

## **46th Session of the WCRP Joint Scientific Committee (JSC)**

Date: 12-16 May 2025

### **Update report for the WCRP Joint Scientific Committee**

#### **CMIP and WGCM Infrastructure Panel**

#### **1. High-level publications**

There are two Geoscientific Model Development (GMD) Special Issues established for CMIP7:

1. **CMIP7 scientific objectives, experimental design, and organization** with the following papers:
  - Dunne *et al.*: An evolving Coupled Model Intercomparison Project phase 7 (CMIP7) and Fast Track in support of future climate assessment, EGU sphere [preprint], <https://doi.org/10.5194/egusphere-2024-3874>, 2024.
  - Durack *et al.*: The Coupled Model Intercomparison Project (CMIP): Reviewing project history, evolution, infrastructure and implementation, EGU sphere [preprint], <https://doi.org/10.5194/egusphere-2024-3729>, 2025.
  - Gillett, N. P., *et al.*: The Detection and Attribution Model Intercomparison Project (DAMIP v2.0) contribution to CMIP7, EGU sphere [preprint], <https://doi.org/10.5194/egusphere-2024-4086>, 2025.
  - Juckes, M., *et al.*: Baseline Climate Variables for Earth System Modelling, EGU sphere [preprint], <https://doi.org/10.5194/egusphere-2024-2363>, 2024.
  - Roberts, M. J., *et al.*: High-Resolution Model Intercomparison Project phase 2 (HighResMIP2) towards CMIP7, Geosci. Model Dev., 18, 1307–1332, <https://doi.org/10.5194/gmd-18-1307-2025>, 2025.
  - van Vuuren *et al.*: The Scenario Model Intercomparison Project for CMIP7 (ScenarioMIP-CMIP7), EGU sphere [preprint], <https://doi.org/10.5194/egusphere-2024-3765>, 2025.
2. **Coupled Model Intercomparison Project Phase 7 (CMIP7) forcings and inputs – development, documentation, and evaluation (GMD/ESSD inter-journal SI)** with the following papers:
  - Funke, B., *et al.*: Towards the definition of a solar forcing dataset for CMIP7, Geosci. Model Dev., 17, 1217–1227, <https://doi.org/10.5194/gmd-17-1217-2024>, 2024.
  - Ke, Z., *et al.*: Enhancing Climate Model Performance through Improving Volcanic Aerosol Representation, EGU sphere [preprint], <https://doi.org/10.5194/egusphere-2024-1612>, 2024.

An additional paper from the Model Benchmarking Task Team has been submitted:

- Birgit Hassler, Forrest M Hoffman, Rebecca Beadling, et al. Systematic Benchmarking of Climate Models: Methodologies, Applications, and New Directions. *ESS Open Archive*. March 14, 2025. [10.22541/essoar.174196646.65056548/v1](https://doi.org/10.22541/essoar.174196646.65056548/v1)

Two commentary papers are also in preparation, described in Section 7 of this report, together with six papers documenting the CMIP7 harmonised data request.

## 2. Capacity Building/Education and Training Highlights

Capacity building is an integral activity in the CMIP community to ensure knowledge is passed through generations of scientists across the world.

### Fresh Eyes on CMIP (FEoC)

Fresh Eyes on CMIP is an Early Career Researchers network which brings new people and perspectives into the community. FEoC has 184 members from 36 countries spanning all continents, except Antarctica, and is led by a diverse Steering Group comprising members representing all regions of the world. Activities in Fresh Eyes are now organised into two streams: Projects and Directory. Members in the Directory stream enjoy a ‘commitment-free’ membership to Fresh Eyes, where they can access training materials, consultation invitations, events, and more with their engagement tailored to their own capacity. Members in the Projects stream engage at a higher level with CMIP, contributing to one or more projects addressing issues within CMIP, from gathering analysis tools repositories to testing and evaluating early CMIP7 forcings datasets, or quantifying the impact of the CMIP project across past phases. Work is also ongoing to develop the Fresh Eyes Platform – a user forum where members can share Project progress, discuss new Project proposals, network with other members, and access training resources. An inaugural marathon 22-hour Fresh Eyes Workshop will take place in May 2025 combining three regional hubs (Asia/Australia, Europe/Africa, the Americas) to bring together the global membership. The Workshop will feature science sessions, practical training, and networking opportunities and aims to bring together the Fresh Eyes community alongside our Task Team and governance members.

### Joint CMIP-ESMO community training programmes

The CMIP and ESMO IPOs jointly developed two sets of training programmes to support capacity building in the community, further details can be found in the ESMO report.

## 3. Linkages with other Core Projects (CPs), Lighthouse Activities (LHAs), Academy etc.

CMIP has been engaging pro-actively across the WCRP landscape including:

- [CMIP AR7 Fast Track experiments](#) (to be renamed as Assessment Fast Track) were developed together with and are directly relevant to many activities across CPs and LHAs.
- [Historical forcings datasets](#) developed by the CMIP Forcings Task Team, support users e.g., DCP, EPSC and are a collaboration point between modelling and observational communities under ESMO.
- [CMIP7 Data Request](#) is being co-developed through [five thematic author teams](#) with representation from across CPs and LHAs.
- A working group on model selection/usage has been established jointly across CMIP, CORDEX, ISIMIP, ISMIP, GlacierMIP and VIACS with an initial brainstorming [Streamlining Model Selection virtual workshop](#) held in March 2025.

