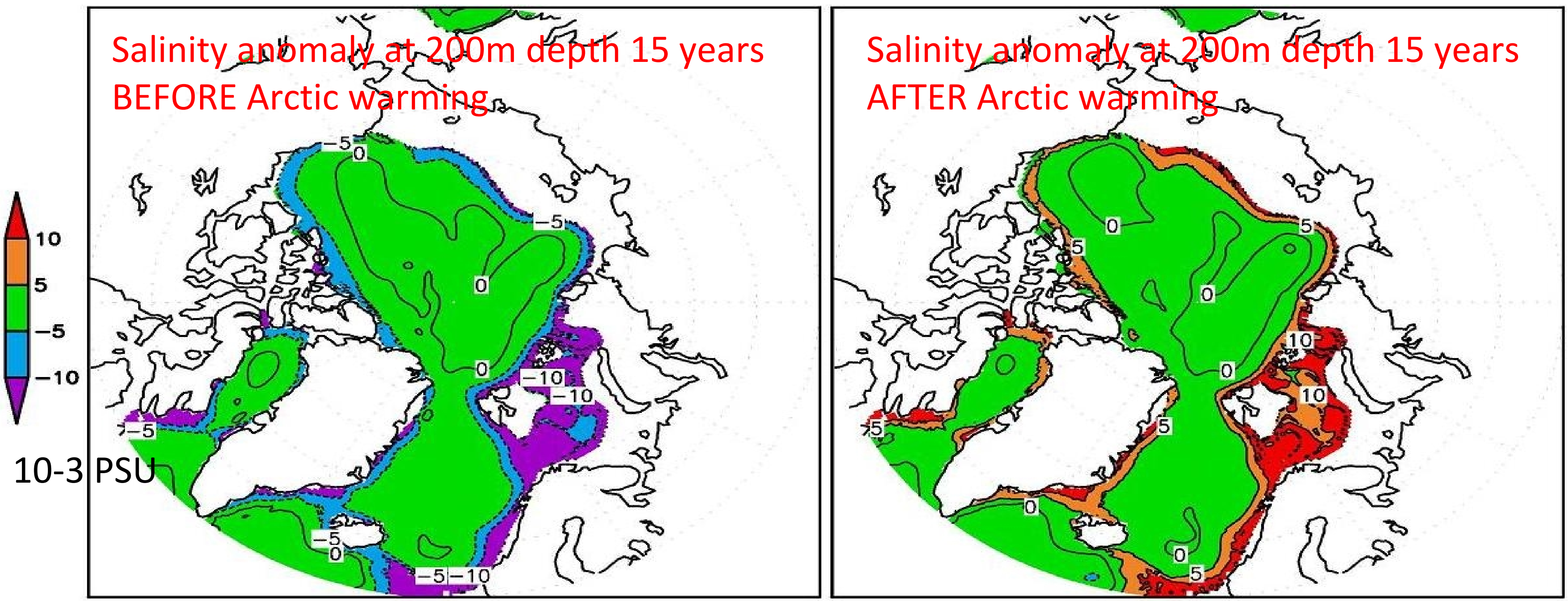
Tian, B., Fetzer, E. J., & Manning, E. M. (2019), The Atmospheric Infrared Sounder Obs4MIPs Version 2 Data Set, *Earth Space Sci.*, *6*(2), 324-333, https://doi.org/10.1029/2018EA000508.

This work was supported by an award to Baijun Tian under the NASA Data for Operation and Assessment program administered by Dr. Tsengdar Lee.

