

Land in CMIP7 Discussion



February 27, 2024



CMIP AR7 Fast Track v1

Drop-in information sessions, Thursday 30th November 2023 (05:00 and 17:00 UTC)

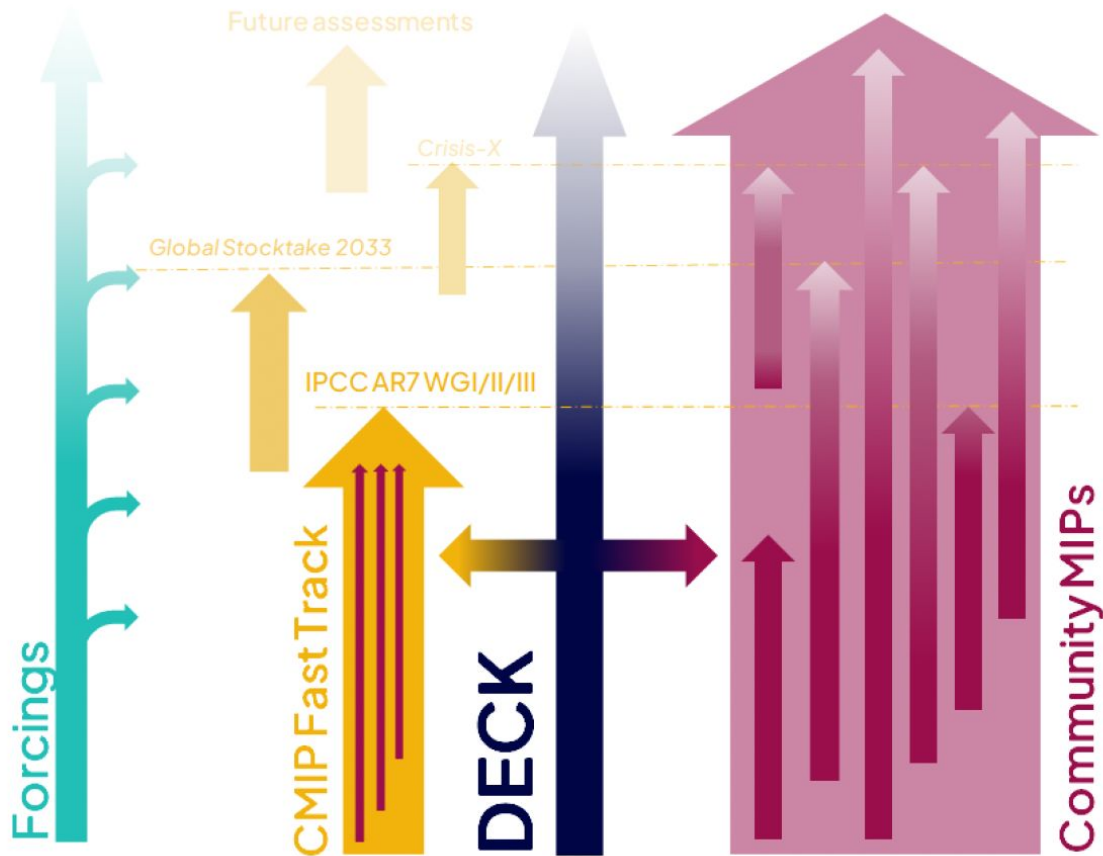


An evolving CMIP design

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.



Community MIPs

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

Computational load

Activity	Coupled	Atmosphere only	Land only	Activity total
DECK	1125	136		1261
DCPP	100			100
ScenarioMIP	695			695
AerChemMIP	1400 (350)	825 (615)		2225 (965)
C4MIP	850			850
CFMIP		231		231
DAMIP	1575 (525)			1573 (525)
GeoMIP	50			50
LMIP			175	175
PMIP	100			100
RFMIP		456		456
Grand Total	5895 (3795)	1648 (1438)	175	7718 (5408)

