CMIP
Coupled Model Intercomparison Project

CMIP evolving

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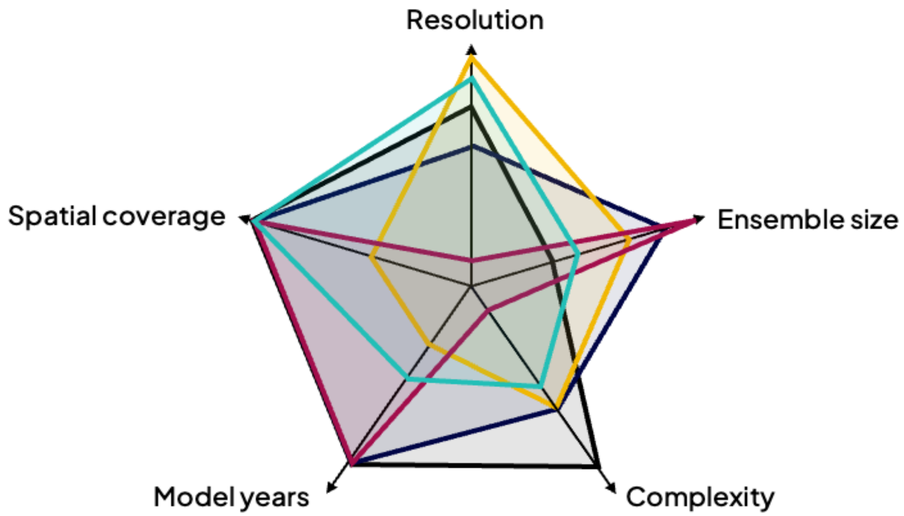
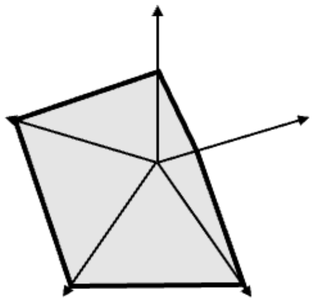
John Dunne (GFDL) and Helene Hewitt (Met Office), CMIP Panel Co-chairs

Tuesday 7th November 2023, 13th Climate Change Initiative colocation CMUG Integration

CMIP within the modelling multiverse

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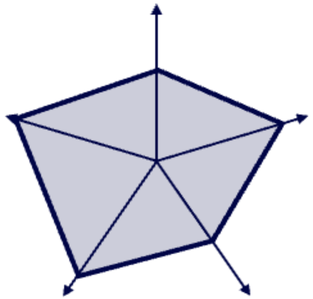
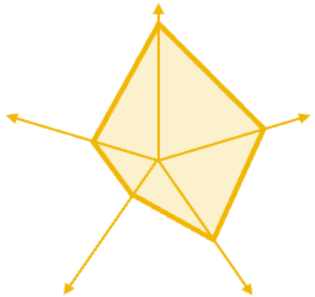
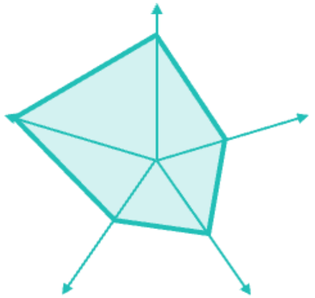
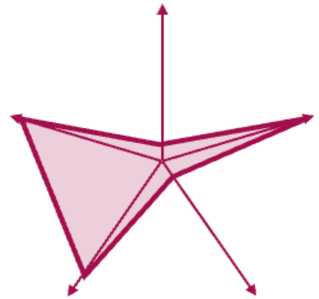

CMIP


CORDEX


High resolution


Emulators

The continuing need for multi-model ensembles

CMIP supports

…..**scientific investigation**

- by addressing questions that require long simulations, large ensembles, and representation of comprehensive earth system processes.
- by exploiting updated historical forcings, scenarios and longer, richer observational records.

…..**scientific assessments** including IPCC

……**value added uses** including climate services and supporting downstream users.

An evolving vision of CMIP

….to coordinate a community-based effort to tackle key and timely climate *science questions* and facilitate delivery of relevant multi-model simulations through shared infrastructure for the benefit of the *climate research community*, *climate impact and adaptation practitioners*, *national and international climate assessments*, and society at large.

