Section 1: Respondent information

CMIP | WCRP

Respondent categories (could select more than one)

Individual vs Organisational responses

- Individual (yellow)
- Organisation/activity/affiliation (dark blue)

Pie chart: 21 / 21

Bar chart values:
- Modelling centre/group: 13
- Model Intercomparison Project (MIP): 16
- WCRP Core Project or Lighthouse Activity: 3
- Infrastructure provider: 1
- Forcing dataset provider: 3
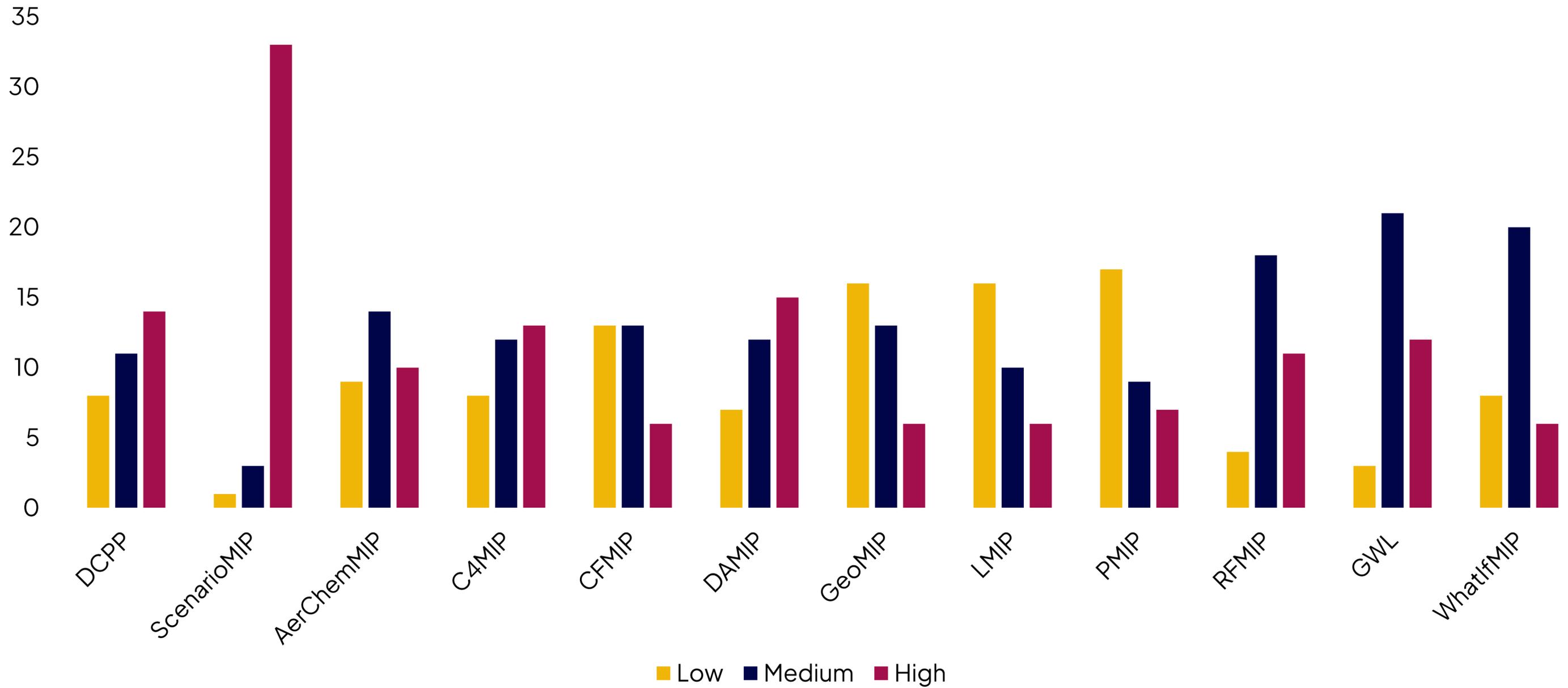- CMIP data user: 27
- Other: 2
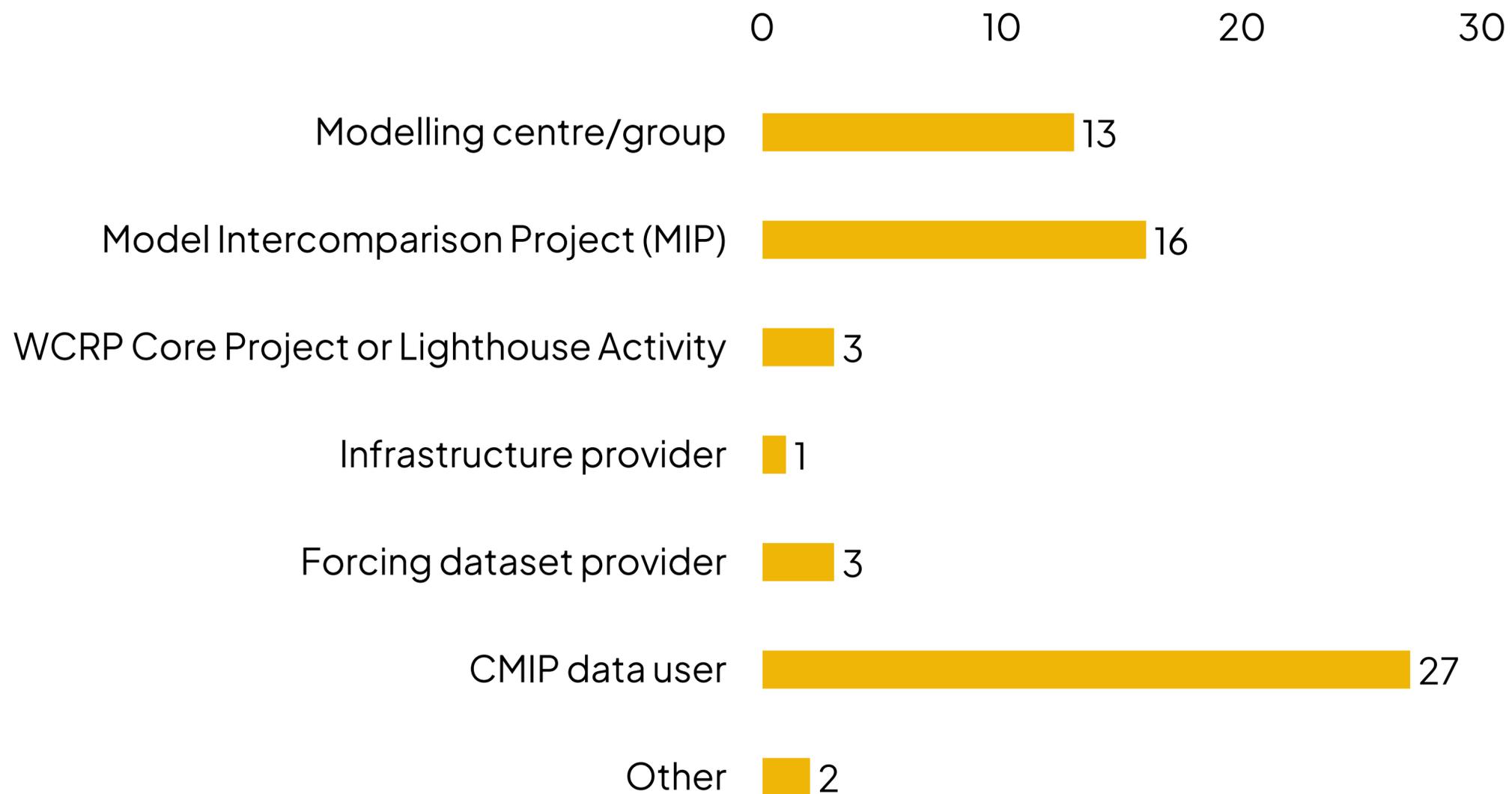
- Responding MIPs (organisation responses): CFMIP, DAMIP, GeoMIP, ISMIP7, PMIP, RAMIP, RFMIP, SOFIAMIP, VIACS
- Poor response from WCRP core project and lighthouse activities!
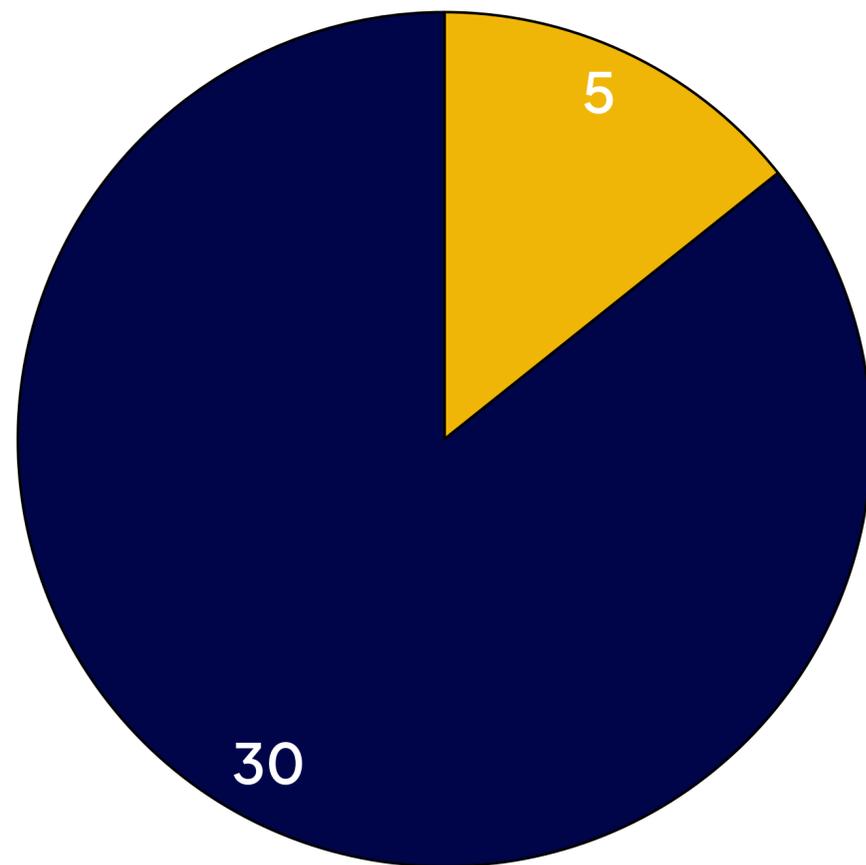
Section 2: Experiment feedback

