

Coupled Model Intercomparison Project (CMIP) International Project Office

Dr Eleanor O'Rourke, Director, CMIP IPO

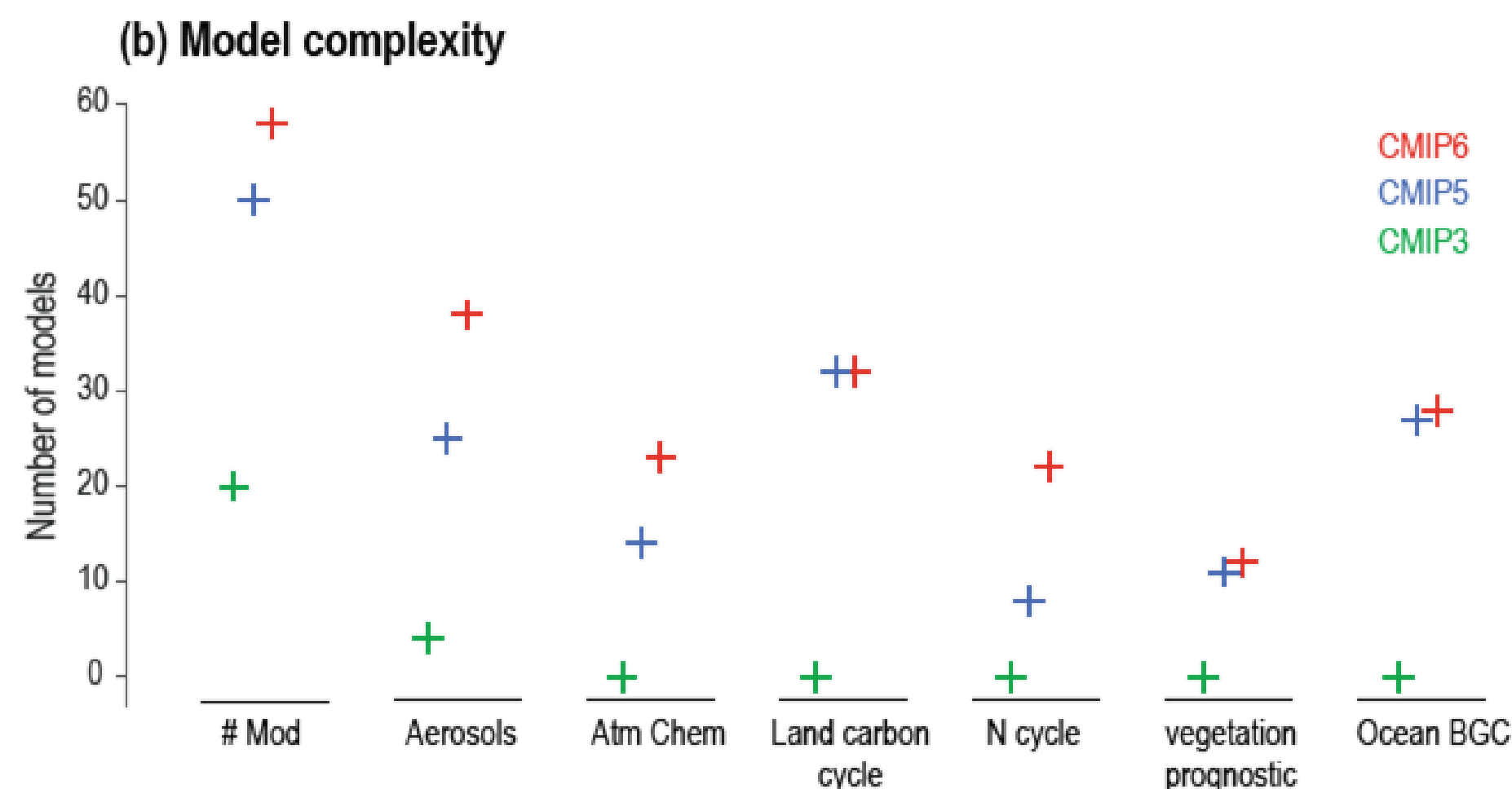
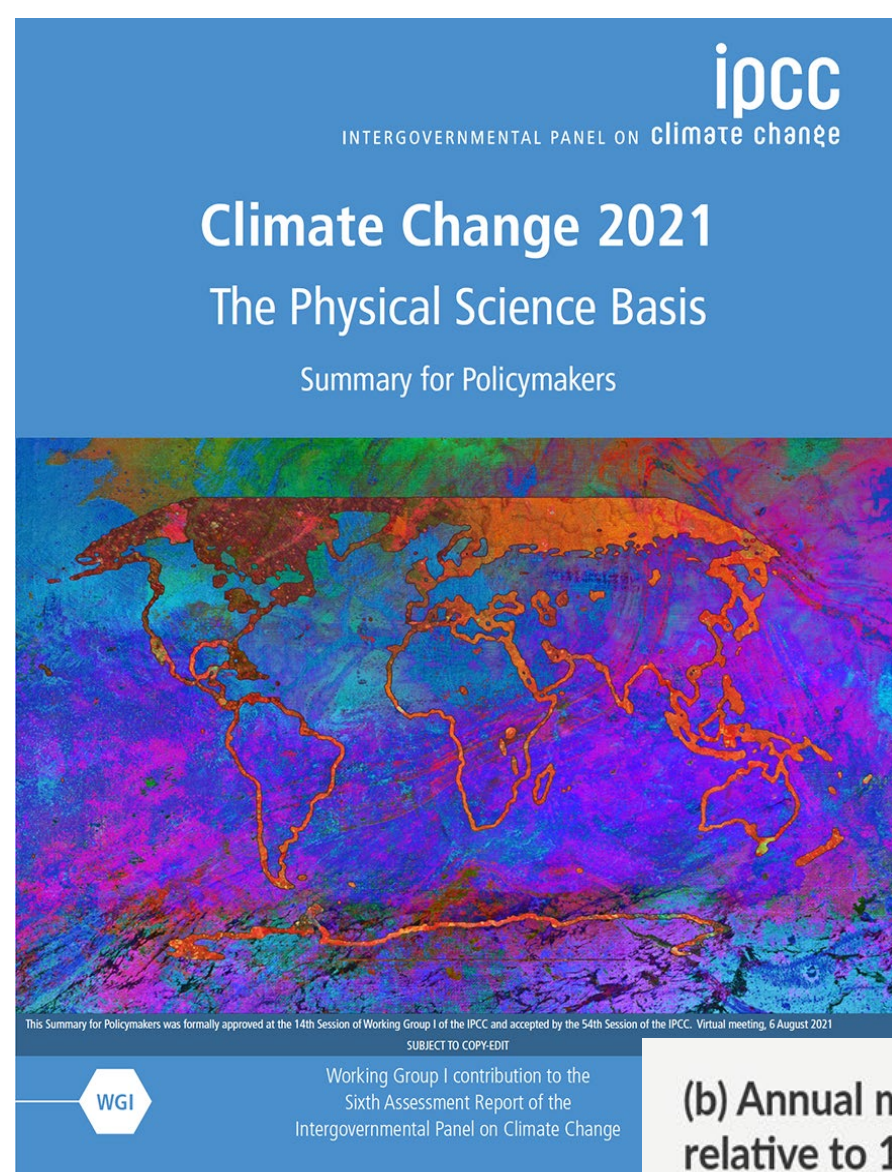
CCI Programmatic Review – Monday 9th December 2024