An evolving CMIP organisation

As the utility of CMIP grows we seek a wider range of voices contributing to CMIP design, organisation and governance.

The CMIP Task Teams support CMIP experimental design and implementation. Most task teams focus on the infrastructure required for coordinated experiments (e.g., data request, forcings….). Others address community needs (e.g., data access….) or overarching scientific issues (strategic ensemble design).

Fresh Eyes on CMIP integrates the voices of ECRs worldwide into CMIP.

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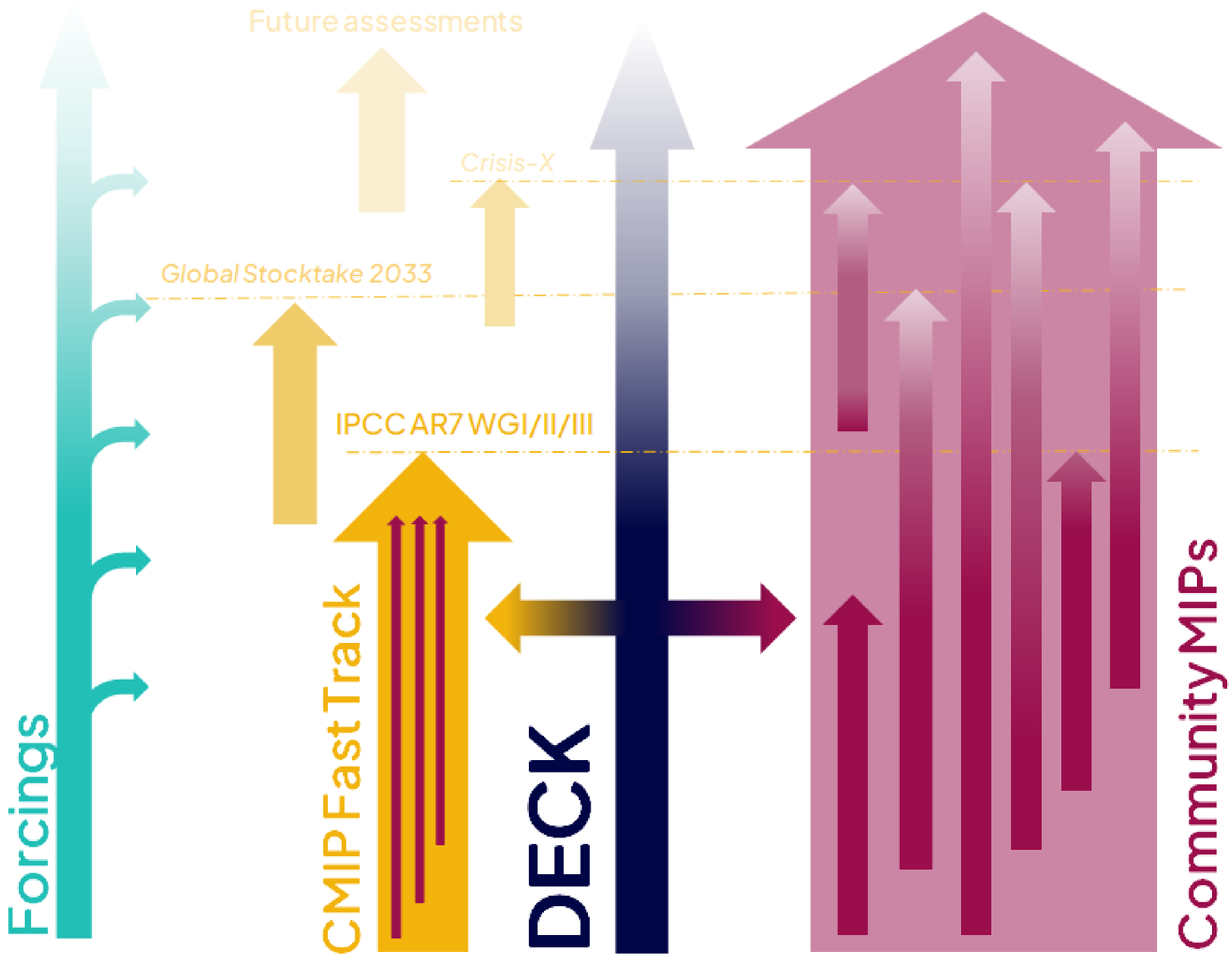
An evolving CMIP design

A more continuous approach with small targeted “Fast Track” experiment sets. The first will respond to the needs of IPCC AR7.