Prioritisation responses (all)

![CMIP | WCRP logo]

Do you think there are experiments missing from the proposed Fast Track?

- Yes
- No

Suggestions for further/other Fast Track experiments:

- ISMIP, relating to the impact of the ice shelves that are currently melting quickly.

- Given the latest science and high relevance of ice sheets ISMIP7 should be considered to be included with high priority.

- ScenarioMIP might want 5 or more experiments. We would argue that these can and should be prioritised, as the incremental cost of each scenario is very low compared to the cost of having an ESM performing the DECK experiments. See more details in the community discussion paper here: https://gmd.copernicus.org/preprints/gmd-2023-176/.

- Suggest a set of scenarios that will in particular help the emulators to be better trained to the ESM CMIP7 outcomes. These are the -aer and -GHG variants of the high ScenarioMIP choice. For example, if SSP3-7.0 were chosen as the highest scenarios, we would recommend adding a ssp370-aer and ssp370-GHG variant in continuation of the hist-aer and hist-GHG runs. One of the largest differences across emulators for lower pathways was their different parametrization of aerosols, which could be tested against ssp370-aer and ssp370-GHG variants, if they were available.

- Simulations from HighResMIP could be interesting for VIACS applications.

- Equivalent to RCP8.5 or SSP585

- More information on negative emissions that play a major role in mitigation scenarios is urgently needed. Therefore, CDRMIP is of high priority and should be added

- Since land will play a major role for negative emissions, LUMIP should also be considered to become part of the Fast Track simulations.