- [Joint CMIP Fresh Eyes-RIFS Responsible Data Use Task Team](#) this task team seeks to reduce data misuse by developing recommendations for better means of documenting the limitations of CMIP model outputs for various key applications.
- Co-organised events with ESMO and WGORC including [ESA Climate Change Initiative Colocation meeting \(October 2024\)](#) and [Committee on Earth Observation Satellites \(CEOS\) WG Climate \(March 2025\)](#) to support strengthening of observational-modelling interface.
- [obs4MIPs](#) is currently supported by the CMIP IPO, working closely with ESMO (*please refer to the ESMO report for obs4MIPs update*).

#### 4. Partnerships with entities outside of WCRP

CMIP engages regularly with external activities and bodies including:

- The [modelling centres](#) and [data nodes](#) around the globe producing and delivering CMIP data.
- The [Integrated Assessment Modelling community](#) through [ScenarioMIP](#).
- Engagement with [IPCC](#) through preparation of briefings and meetings, as relevant, with AR7 WG chairs and leadership.
- [Earth System Grid Federation \(ESGF\)](#): The ESGF consortium is a coordinated international project that develops shared infrastructure across numerous countries to publish and share local model data. The ESGF is vital to the delivery of open and accessible CMIP and CORDEX output. The WIP Chairs now have a monthly meeting with ESGF Executive Committee Chairs with the CMIP IPO providing coordination support to relevant ESGF activities.
- [Copernicus Climate Change Service \(C3S\)/ECMWF](#): Provision of a 0.25 FTE liaison officer to support CMIP IPO activities particularly in regard to model documentation, quality control and assurance, and co-organiser/host of the [Pathway to regular and sustained delivery of climate forcing datasets workshop](#).
- [European Space Agency \(ESA\) Climate Office](#): As host of the CMIP IPO, ESA Climate Office continues to be highly supportive of CMIP and wider WCRP activities including funding for a number of CMIP forcing datasets, provision of IPO Technical and Facilitation Officers to support the WIP and CMIP infrastructure more actively, involvement in ESMO and obs4MIPs steering groups supporting close collaboration across the observation-modelling interface, and co-funder of the CMIP Assessment Fast Track Rapid Evaluation Framework.
- [US Department of Energy](#): Funds the ESGF2-US multi-lab consortium, a very significant contribution to the ESGF capacity, and co-funder of the CMIP AR7 Fast Track Rapid Evaluation Framework.
- NASA (co-chair of obs4MIPs) and [CEOS WG Climate](#).
- [CF conventions](#) community and [CMOR](#) development supports the open, standardised delivery of CMIP and CORDEX data.

#### 5. Future Science Directions for JSC consideration

The CMIP Panel and WIP would like the JSC to consider the following areas of activity:

##### **Potential for Integrated Assessment Modelling (IAM) activity or stronger linkages within WCRP**

As highlighted in our JSC-45 report, given the increased profile and importance of scenario development to climate policy assessments, we feel greater visibility of IAM community activities within

WCRP may be beneficial to ensure timely delivery, adequate structural support, and establishing a closer connection across the WCRP and IAM communities. It is worth noting that this history extends backward to the planning phase for CMIP5 in 2006 ([Hibbard et al 2007](#)).

### **Scoping report – viability and mechanisms for a CMIP sustained mode**

As reported at JSC-45, a core scoping group was formed of the chairs of the CMIP Panel, WIP, WGCM and WGNE Chairs plus WMO climate services representative, and supported by the CMIP IPO. It became clear that this is a complex discussion, and a first step was to develop a commentary (Contribution of the Coupled Model Intercomparison Project to the regular provision of climate information) to outline the vision. This effort is underway. A second step was to conduct a [Pathway to regular and sustained delivery of climate forcing datasets workshop](#) whose outcomes identified delivery of annual extensions to CMIP forcing datasets as a key objective facilitating up to date historical simulations to understand recent climate and more robustly initialize predictions. A Nature commentary is in preparation to support community consultation and attract funding support.

### **Potential establishment of new panels/WGs under ESMO**

There are two streams of activity currently operating under CMIP Panel task teams that potentially could be evolved into scientific advisory/steering groups under ESMO to enhance modelling-observational community interaction and support scientific guidance providing oversight to emerging sustained mode activities:

- Climate forcings
- Model evaluation/benchmarking

Both tasks' teams will present recommendations on a future governance structure to CMIP Panel, WGCM, ESMO and JSC in late 2025/early 2026.