CMIP infrastructure, standards and tools support ongoing science and assessment activities.

This design reflects extensive feedback from the modelling centres and wider user community.



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DECK

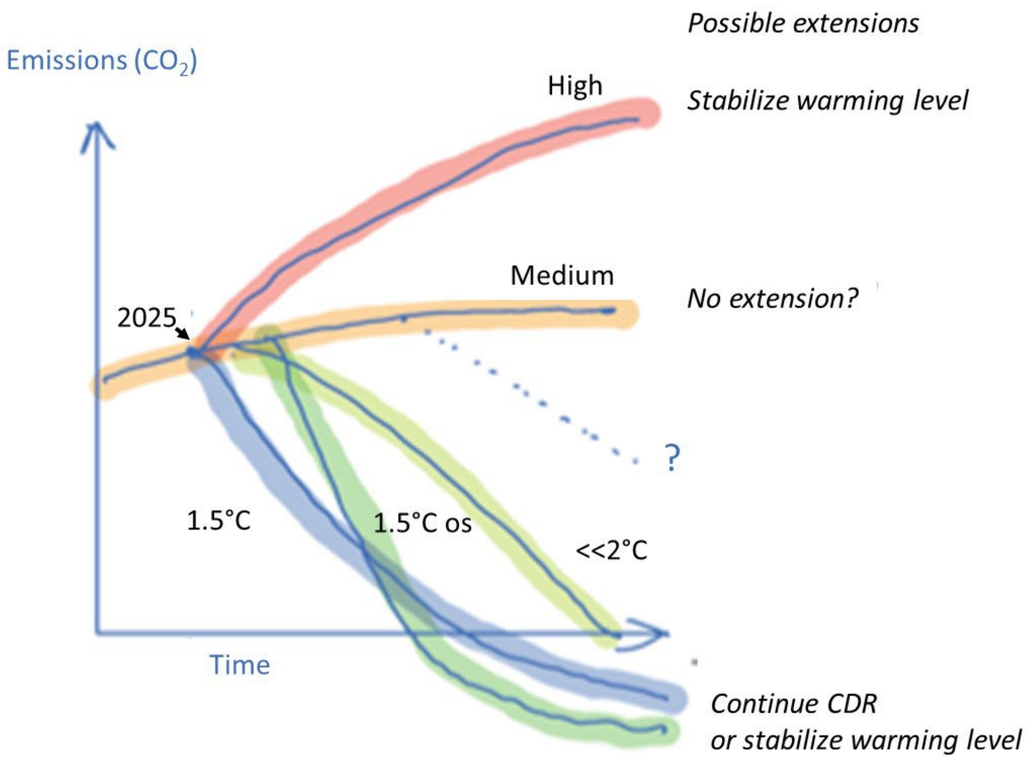
- Remains as entry card to CMIP participation
- Will now include:
    - historical
    - esm-historical
    - piClim-control
    - piClim-anthro
    - piClim-4xCO2
- Emissions driven experiments trialled during CMIP7 may lead to an ESM-DECK in the future.

What are CMIP Fast Tracks?

- A compact set of experiments including the DECK and selected experiments from Community MIPs.
- Chosen to support specific needs e.g., scientific assessments such as AR7.
- Operate under strict timelines.
- Do not reflect prioritisation of experiments on any basis apart from timeline.

The DECK (CMIP “entry card”) and Fast Track experiments are governed and designed by the CMIP Panel. Participation in Fast Track or Community MIPs is dependent on individual centres’ scientific and other interests.

Scenario development



- Scenarios will be a core component of the CMIP AR7 Fast Track.
- ScenarioMIP are currently developing their experimental protocol with a first proposal for stakeholder review expected by end of the year.
- A number of task forces have been established: low/overshoot scenarios, middle/high scenarios, extensions, CDR and IAM-ESM interactions.

More information at ScenarioMIP webpages.

Community MIPs

- Can run on timeline determined by the needs of the MIP.
- May or may not choose to align with IPCC timeline.
- Can benefit from CMIP infrastructure and tools.
- If do align will need to adhere to strict deadlines.
- The CMIP Panel will not be endorsing MIPs but will provide best practice guidelines.
- Requests for Panel feedback and IPO support can be submitted when registering MIP.