CMIP: an overview

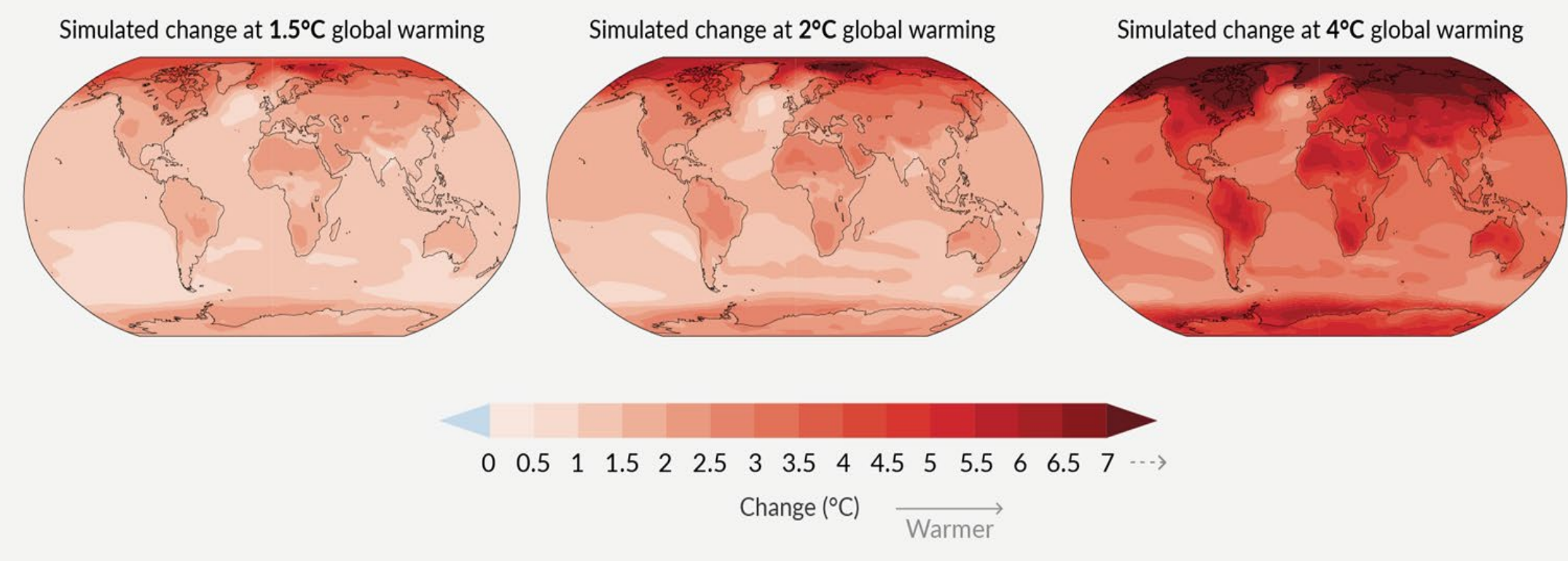
- The Coupled Model Intercomparison Project (CMIP) is an international climate modelling project under the World Climate Research Programme (WCRP), designed to better understand past, present and future changes in the climate.
- To understand range of possible future climate with a multi-model ensemble with both idealised and realistic experiments.
- CMIP has a dual role: a scientific enterprise driving climate modelling research and development and policy support.

CMIP: driving science, informing policy



(b) Annual mean temperature change (°C) relative to 1850–1900

Across warming levels, land areas warm more than ocean areas, and the Arctic and Antarctica warm more than the tropics.



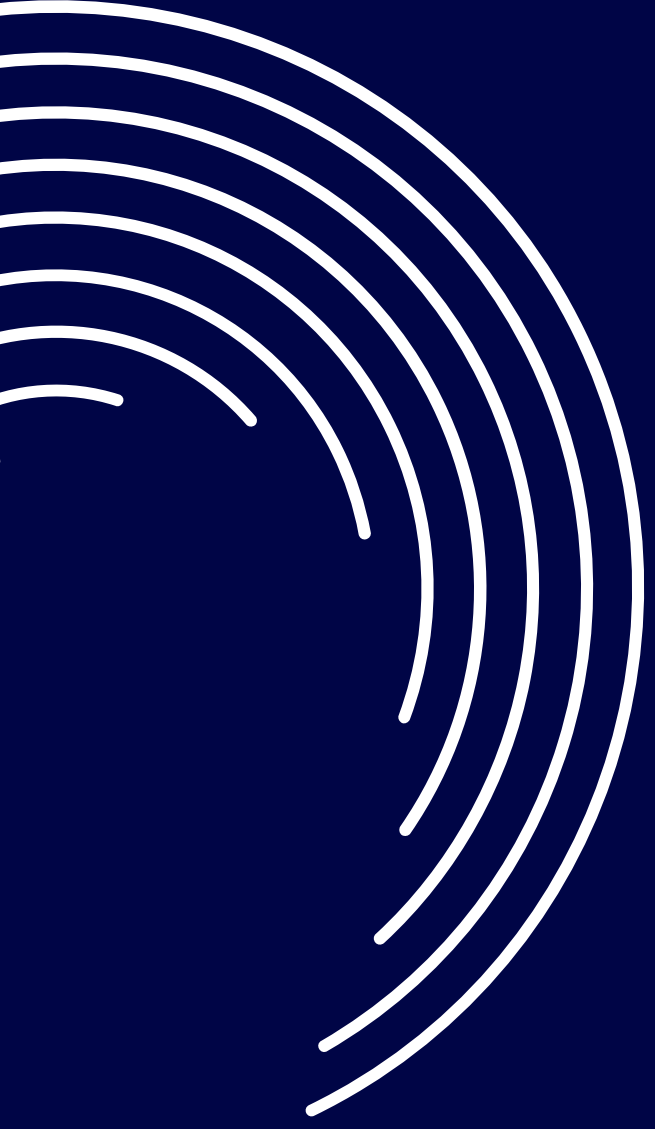
CMIP6: biggest yet!

- 24 endorsed MIPs
- 25 countries
- 43 institutions
- 131 models
- 322 experiments
- 8450 citations of CMIP6 and MIP design papers
- Over 16PB of CMIP6 data openly available
- 30+ ESGF data nodes
- Ever wider range of users

CMIP International Project Office

- CMIP had expanded to a point where coordination of its elements required dedicated facilitation and secretariat support.
- The IPO was established in March 2022 at its host institution, ESA's ECSAT site in Harwell, UK.
- IPO team consists of:
 - Director (Eleanor O'Rourke)
 - Programme Manager (Briony Turner)
 - Science & Communications Officer (Beth Dingley)
 - Technical Officer (Dan Ellis)
 - Science & Infrastructure Facilitation Officer (recruiting)
 - Administrative support (Alice Kolesnikov)