C4MIP Fast Track suggestion for CMIP7



- Assume:
 - E-driven ctl/hist are in DECK
 - E-driven scenarios are in ScenarioMIP
- FastTrack suggestions from C4MIP
 - 1. IPCC requirement to quantify TCRE and ZEC. For this need:
 - 1% run for TCRE, or e-driven equivalent (pending design of DECK – e.g. flat10). So assume this is covered
 - Simulation for ZEC – may also be covered in e-driven DECK
 - 2. Requirement for better hand-over to simple models/emulators
 - Require feedback diagnostics for calibration, so 1%-BGC run required.
 - Possible request for a CO₂ pulse experiment – details TBC
 - Benefit to multiple communities including carbon feedbacks, radiative forcing/metrics and calibration of emulators

C4MIP

1pctCO2-bgc	C4MIP <u>Summary slide</u>	AOGCM BGC	Designed to isolate carbon-concentration and carbon-climate elements of the global carbon feedbacks. Will enable calibration of climate emulators.
1pctCO2-rad			
flat10-cdr			Gradual reduction in emissions: 100 years of +10 PgC, 100 years gradual ramp-down to -10 PgC, 100 years of -10 PgC. Total cumulative emissions=0 by the end.
Joos pulse			Details to be confirmed, but as place-holder cite Joos et al (2013): https://acp.copernicus.org/articles/13/2793/2013/acp-13-2793-2013.html) with a desire to update their results.
flat10-zec			ZEC required to inform carbon budget estimates *flat10 discussion ongoing - https://benmsanderson.github.io/esm-deck/flat10_protocol.pdf .

LMIP (land-hist) plans

Leads (volunteers ... or Hyungjun Kim and Dave Lawrence)

- Land-hist protocol well-established so not much to do
- Main issue is the lack of an atmospheric forcing dataset
 - Princeton forcing v1 : 1° resolution:, 3h time step, starts in 1948, stops in 2010, not updated. Problem: very high level of air humidity
 - Princeton forcing v2 : 0.5 resolution:, 3h time step, starts in 1901, stops in 2012, not updated. Problem: suspicious trends in the wind field and air humidity in the tropics
 - GSWP3 : 0.5 resolution:, 3h time step, starts in 1901, stops in 2014, not updated. Problem: underestimation of air humidity in the tropics
 - WATCH/WFDEI : 0.5 resolution:, 3h time step, stops in 2016, not updated. Problem: discontinuity in 1979
 - CRUJRA : resolution: 0.5 resolution:, 6h time step, updated until 2022 (likely not after). Problems: doesn't cover Antarctica and has only a 6h timestep which gives spurious results for the energy and water balance
 - **But there is also ERA5 (best high-frequency global reanalysis) : 9km resolution (but can be used reasonably at 0.25°), 1h timestep, regularly updated (daily updates 5day behind). Problems: starts in 1940 and should be corrected with other datasets (radiation etc)**

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Dec 5, 2023

Harmonised Thematic Variables



The CMIP **Data Request Task Team** are seeking to work with community representative leads and engage with the wider community to devise a controlled list of high priority variables that facilitate the majority of user needs, while keeping the request as small as possible.

Papers across identified themes (provisionally the five **listed below**) will define a collection of harmonised variables to support the high impact analysis of climate model output, and provide a consistent and robust set of parameters on which to build the CMIP7 archive. Each will be a collaboration between the CMIP Data Request Task Team and the MIPs and communities relevant to each theme.

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Feb 13, 2024

CMIP7 Data Request: Call for Land and Land-Ice theme paper co-authors

Deadline: 8 March 2024, 12:00 UTC

The CMIP Data Request Task Team are seeking to work with community representative leads in the **Land & Land-Ice theme (including glaciers, ice sheets and ice shelves)** and engage with the wider **land** and **land-ice science** communities. This work is one of a set of realm papers which will develop a collection of harmonised variables and to use them to create the land and land-ice component of the harmonised CMIP7 Data Request. Authors and reviewers are now being sought for the **Land & Land-Ice theme paper**.