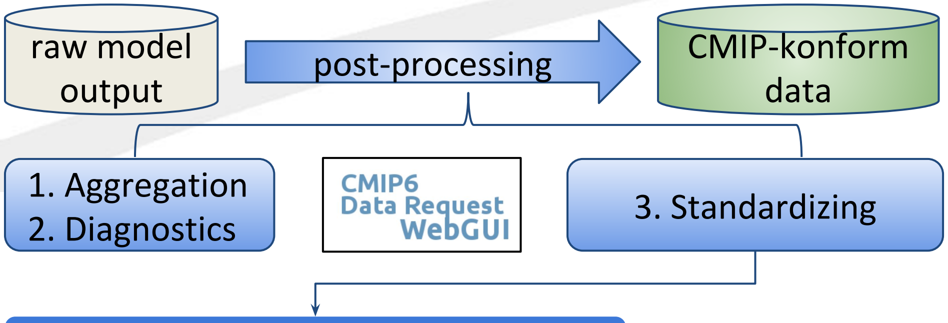
The nature of 60-year oscillations of Arctic climate according to data of INM RAS climate model. P27

Volodin E. Institute of Numerical Mathematics RAS, Moscow.

1. 60 year climate oscillations in climate model INM-CM5-0 is studied on the basis of preindustrial run (1200 years).
2. Arctic surface temperature show spectral peaks at periods of 60 and 10-15 years.
3. Composite analysis of oscillation with a period of 60 years show enhanced Atlantic water inflow to Arctic ocean 15 years before Arctic warming and during warming itself, and decreased Atlantic water inflow 15 years after warming.
4. Special technique was developed and applied to estimate the contribution of each term in the equations for T and S in generation and phase evolution of 60 year oscillation.



CDO can be linked with CMOR which creates CMIP compliant output.
Users can combine other operators with cdo cmor.



cdo cmor operator

```
cdo cmor,MIP-Table, \
            info=config.txt, \
  mapping_table=mt.txt \
            infile
"File stored in: $DRS/outfile "
```

cdo expr operator

```
cdo mulc,9.81 in out
```

```
cdo expr,"ov=iv*9.81" in out
```

Pipe **cdo expr** and **cdo cmor**

```
cdo cmor,Amon,mt=mt.txt \
-expr,"ov=iv*9.81" in out
```

cdo climate extremes indices

contact: wachsmann@dkrz.de

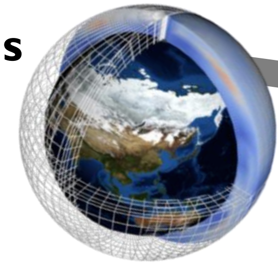
CFMIP
Cloud Feedback Model Intercomparison Project

Cloud Feedback Model Intercomparison Project (CFMIP) Phase 3: Current status for CMIP6

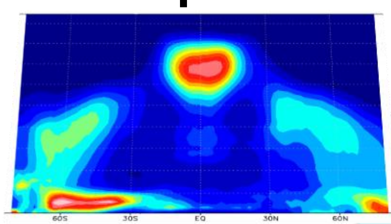
Masa Watanabe, George Tselioudis, and CFMIP SSC

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

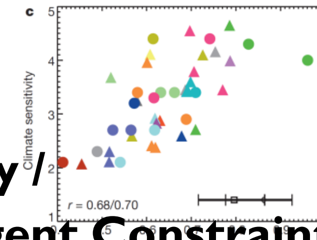
GCMs



Satellite products



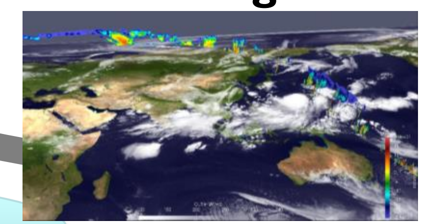
Theory / Emergent Constraints



Sherwood et al., 2014

Understanding Clouds, Circulation, Precipitation & Climate Sensitivity

Cloud resolving models



CMIP6, IPCC AR6, WCRP Grand Challenge

Objectives

1. Improving understanding of cloud-radiative feedback mechanisms in a changing climate.
2. Better evaluation of clouds and cloud feedbacks in GCMs.
3. Understanding of other aspects of climate response related to clouds, such as changes in circulation and precipitation, and link these knowledge to assess climate sensitivity.

Timeline for data availability of CFMIP3 experiments

Tier 1 data will be available by the middle of 2019, followed by Tier 2 data by the end of 2019

Main Progress of the Beijing Climate Center Climate System Model (BCC-CSM) from CMIP5 to CMIP6

Tongwen Wu, Yixiong Lu, Fang Yongjie, and et al.