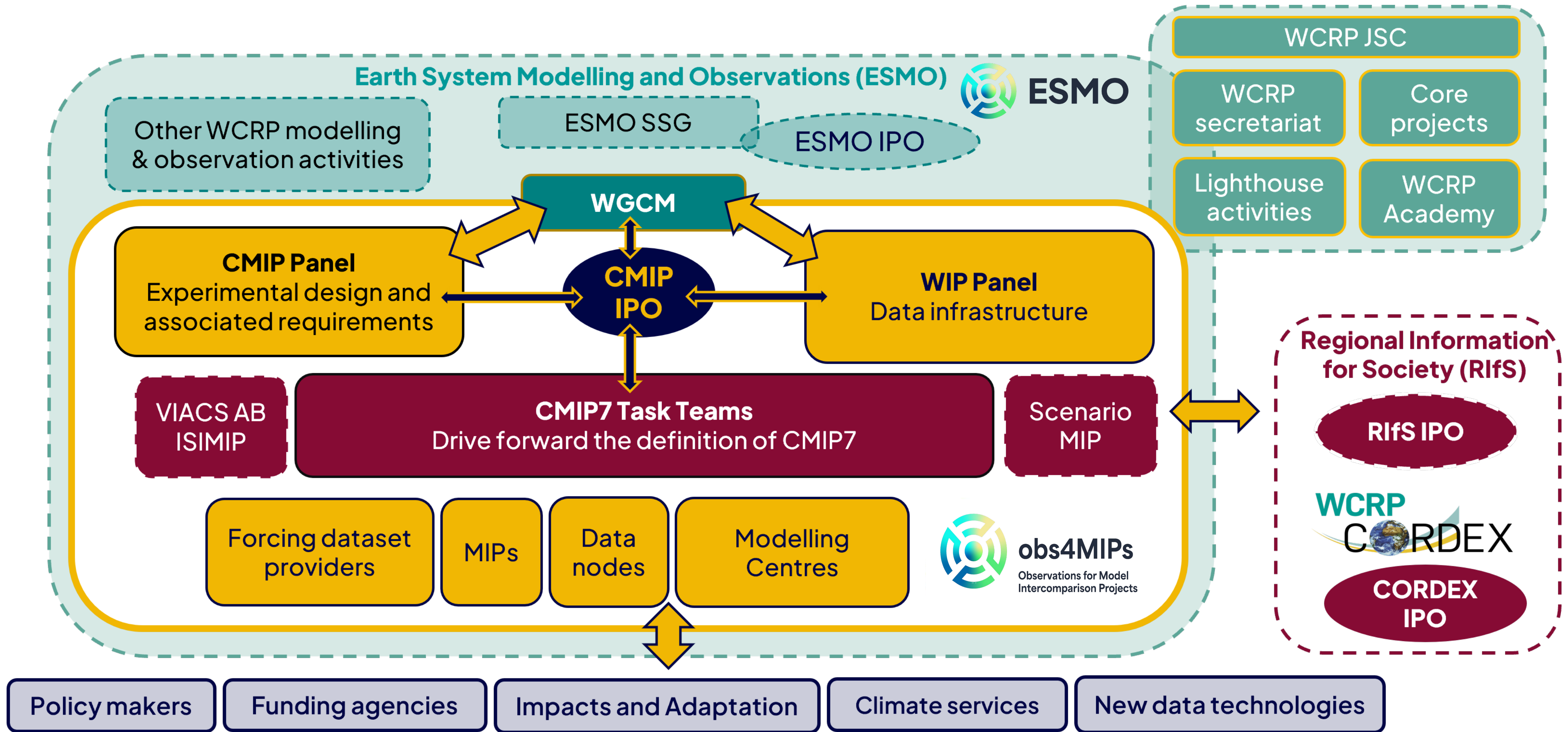




The role of the IPO



IPO role: communication and coordination

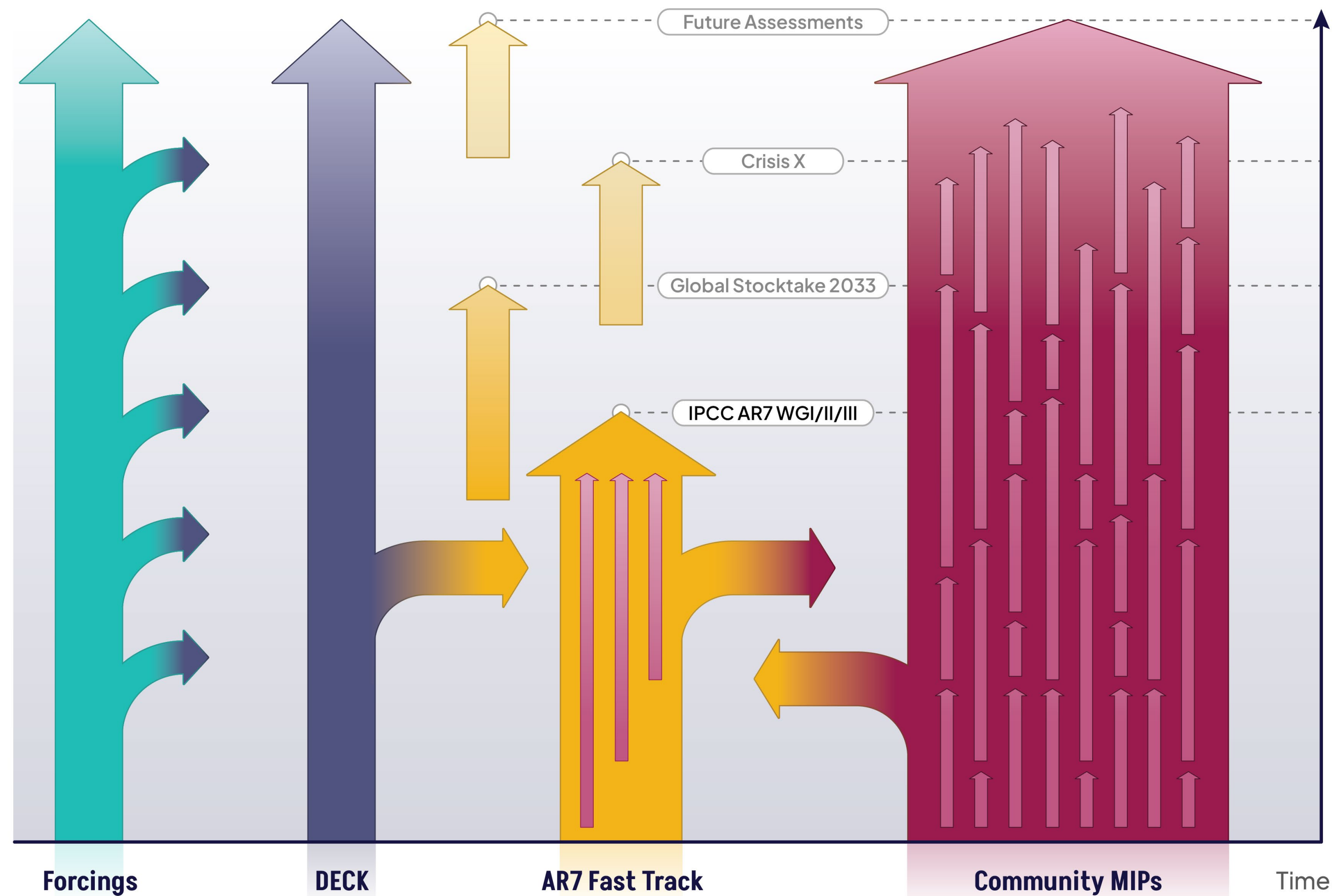


Supporting the evolving CMIP experimental design

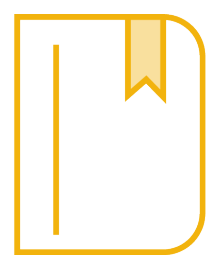
A more continuous approach with small targeted “Fast Track” experiment sets. The first will respond to the needs of IPCC AR7.

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

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



Supporting co-creation processes: the AR7 Fast Track



The Strategic Ensemble Design Task Team developed a proposed set of experiments to the CMIP Panel through brainstorming within the TT, with stakeholders, and interaction with MIP chairs.



Two rounds of consultation:

- Early v1 proposal shared with modelling centres for their views and appetite/readiness for CMIP7
- v2 proposal shared with both modelling centres and to open consultation with the wider CMIP and user community.