The aim is to facilitate the creation of a controlled list of high priority variables that serve the majority of user needs in the **Land & Land-Ice theme** and to create a harmonised set of MIP data requests which balance scientific demand for data against modelling centre and infrastructure capacity. We are seeking to ensure that those performing **physical land and land-ice analysis** have the appropriate data available in the CMIP7 archive. It is particularly important that authors consider the balance between demand for data volumes and appropriate use of modelling and infrastructure resources to supply data, while enabling **land and land-ice** model data users.

Links & Downloads

[Apply to be an author or reviewer here](#)
→

[Variable selection process of the harmonised thematic variables](#) →

[Find out more about the Data Request Task Team](#) →

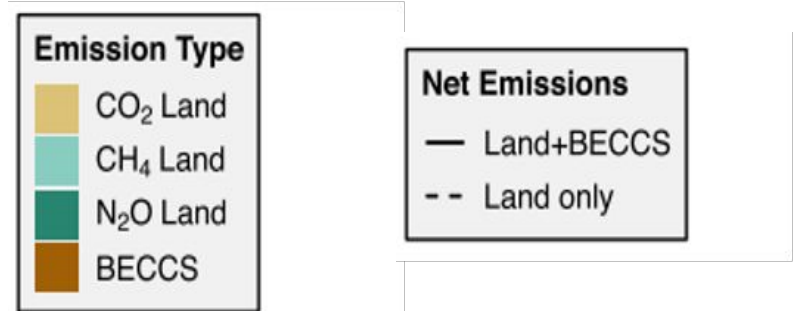
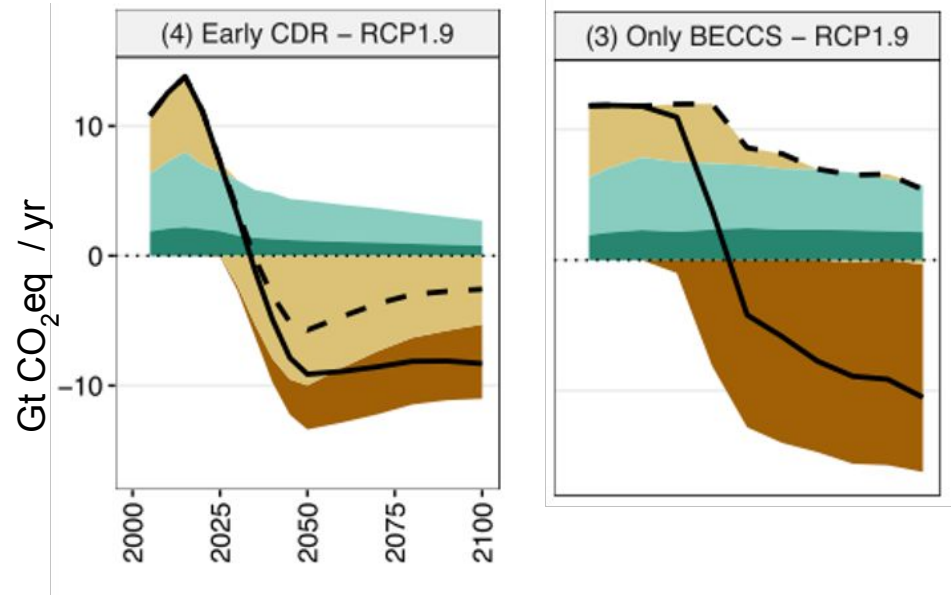
[Other open calls of the Data Request Task Team](#) →

Tier I

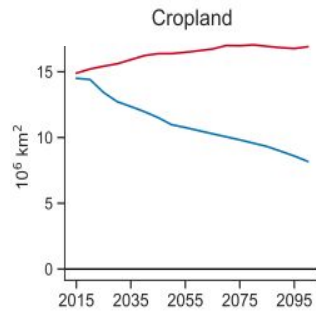
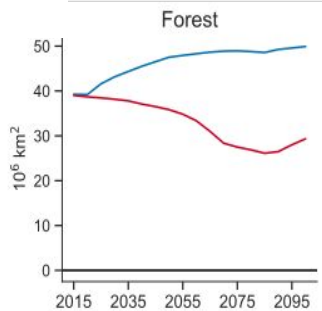
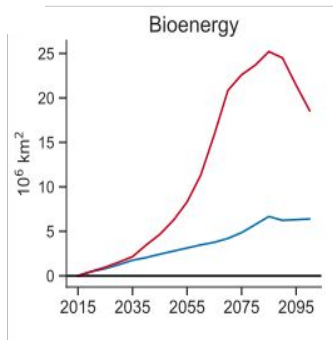
- ~~Idealized deforestation (20 million km² removal of forest over 50 years)~~
- ??? Historical no land use change (coupled and land-only)
- Alternative land use scenario for projection period (concentration and **emissions-driven**) – SSP1-2.6 with two alternative mitigation strategies