Upcoming CMIP timeline update

The first CMIP Fast Track depends on the specification of IPCC AR7 needs (to be determined over the course of 2024). Community MIPs do not need to align with that timeline. CMIP currently estimates:

- **CMIP description paper:** Intention for submission in 2024.
- **Historical forcings:** Data extending until December 2021 available by mid-2024 and revised in 2026 (CMIP Forcings timeline – current status).
- **Data request:** Initial production versions expected early to mid-2025, with regular updates thereafter.
- **Scenario forcings:** Unlikely before early 2026 (link to ScenarioMIP pages)

Concurrently we anticipate:

- **Modelling centres:** Consulting on expectations for when new models and associated infrastructure will be ready – most appear to be indicating starting runs between late 2024 and early 2026.
- **Data infrastructure:** Earth System Grid Federation (ESGF) supporting the collation and distribution of data. Ongoing discussions led by the WGCM Infrastructure Panel (WIP) and ESGF community.

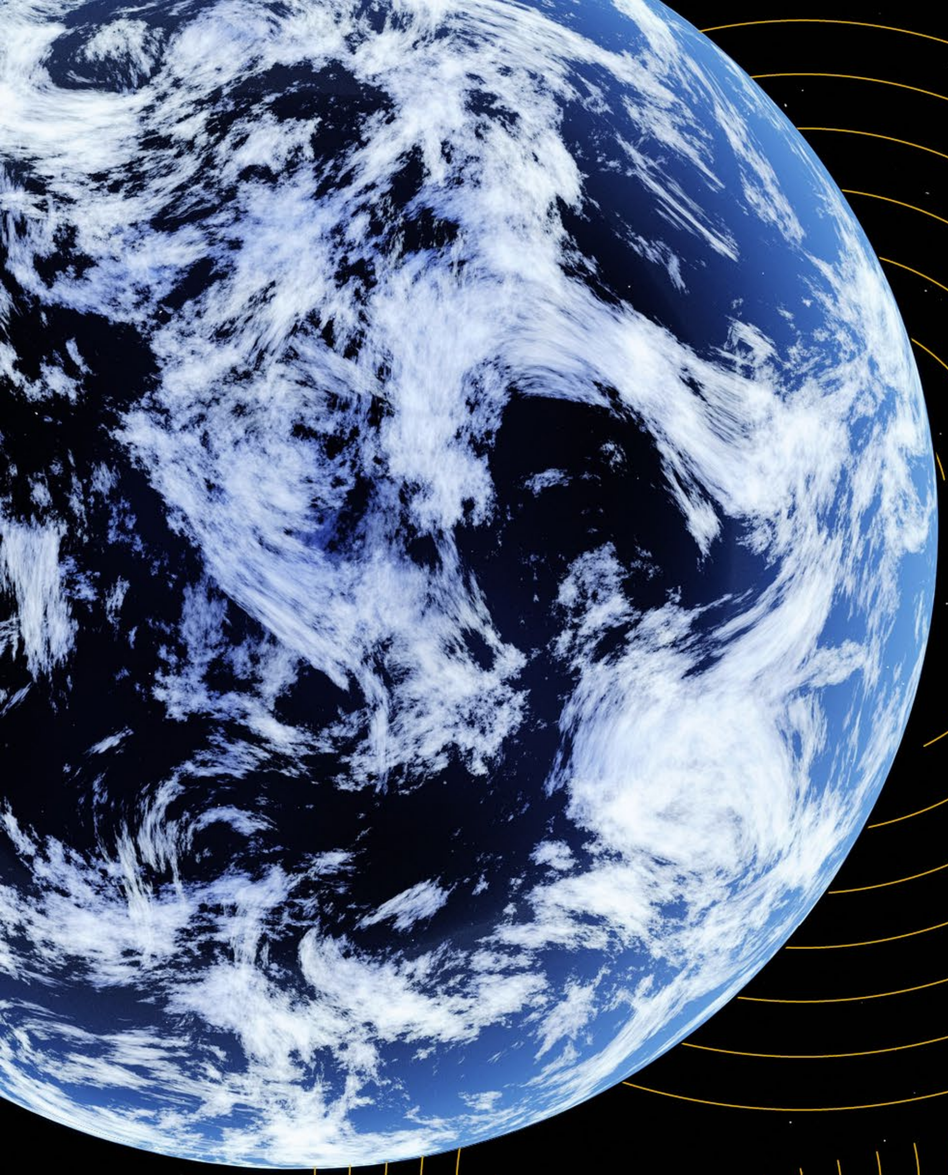
What is next

The CMIP task teams' activities include time sensitive activities such as delivery of updated forcing and development of the data request.