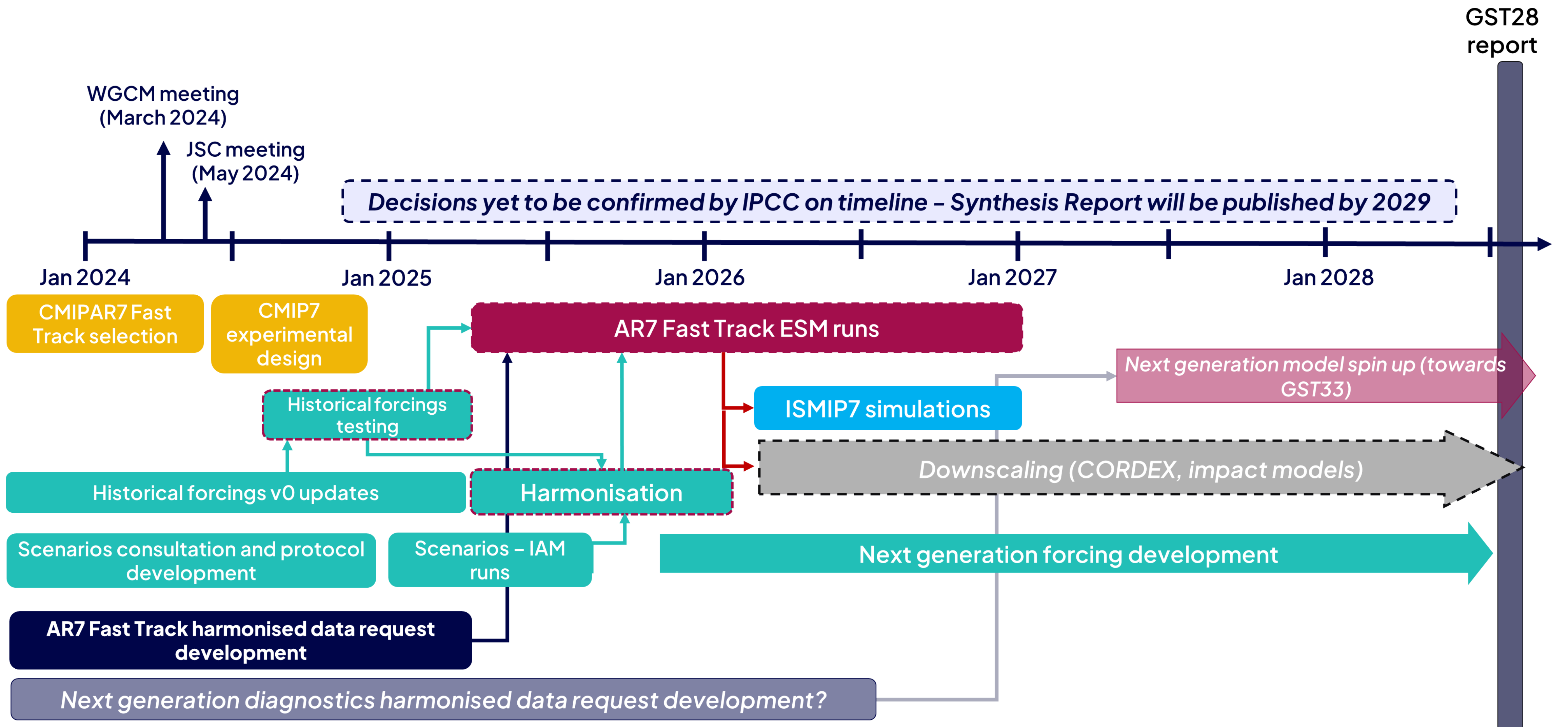


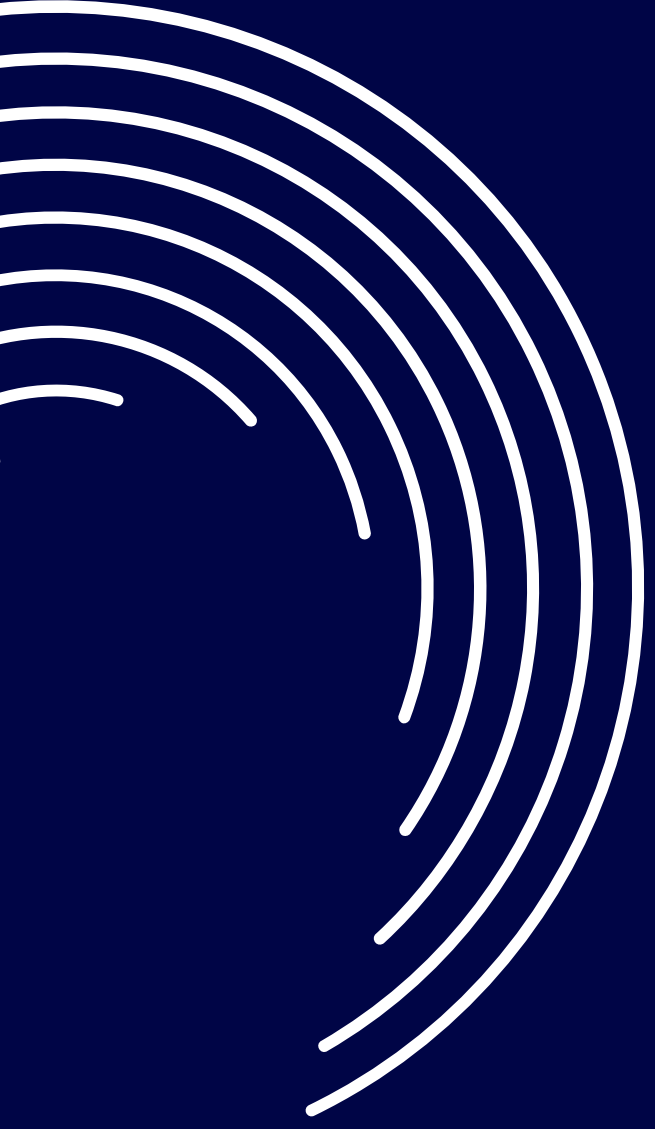
CMIP AR7 Fast Track experiment selection and DECK additions endorsed by WGCM in March 2024.

View the summary survey results



Facilitating delivery to ambitious timeline of IPCC AR7





**Strengthening the observation-
modelling interface:
example activities**





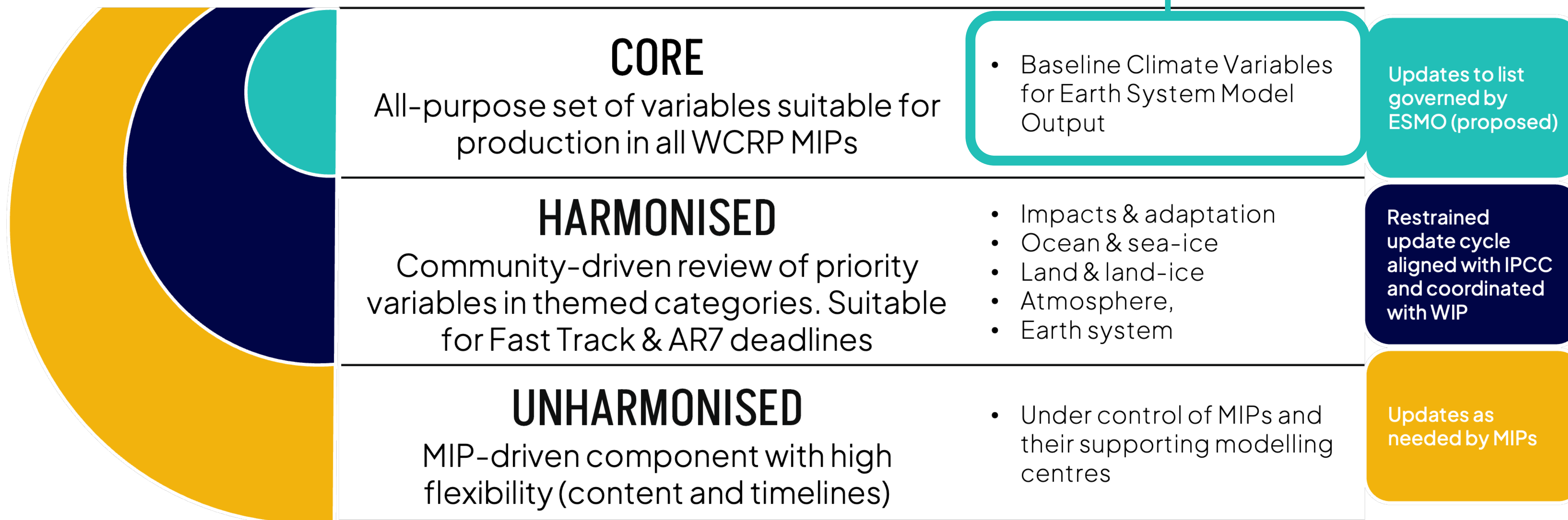
Historical forcings

- Up-to-date, accurate, and well-documented forcing datasets are needed to build confidence in model simulations, attribution of historical changes, and projections of future climate change.
- Delays in forcings dataset delivery was a major issue during CMIP6.
- The IPO has **worked with ESA** to support delivery of some of the **key datasets (GHG concentrations, volcanic emissions, ozone and SST)** to support the AR7 Fast Track and develop longer term dataset developments optimising the use of earth observation data and looking to address important science questions.
- Co-organised, together with ECMWF, the [“Pathway to regular and sustained delivery of climate forcing datasets” workshop](#) in October 2024.