MIP responses

MIP	DCPP	ScenarioMIP	AerChemMIP	C4MIP	CFMIP	DAMIP	GeoMIP	LMIP	PMIP	RFMIP	GWL	WhatIfMIP
CFMIP	Low	Medium	Medium	Medium	High	High	Medium	Low	High	High	Medium	Medium
DAMIP	Medium	High	High	High	Medium	High	Low	Low	Medium	Medium	Medium	Medium
GeoMIP	Medium	Medium	Medium	High	Low	Medium	High	Medium	Medium	Medium	Medium	Low
ISMIP7		High									Medium	
PMIP	Low	High	Medium	Medium	High	High	Low	Medium	High	High	High	High
RAMIP	Medium	High	High		High	Medium			Medium	High	High	High
RFMIP	Low	High	High	High	High	High	Medium	Medium	Medium	High	Low	Low
VIACS AB	High	High	Medium	Low	Low	Medium	Medium	Low	Low	Low	High	Medium

Only VIACS answered they would like additional experiments:

Simulations from HighResMIP could be interesting for VIACS applications.

Low priority	(pink)
Medium priority	(yellow)
High priority	(green)
No response	(white)

With reference to the timeline presented, will your MIP be planning to align with this timeline?

All responding MIPs replied "Yes" apart from one (who felt they were too small to align)

Do you intend to publish a peer-reviewed MIP paper?

All responding MIPs replied "Yes" with GeoMIP (link) and SOFIAMIP (link) published, four within next year/2025 and three on an undetermined timeframe.

Do you have any suggestions of how CMIP could improve communication and collaboration between MIPs

- We welcome the list CMIP7 MIPs and hope that as soon as MIPs have some type of protocols this information is distributed to all MIPs. Or maybe MIPs can complete a very simple fact sheet, so that one could more easily understand the planned experiments resulting in increased collaborations?
- We noticed that modelling centres tended to receive more information from MIPs or CMIP than MIPs themselves, so we were glad to have steering committee members in modelling centres, but this may not apply to all diagnostic MIPs.
- Maybe organise opportunities for meetings (even virtual) between MIPs on precise topics. For instance aerosols, climate sensitivity, etc ...

## How can the CMIP Panel make sure the Fast Track is not detrimental to Community MIPs?

- Avoid implying that the Fast Track simulations will be the *only* simulations of relevance to IPCC AR7 and encourage groups to run full sets of Community MIP simulations on a timeline where they can be assessed in AR7 if possible.

- We see a potential issue of CMIP model changes between Fastrack and other MIPs (this happened with CMIP6 when extensions to 2300 were done with different settings for some CMIP models, which meant that atmospheric and oceanic fields in the polar regions at 2100 were sometime different).

- Try to provide a data request for Fast Track that is as compatible as possible to any future data requests that will be potentially released thereafter. The experiments themselves have to be compatible with other MIPs.

- FastTrack should result in a reference collection of simulations, and not grow too large so that modelling groups still have the resources to run the community MIPs, in addition to the FastTrack, at their own pace.