Land-based climate change mitigation strategies

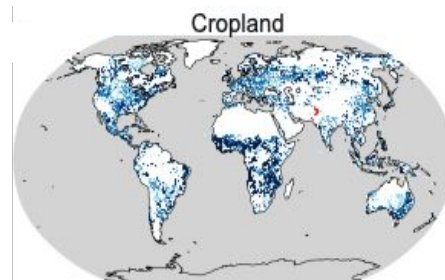
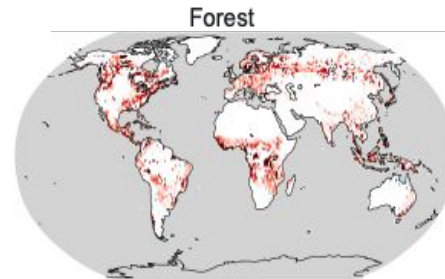
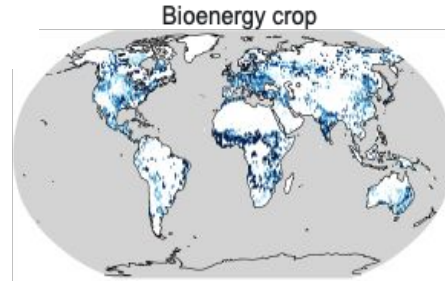
- Land-based mitigation strategies (natural climate solutions) required to achieve 1.5° C or 2° C climate targets
- Potential to mitigate approximately 10–15 GtCO₂eq yr⁻¹ by 2050, about 20%–30% of the mitigation needed to achieve 1.5°C temperature target (Roe et al., 2019)
- **Re/afforestation and bioenergy carbon capture and storage (BECCS)** along with **reduced deforestation** have highest mitigation potential and are central to mitigation pathways



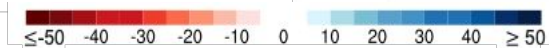
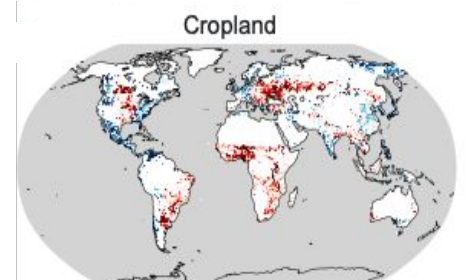
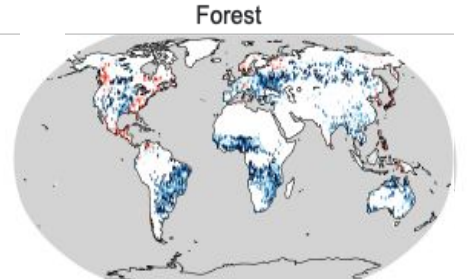
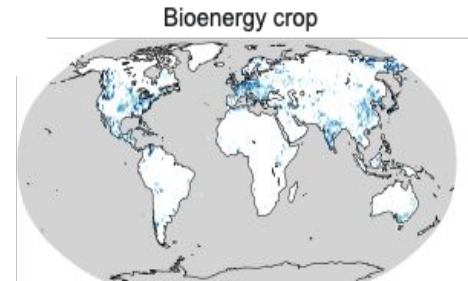
Alternative mitigation pathways



SSP2 Land use change
(bioenergy focused)



SSP1 Land use change
(re/afforestation focused)



Decrease Increase