Strategic approach for CMIP data request

Baseline Climate Variables for Earth System Modelling

Plans to work with modelling and observational communities (with ESMO) on the developing the interaction between BCV and ECVs, how to compare what is modelled with what is measured?



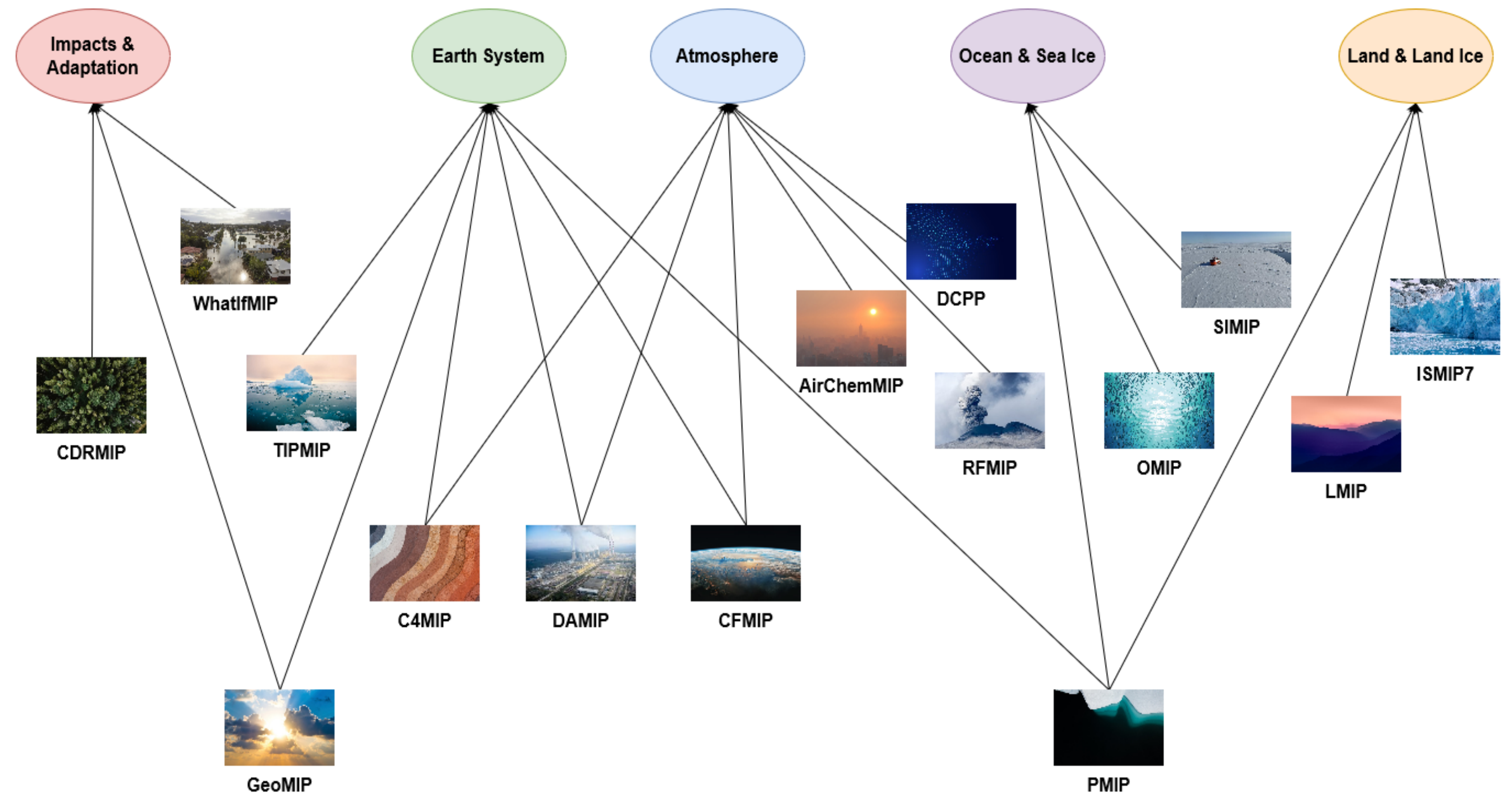
AR7 Fast Track harmonised data request structure

Process underway to develop the Harmonised Data Request for the AR7 Fast Track

Latest consultation is open at <https://wcrp-cmip.org/cmip7-data-request-consultation-phase2/>

Consideration of high-quality observational comparisons available when selecting variables for the AR7 Fast Track data request across five thematic areas.

Breakout session at the CMUG-CCI colocation meeting provided highly beneficial insight from CCI community.





About obs4MIPs

- Established in 2014 by the WCRP's Data Advisory Council (WDAC) to facilitate the use of observational products in climate model evaluation, research and development.
- Project of WCRP ESMO core project with CMIP IPO providing secretariat support.
- Products that adhere to the obs4MIPs data standards are made publicly available on the Earth System Grid Federation (ESGF) alongside the CMIP model output.
- obs4MIPs is currently focused on large scale gridded data products.



Seven active task teams covering topics ranging from solutions for integrating reanalyses into obs4MIPs through to prototyping inclusion of in-situ data.

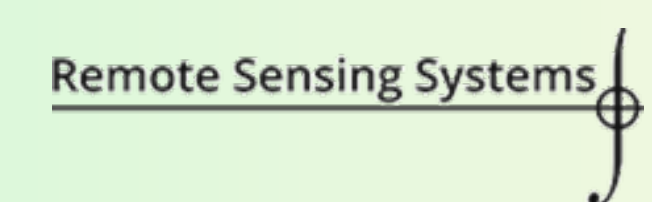
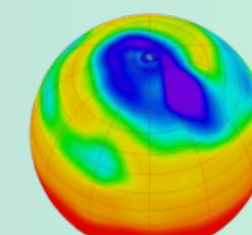
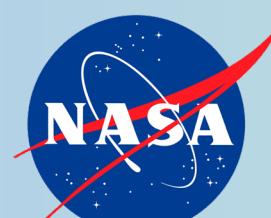
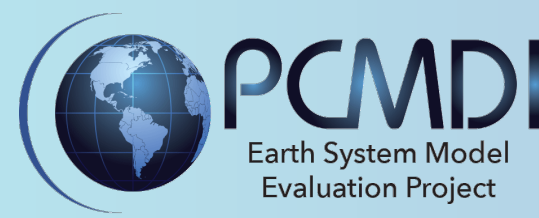
Achievements this year:

1. Workflow efficiency –dataset proposal form revamped, and steering panel trained as reviewers
2. Data Specifications ODS 2.5
<https://zenodo.org/records/11500474>