### **Need for WCRP coordinated synthesis papers to feed into IPCC AR7 cycle**

Initial discussions with AR7 WG Chairs and leadership emphasised the main AR7 requirement for high quality science (both original research and synthesis) to assess. The CMIP Assessment Fast Track is focused on delivering output to support this analysis, and other global and national level assessments, and together with the many MIP activities and WCRP CP and LHA activities will deliver science to address WG report requirements. We suggest coordinated WCRP synthesis papers on topics such as tipping points, TCRE, CDRMIP/Climate interventions would be a highly effective and sought after contribution to AR7. CMIP would be happy to play a role in this.

## **6. New Activities**

Activities being established across CMIP and WIP include:

1. **Rapid Evaluation Framework (REF)**: The CMIP Assessment Fast Track Rapid Evaluation Framework will be a complete end to end system providing a systematic and rapid performance assessment of the expected models participating in the CMIP Assessment Fast Track, primarily supporting the IPCC AR7 cycle. However, it is designed to be a starting point for the community to develop and build upon, with applications across the WCRP Modelling Multiverse and beyond.

2. **New task teams:** [Controlled Vocabularies](#), Quality Assurance/Quality Control (joint with ESGF), [Energy Consumption and Carbon Footprint](#) (joint activity with ENES MTHPC Task Force) and [Responsible Data Use](#) (joint activity with RfS).
3. **Variable registry:** Introduction of a registry to contain variable definitions across multiple activities. This aims to provide a single location for CMIP variable definitions across multiple CMIP phases, incorporating definitions from input4MIPs (forcings datasets), obs4MIPs, CORDEX and other CMIP-supporting activities. The longer-term plan is to augment the registry to meet the needs of ongoing MIP activities and broaden the scope to cover a broader swath of WCRP activities outside of the MIP remit.
4. **Development of updated CMIP7 guidance** for modelling centres, node managers, and the increasingly diverse range of CMIP data users. This will build on and update the considerable existing information that was collated during the CMIP6.

## 7. General

### For JSC awareness

#### CMIP6 closure

CMIP Assessment Fast Track data publication is expected to commence in late 2025. In preparation for CMIP7 and to redirect scarce resources to serve CMIP7 needs, the ESGF CMIP6 project will close to further publications on Monday 7th April 2025. The currently active [CMIP6Plus](#), obs4MIPs, input4MIPs and other small projects will not be affected by the CMIP6 closure. New publications to these projects will remain active until CMIP7 infrastructure is tested and established, with migration of these ongoing projects from old to new infrastructure in planning and active engagement with MIPs and the wider community.

#### CMIP Community Workshop 2026

The CMIP Community Workshop will be held in Japan in March 2026, the first time a major CMIP workshop will be held outside of the US or Europe reflecting the drive for CMIP to be more globally inclusive. The workshop will include science sessions, an ECR hackathon, policy, user and funder engagement session, and networking opportunities. The CMIP Panel and WIP are keen to ensure participation from across WCRP CPs and LHAs.

### Issues for JSC consideration

#### Concerns regarding capacity and sustainability of the ESGF

As in previous CMIP phases, delivery of the CMIP Assessment Fast Track and wider CMIP7 activities is dependent upon the publication and accessibility of the model output on ESGF. The contributions of the ESGF community and associated funders are hugely appreciated and have been recognised by the JSC, with WCRP thank you letters sent out the primary ESGF contributors in September 2024. However, the landscape is increasingly complex, and both financial and human resources are constrained for many nodes across the globe, putting open access to CMIP and CORDEX data at risk. JSC leadership towards widening participation, strengthening existing contributions, and supporting provision of compute resources alongside MIP data hosted on these systems to facilitate an even broader WCRP community to access and use MIP data would be welcomed.

#### Clarity around role of WCRP secretariat

The WCRP secretariat plays a hugely important role in providing the high-level view across all CP's, LHAs, and JSC. It would be very useful to have a clear definition of their role and responsibilities, particularly to ensure there is no duplication of effort with IPOs or potential gaps in communication or coordination. For example, with the broadening of involvement across the CMIP project there is a need for more consistent and granular governance and guidance beyond the WCRP High-level Steering Committees to the many task teams, working groups and panels where significant contributions are made by individuals and associated institutions. We also see that the secretariat has a really important role to play with linking to other activities based at WMO including GCOS, Climate Services and IPCC. The WIP and CMIP panel leadership are more than happy to engage in discussions to more clearly articulate this request.

### **Climate Forcings Datasets**

CMIP is interested in exploring INFCOM's potential involvement in the regular updates of climate forcings datasets currently organized by CMIP. Specifically, CMIP is keen to discuss securing a mandate and discussing governance options for the informal consortium producing these datasets. It has been suggested (e.g., by Paco Doblas-Reyes) that one possible approach could be aligning an annual climate forcings update with a governance structure similar to that of the WMO's annual to decadal forecast, which falls under SERCOM. Initial discussions with the INFCOM president have been started and CMIP was invited to present at the Climate Infrastructure Task Team in March to kickstart discussions on establishing a framework for regular Climate Forcings updates. CMIP leadership is happy to engage in discussions with the JSC to see the direction in which this can be taken up.