Abstract Main progresses of Beijing Climate Center (BCC) climate system model from the phase five of the Coupled Model Intercomparison Project (CMIP5) to its phase six (CMIP6) are presented, in terms of physical parameterizations and model's performance. BCC-CSM1.1 and BCC-CSM1.1m are the two models involved in CMIP5**. BCC-CSM2-MR, BCC-CSM2-HR, and BCC-ESM1.0 are the three models configured for CMIP6.** Historical simulations from 1851 to 2014 from BCC-CSM2-MR (CMIP6) and from 1851 to 2005 from BCC-CSM1.1m (CMIP5) are used for models assessment. **Compared to BCC-CSM1.1m, BCC-CSM2-MR shows significant improvements in many aspects** including: tropospheric air temperature and circulation at global and regional scale in East Asia, climate variability at different time scales such as QBO, MJO, diurnal cycle of precipitation, and long-term trend of surface air temperature.

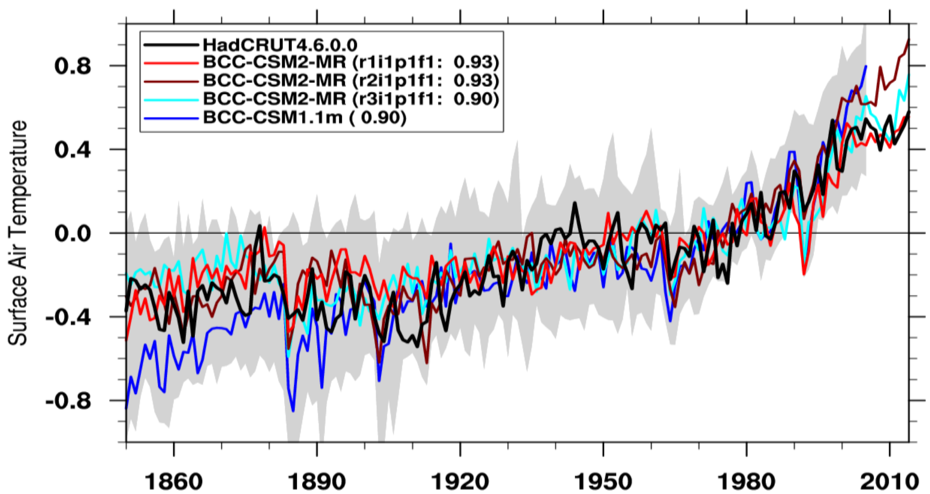


Fig.1 Time series of anomalies in the global (60° S to 60° N) mean surface air temperature from 1850 to 2014. The numbers in the bracket denote the correlation coefficient of 11-year smoothed BCC model data with the HadCRUT4.6.0.0

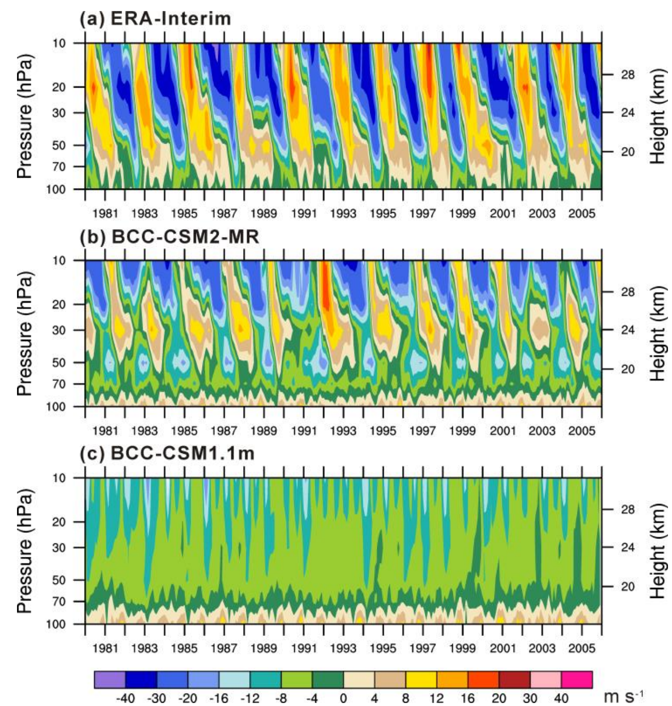


Fig. 2 Tropical zonal winds (m·s-1) between 5° S and 5° N in the lower stratosphere from 1980 to 2005