Upcoming consultation and engagement:

- **Nov-Dec 2023:** Modelling centre review of first version Fast Track proposal.
- **Jan-Feb 2023:** Wider community and user review of next version Fast Track proposal.
- **Mar 2024:** Approval of experiment design at WGCM meeting.
- **Ongoing:** close engagement with the IPCC Bureau.
- CMIP sessions and events at **AGU23, EGU24** and **AOGS24**

Keep up to date with the latest at https://wcrp-cmip.org/events/



esa

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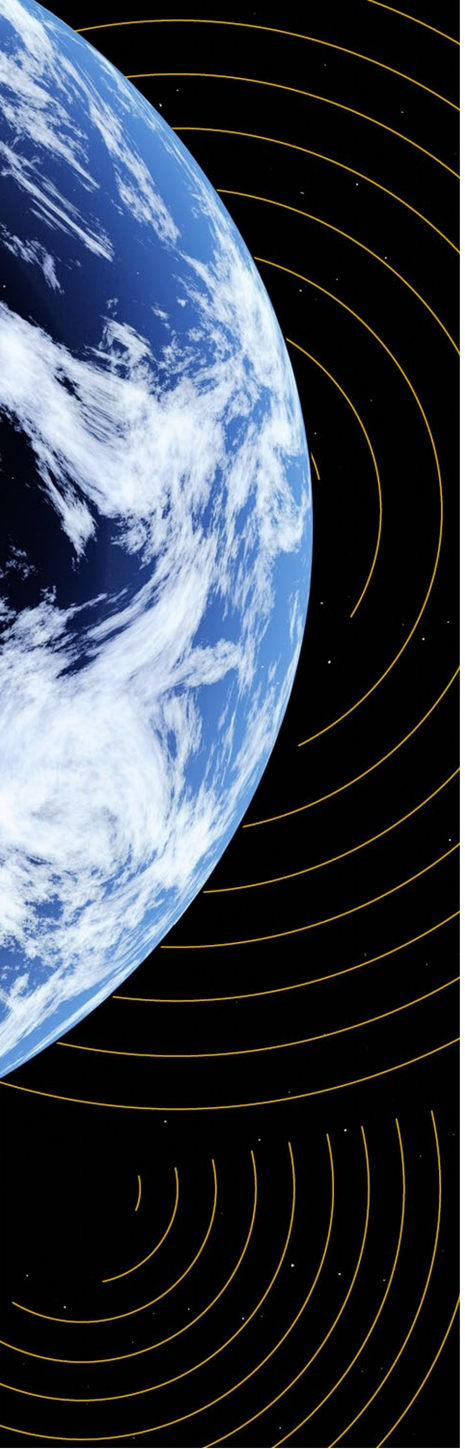
Intercomparison
Project

Strengthening the observation-modelling interface

Historical forcing dataset provision

1. Anthropogenic short-lived climate forcings (including CO_2 and CH_4)
2. Open biomass burning emissions
3. Land use
4. Greenhouse gas historical concentrations
5. Stratospheric volcanic SO_2 emissions and aerosol properties
6. Ozone
7. Nitrogen deposition
8. Solar
9. AMIP boundary forcing
10. Aerosol optical properties/MACv2-SP

Find out more in the following presentation from Claire McIntosh and on the CMIP Forcings Task Team webpage.



obs4MIPs

obs4MIPs is a collection of satellite datasets that are formatted and organized according to the model output requirements of WCRP CMIP and made available on the Earth System Grid Federation (ESGF) together with the archive of CMIP model output data. Simon Pinnock co-chairs the obs4MIPs Steering Group.