- Make clear that modelling centres who do not wish to contribute by the Fast Track deadlines are encouraged to still consider running the Fast Track experiments as part of their wider CMIP7 MIP contributions later in the timeline. Although these experiments are valuable for informing policy, many will be valuable for the more traditional scientific goals of CMIP as well.
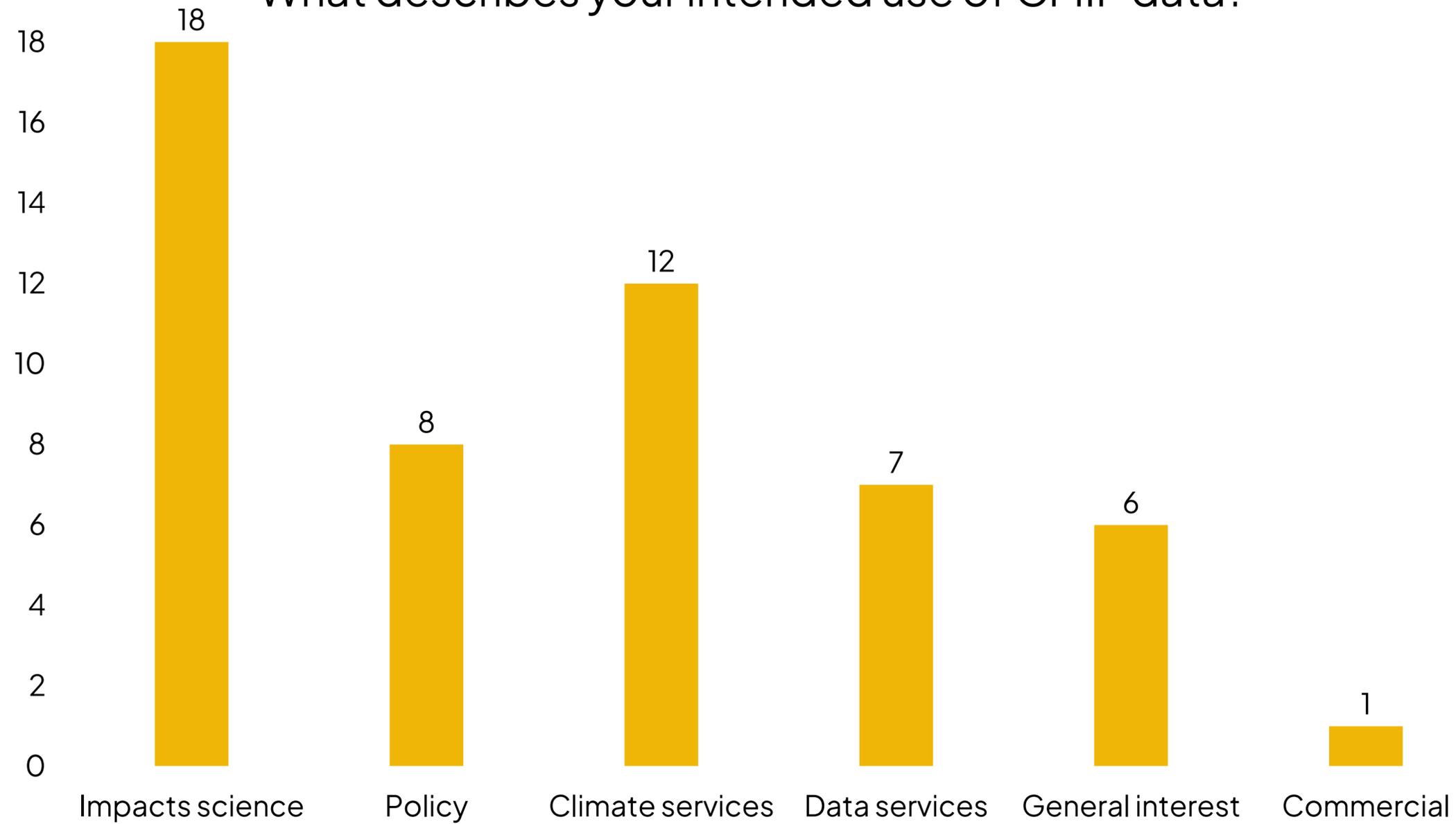
- Foster inter-MIP coordination and collaboration.