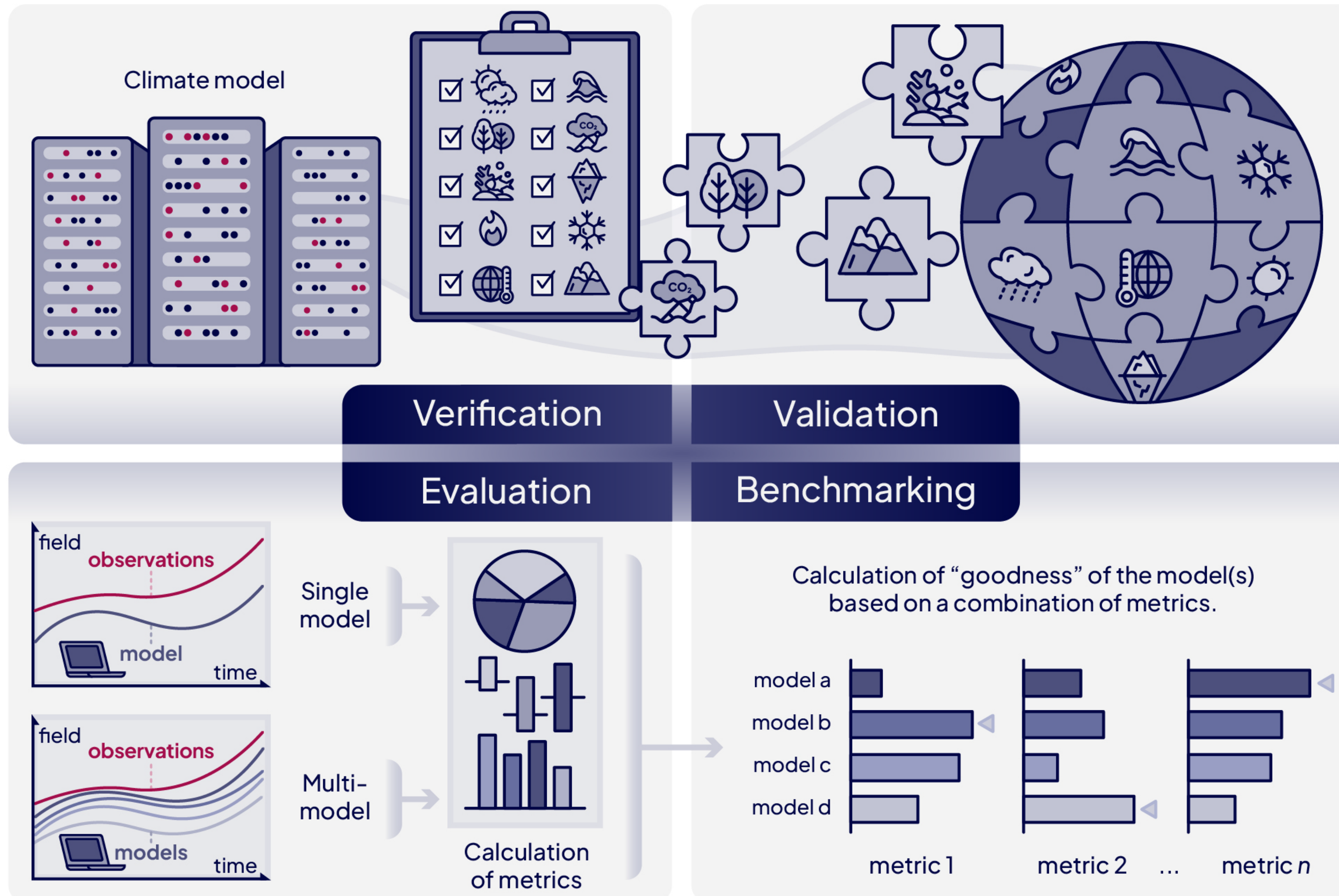
ESA's role

- ESA co-chairs and supports obs4MIPs through the activities of CMUG.
- obs4MIPs is a collection of satellite datasets that are formatted and organised according to the model output requirements of CMIP.
- Each obs4MIPs observational dataset corresponds to a biogeophysical field that is output by a climate model in one or more of the CMIP experiments.
- This technical alignment of observational products with climate model output facilitates model-data comparisons.

ESA's CMUG project are identifying emerging needs.



Importance of model evaluation and benchmarking



As climate models become increasingly complex, there is a need for systematic and comprehensive evaluation and benchmarking through comparison with best-available observational data to assess model fidelity across a wide range of variables.



CMIP Rapid Evaluation Framework (REF)

- The initial focus of the REF will be on delivery of rapid evaluation, and plot generation, for a key set of diagnostics, developed with input from the community (including during the CCI and CMUG co-location), focused on the AR7 Fast Track simulations to support IPCC author teams.
- However, it is designed to be open source and modular, enabling the community to build and expand its capabilities beyond the AR7 Fast Track and potentially serve other WCRP communities (e.g. supporting model selection for downscaling and impacts).
- Is not starting from scratch...building from, and leveraging, many existing tools and packages such as **ESMValTool** and utilising the **obs4MIPs** datasets.
- Development is being funded by **ESA** and US Department of Energy and the expertise of the following software packages and organisations: [Climate Resource](#), [eScience Center](#), [ESMValTool](#), [ILAMB](#), IOMB, [PMP](#) and [CMEC](#).