Achievements: 218 datasets available on ESGF

Current status: 15 dataset proposal submissions (EoIs)

Task groups

- Revision of obs4MIPs Data Specifications
- ESGF (publication & information)
- Guidance and capacity building
- Inclusion of satellite-based exploratory datasets
- Workflow efficiency: Improving workflow for preparing obs4MIPs compliant data

Website: https://pcmdi.github.io/obs4MIPs/ Github: https://github.com/PCMDI/obs4MIPs-cmor-tables

CMIP

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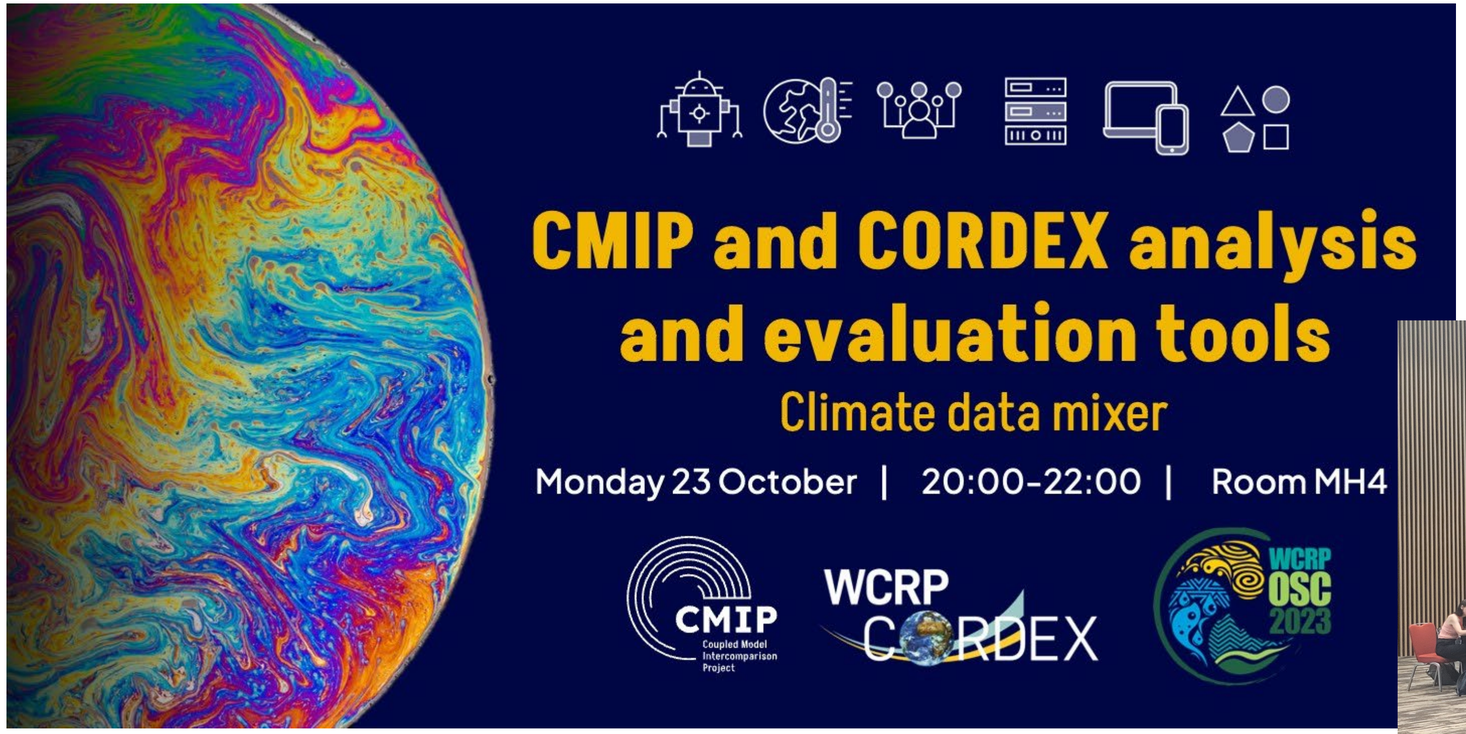
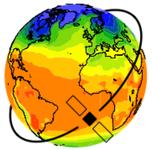