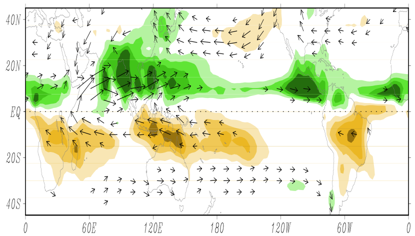
Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2018-254
Revised manuscript under review for journal Geosci. Model Dev.

Overview of the Global Monsoons Model Intercomparison Project (GMMIP) for CMIP6

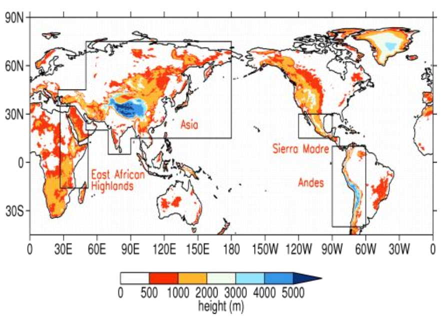
Tianjun Zhou [1], Andrew Turner [2], James Kinter III [3]

1 Institute of Atmospheric Physics, Chinese Academy of Sciences, China, 2 NCAS-Climate and Department of Meteorology, University of Reading, UK,
3 COLA & Dept. of Atmospheric, Oceanic & Earth Sciences, George Mason University, USA. *E-mail: zhoutj@lasg.iap.ac.cn*

Background



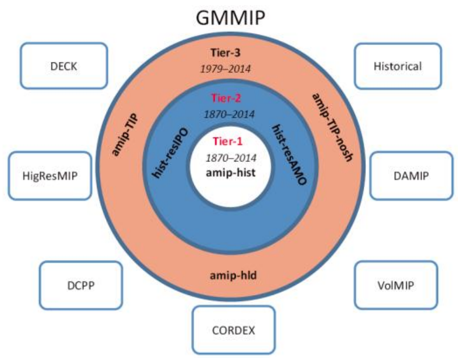
Coherent variation



Orography regions specified for Tier-3

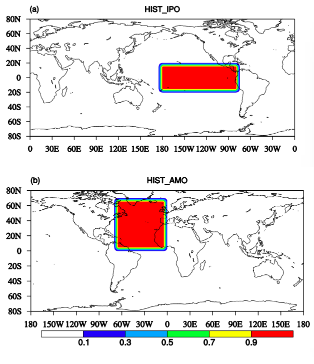
Objectives

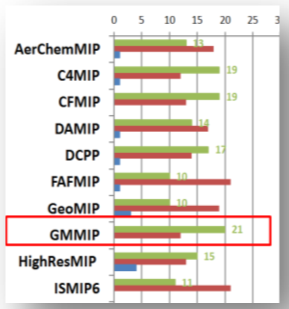
- **Contributions of internal processes & external forcings to monsoon evolution**
- **Effects of Eurasian orography on regional/ global monsoons**
- **Ocean-atmosphere interaction affects monsoon interannual variability & predictability**
- **Benefits of developing high-resolution models & improving model dynamics and physics**



GMMIP Experiments & other related MIPs

Drivers of GM Changes





Model groups' commitments to participate in GMMIP

Conclusions

- ✓ **Quantifying the role of the internal (IPO, AMO) variability and the external forcing (GHG, aerosol) to GM changes relies on climate modeling.**
- ✓ **GMMIP will focus on the dynamical & physical processes that dominate the GM changes.**
- ✓ **We hope that GMMIP will provide a useful platform for the climate modeling community in the collaboration of monsoon studies.**