Section 4: CMIP data users

CMIP data users experiment prioritisation
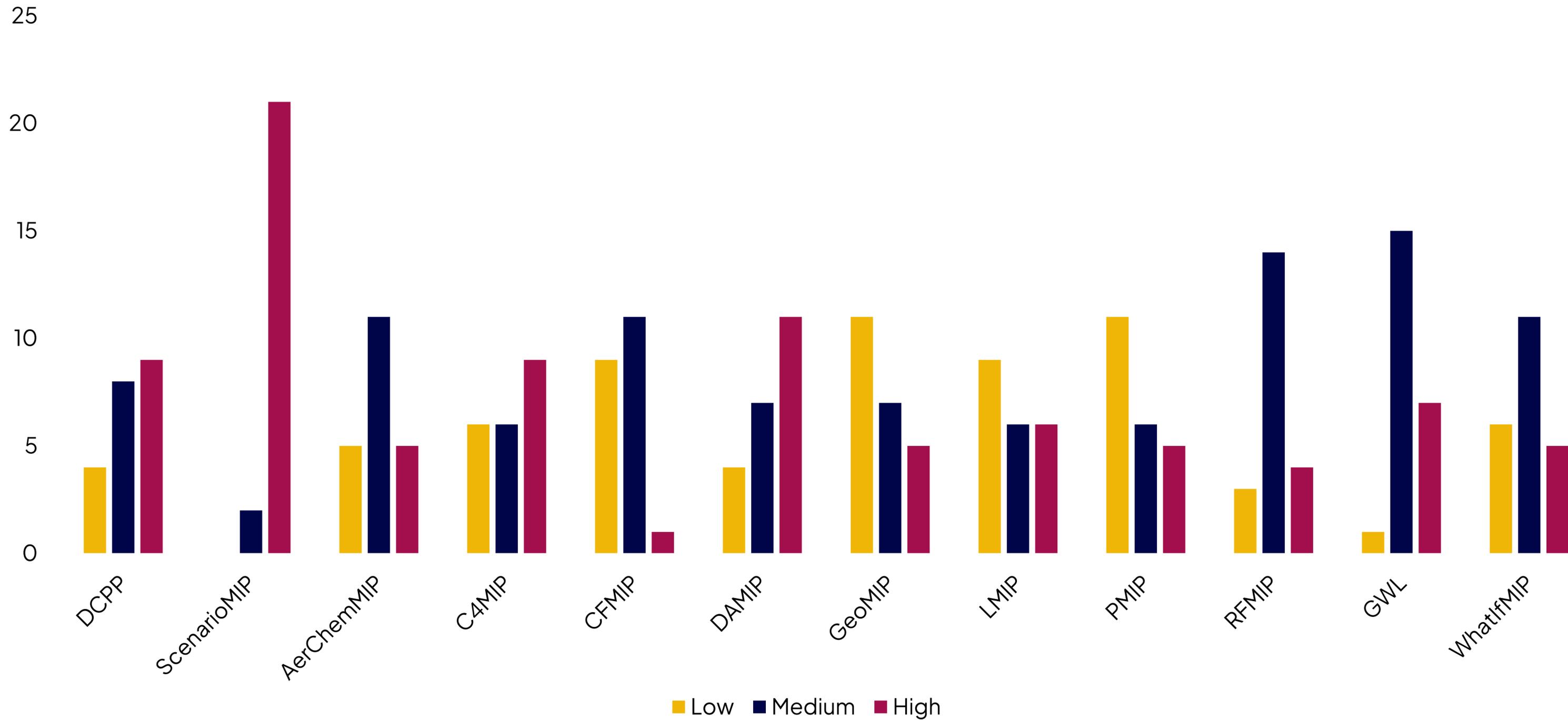
Use of CMIP data

- Only one respondent had not used CMIP data previously – their motivation for wanting to was "….to understand how certain policies are either advocated for or advised against as a result of insights gained through collaborative CMIP research."

- Many users suggested there were using CMIP data directly completing their own processing.

- Very few were using only bias-adjusted or downscaled data with many using both these data and direct from ESGF or other platform (e.g. Jasmin).

- Responses around use of AR7 Fast Track data included: evaluation of future climate, downscaling, bias-adjustment, impacts modelling, downstream applications and services, training emulators…..