[Tools gallery](#) and [tools videos](#) now available on the CMIP website



ESMValTool
Earth System Model Evaluation Tool

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Model Benchmarking

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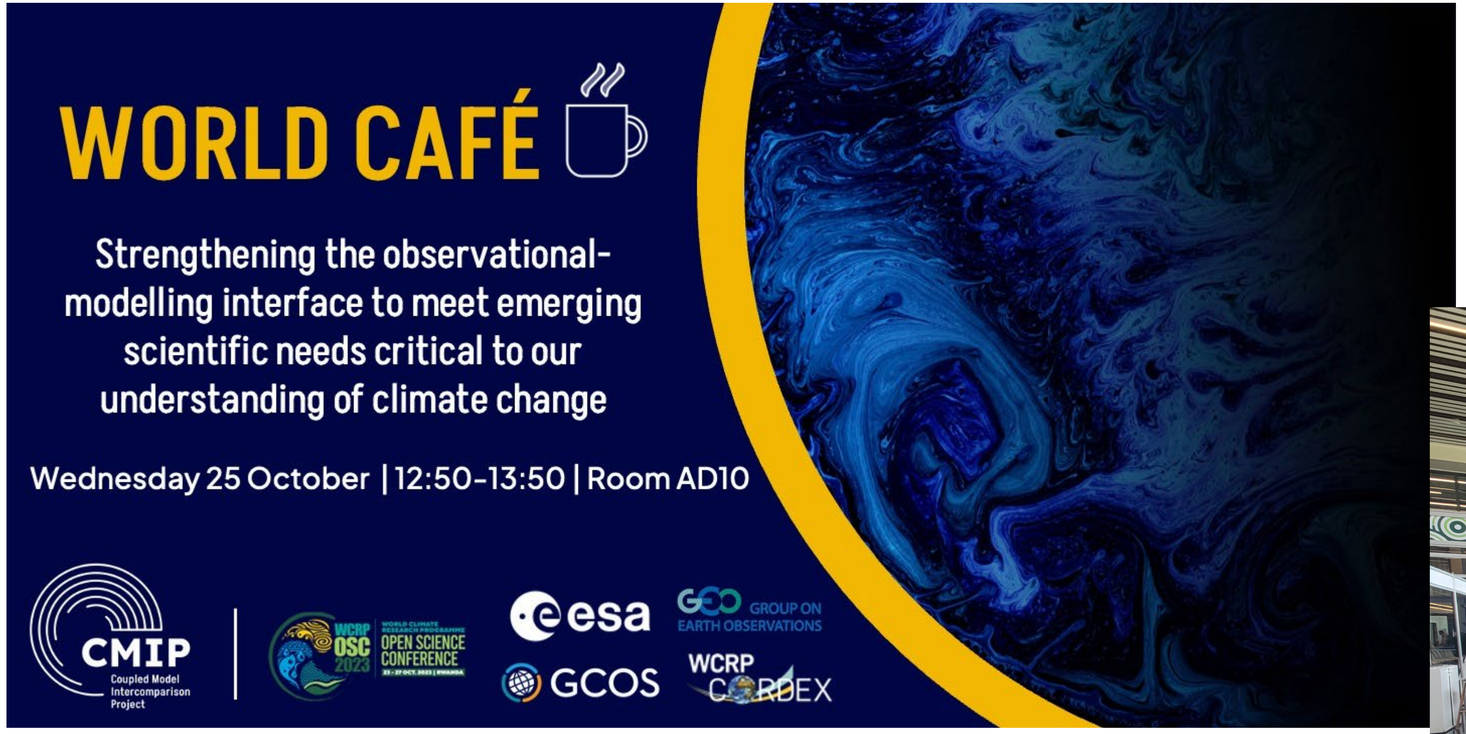

Building on the event at the GCOS conference this session at the OSC in Kigali, plus attendee participation at the WCRP booth, provided further input to the community roadmap for collective action to strengthen the observation-modelling interface critical to our understanding of climate change.

Ideas can still be submitted at bit.ly/om-roadmap-idea

New WCRP core project: ESMO

- Will coordinate all modelling, data and observations activities across WCRP and key partners bringing together existing modelling and data elements of the WCRP structure.
- This framework will enable the formulation of WCRP modelling and observational requirements to observe, understand and predict the climate system.
- Claire McIntosh is a member of the ESMO Scientific Steering Group and Simon Pinnock, as obs4MIPs co-chair, is an ex-officio member.
- The ESMO International Project Office is now established at DKRZ in Hamburg with Director, Fanny Adloff.
- We can expect activities and workstreams to spin up throughout 2024. More information can be found on the ESMO webpages.

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Thank You

Please contact cmip-ipo@esa.int with any questions or feedback
and more information can be found at wcrp-cmip.org

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