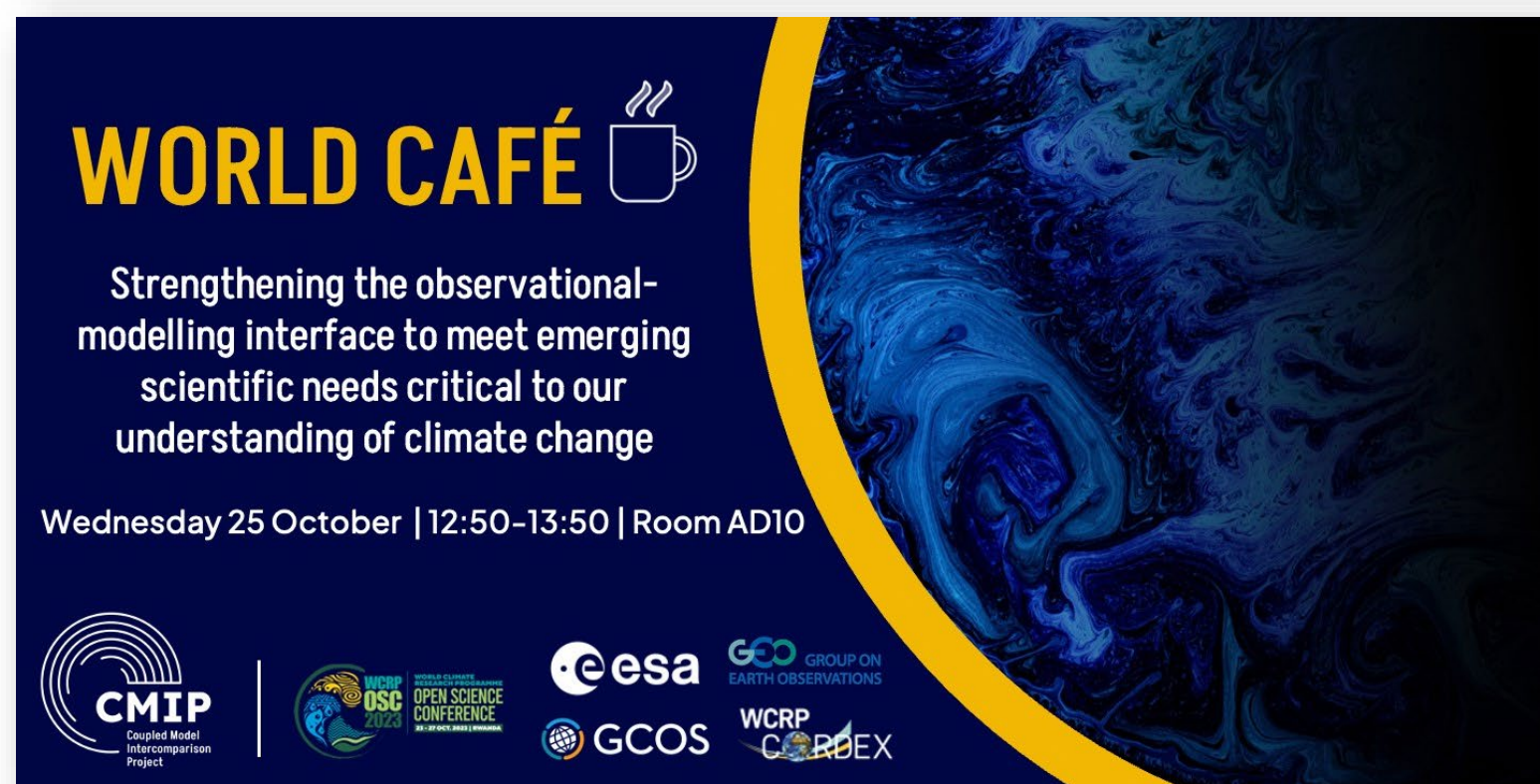
Community events and activities



2nd CLIMATE OBSERVATION CONFERENCE
Contributing session, 17 October, online

WORLD CAFÉ Strengthening the observational-modelling interface to meet emerging scientific needs critical to our understanding of climate change

Logos: WCRP, CMIP, Coupled Model Intercomparison Project, esa, GEO GROUP ON EARTH OBSERVATIONS, GCOS, UN

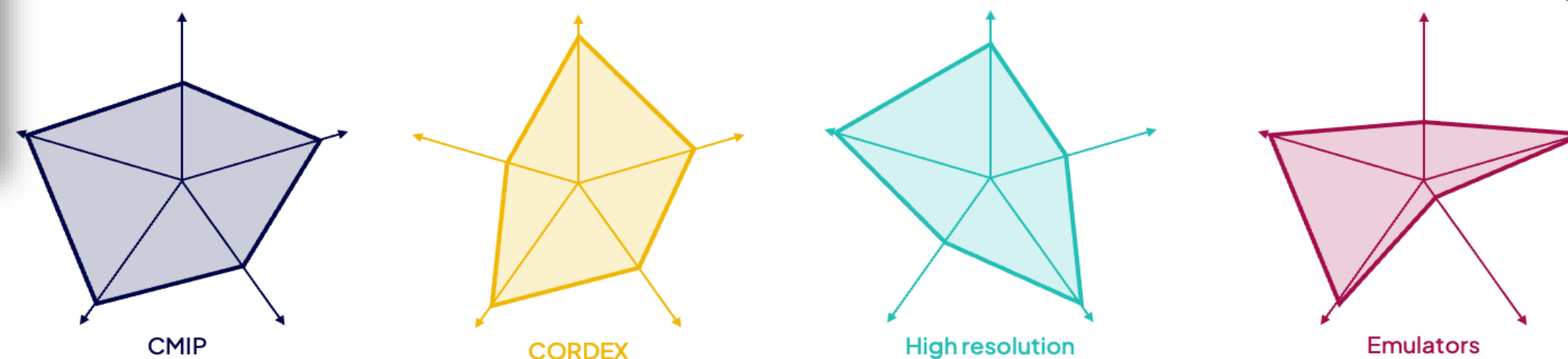
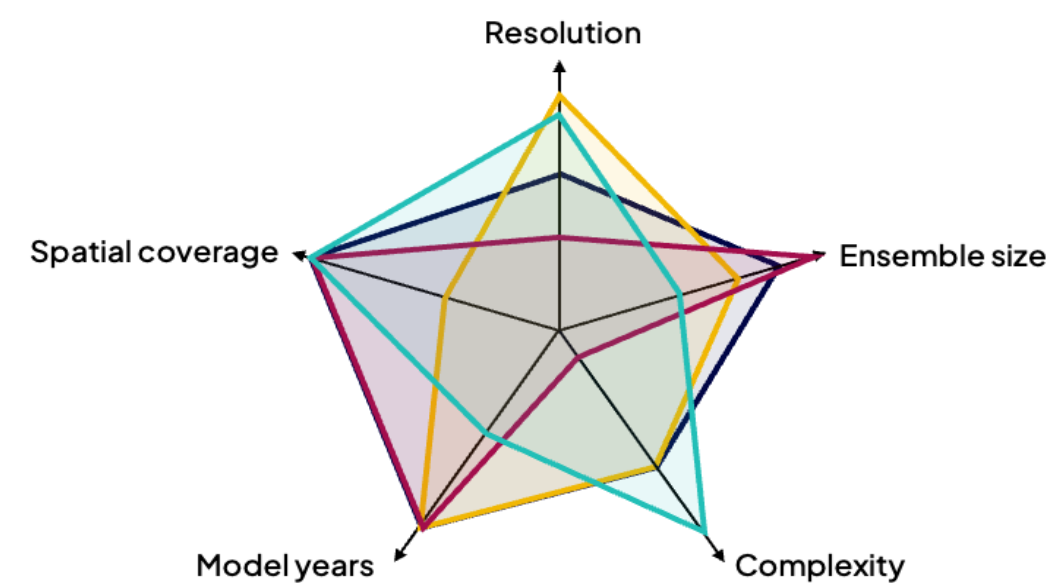
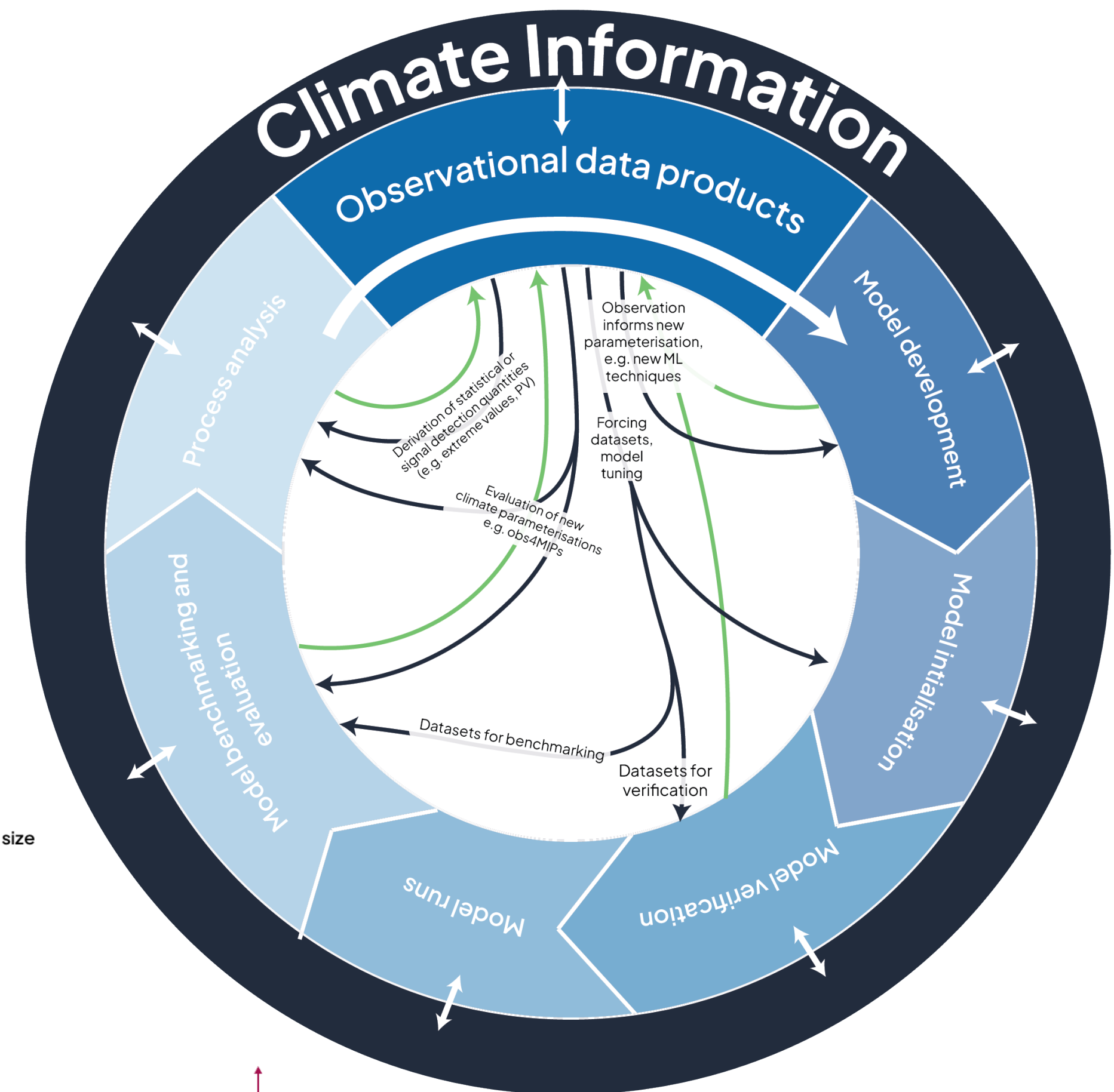