Did you find the variables and time resolution that you needed for your application in CMIP6?
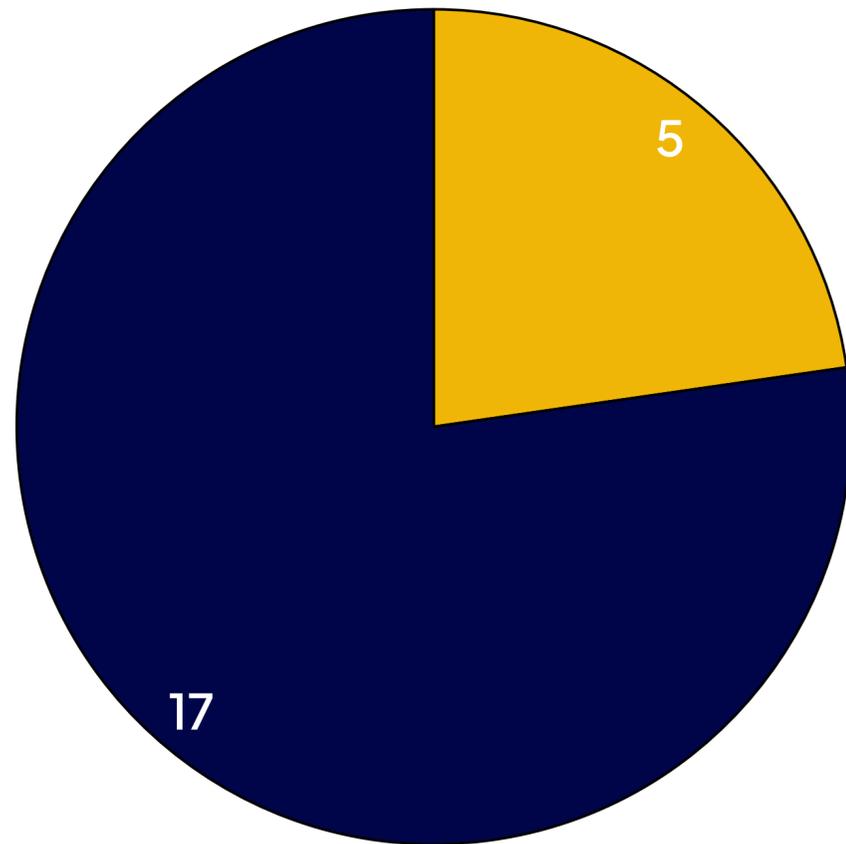
- ☐ Yes ■ Need additional

|	Requested improvement in variables availability compared to CMIP6
Required variables	Variables that affect vegetation due to stratospheric aerosols, including UV radiation, direct and diffuse radiation, and surface ozone.
	More interest in soil moisture, daily minimum relative humidity, short- and longwave radiation, and temperature extreme thresholds.
	Some variables (mixed layer depth, ocean heat content) can be improved upon. It would be very troublesome for us if these variables were not retained in CMIP7. The lack of MLD in CMIP5 causes us a lot of problems already.
	Need zooplankton predation mortality rates (the quadratic or non-linear term in most models) for each zooplankton group. Currently, no center provides these. Grazing rates by each zooplankton group would also be helpful. All at monthly resolution would be good.
	Not enough simulations beyond 2100 store 6-hrly data for regional climate modelling, therefore reducing the available number of climate forcings & realisations until 2300. If data beyond 2100 are not available, major (unphysical) simplifications are used such as fixed climates or parametric extrapolations in cryosphere and sea level projections, risking major underestimates or other errors.
Consistency across models	The biggest limitation was consistency across models. Ideally a core set of variables most used by climate services (~10) would be available for every model for historical/scenarios (all defined the same way).
	Very occasionally some standard diagnostics (e.g., RSDT, OD550AER, SFTLF) are missing from a small number of models.
	the carbon cycle variables were the most difficult to process as they were often missing or not reported correctly. Sometimes area information files (e.g. areacella or areacello) and surface fraction information files (stflf, sftof) were not available, which was quite painful.
	Many models do not provide enough members (> 15), for the historical experiment.
Temporal frequency and resolution	Not always easy to have sub-daily data for relevant fields and aerosol data
	More high resolution data
	Going forward we need consistent hourly or dub-daily ozone (O3) data and consistent daily diffuse radiation data especially from the GeoMIP simulations to evaluate feedbacks in agriculture.
	For renewable energy purpose, wind at 100m or 150m is necessary for example
	Subdaily outputs of key near-surface climate variables would be most helpful to force the downstream impact models (notably within ISIMIP).
	daily would be primary but sub-daily would welcome

Suggestions to improve user experience

- A number of very detailed responses (will be highlighted to relevant TTs and FE groups).