WORLD CAFÉ

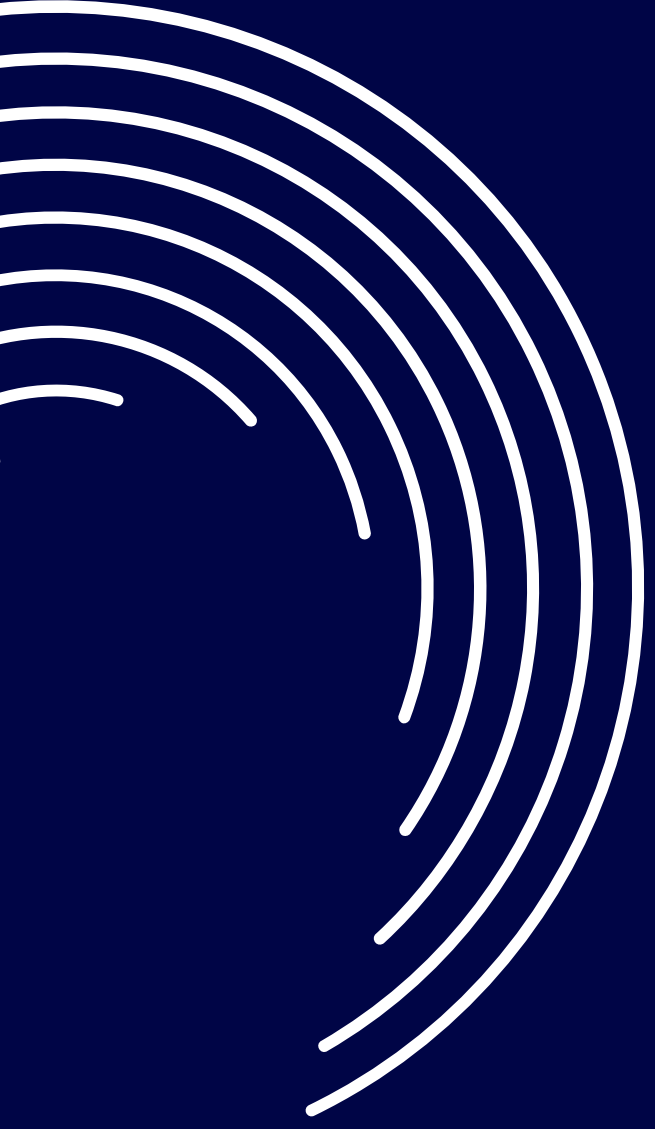
Strengthening the observational-modelling interface to meet emerging scientific needs critical to our understanding of climate change

Wednesday 25 October | 12:50-13:50 | Room AD10

Logos: CMIP, WCRP, esa, GEO GROUP ON EARTH OBSERVATIONS, GCOS, CORDEX



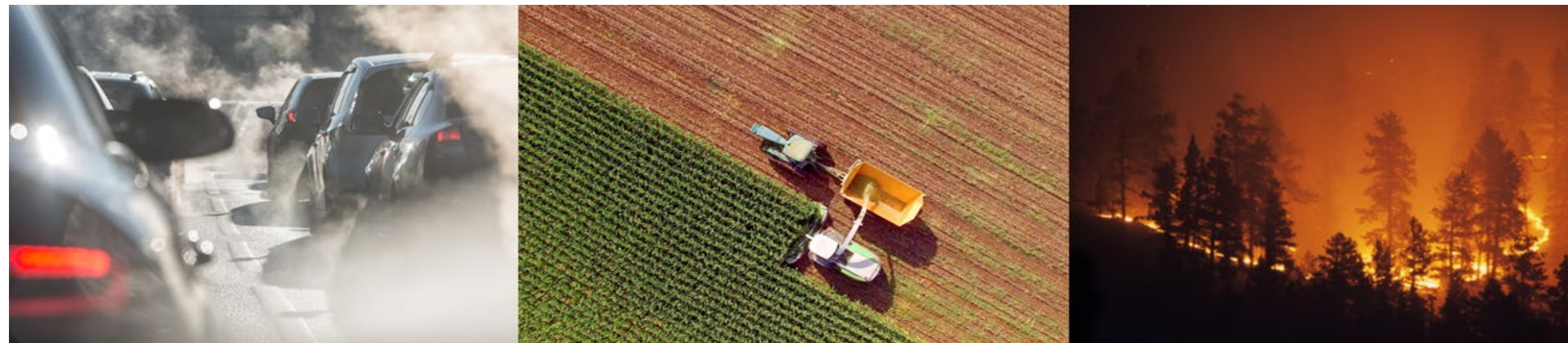
bit.ly/om-roadmap-idea



Supporting the evolution of CMIP



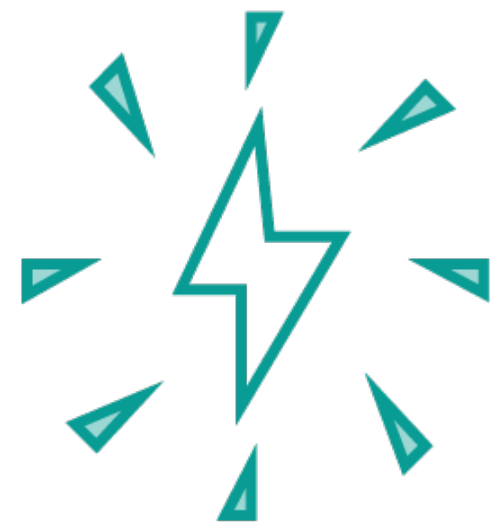
Supporting CMIP7 planning towards a sustained mode for climate information



- Climate information is needed more regularly than phases of CMIP provide.
- Scoping of sustained mode of delivery for limited parts of CMIP is underway.
- Climate forcings is the first priority.

1. Extend historical forcings through the previous year:
 - Up to date historical simulations to understand recent climate
2. Update Scenarios responding to changing policy:
 - Climate projections with new Earth System models

Fresh Eyes on CMIP: driving the new generation



Working group comprised of 151 scientists, researchers and practitioners early in their career.



Directly integrate the voices of ECRs into CMIP through participation in CMIP Panel, WIP, and Task Team meetings



Provide invaluable insight into the generation, access, and analysis of CMIP data