- Improved documentation is a common request plus more tools or pooling of existing community tools, automated post processing, common grids and improved accessibility.

- Comment on need to allow time for climate impacts community run their models and analyse in time for AR7 WGII.
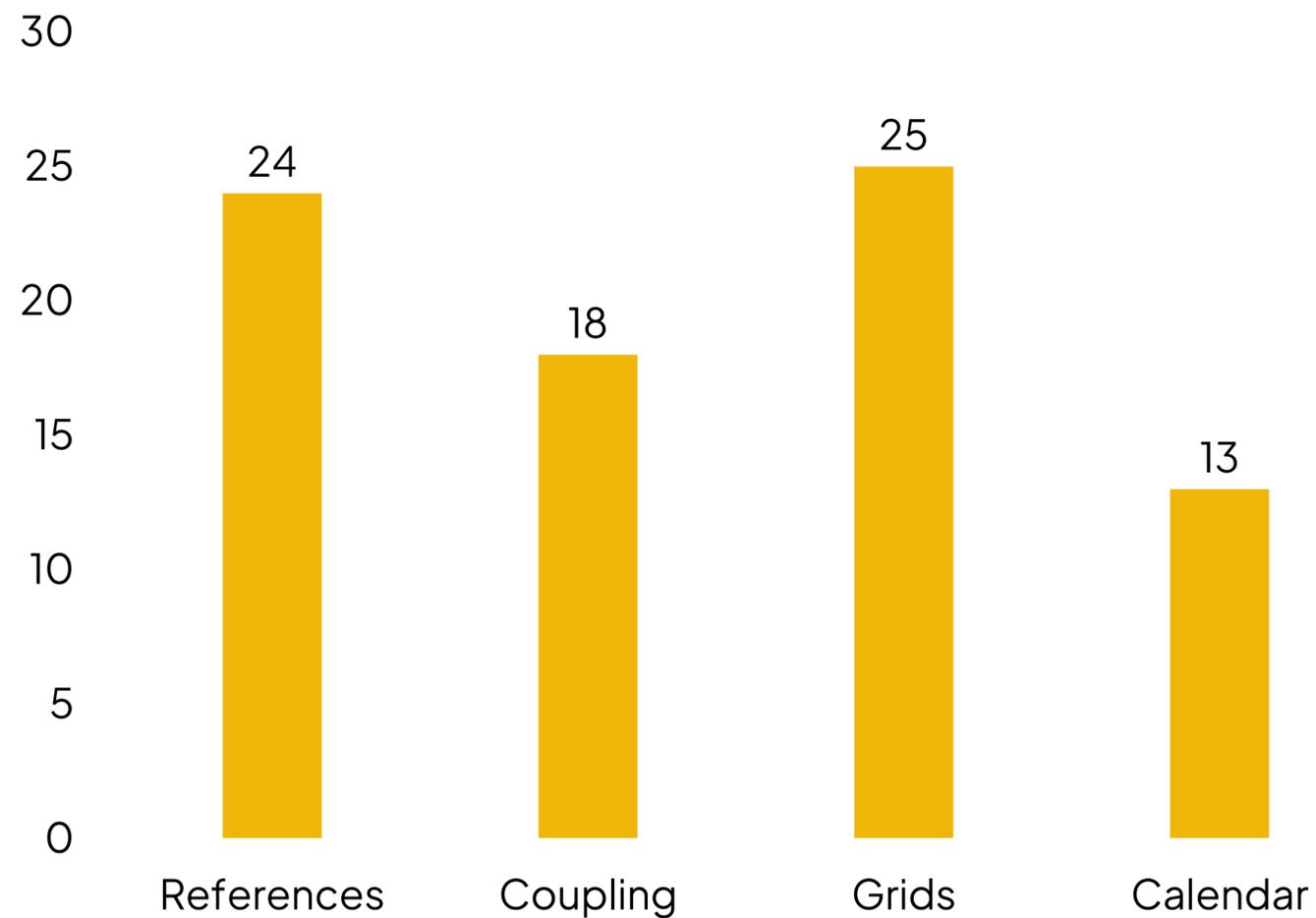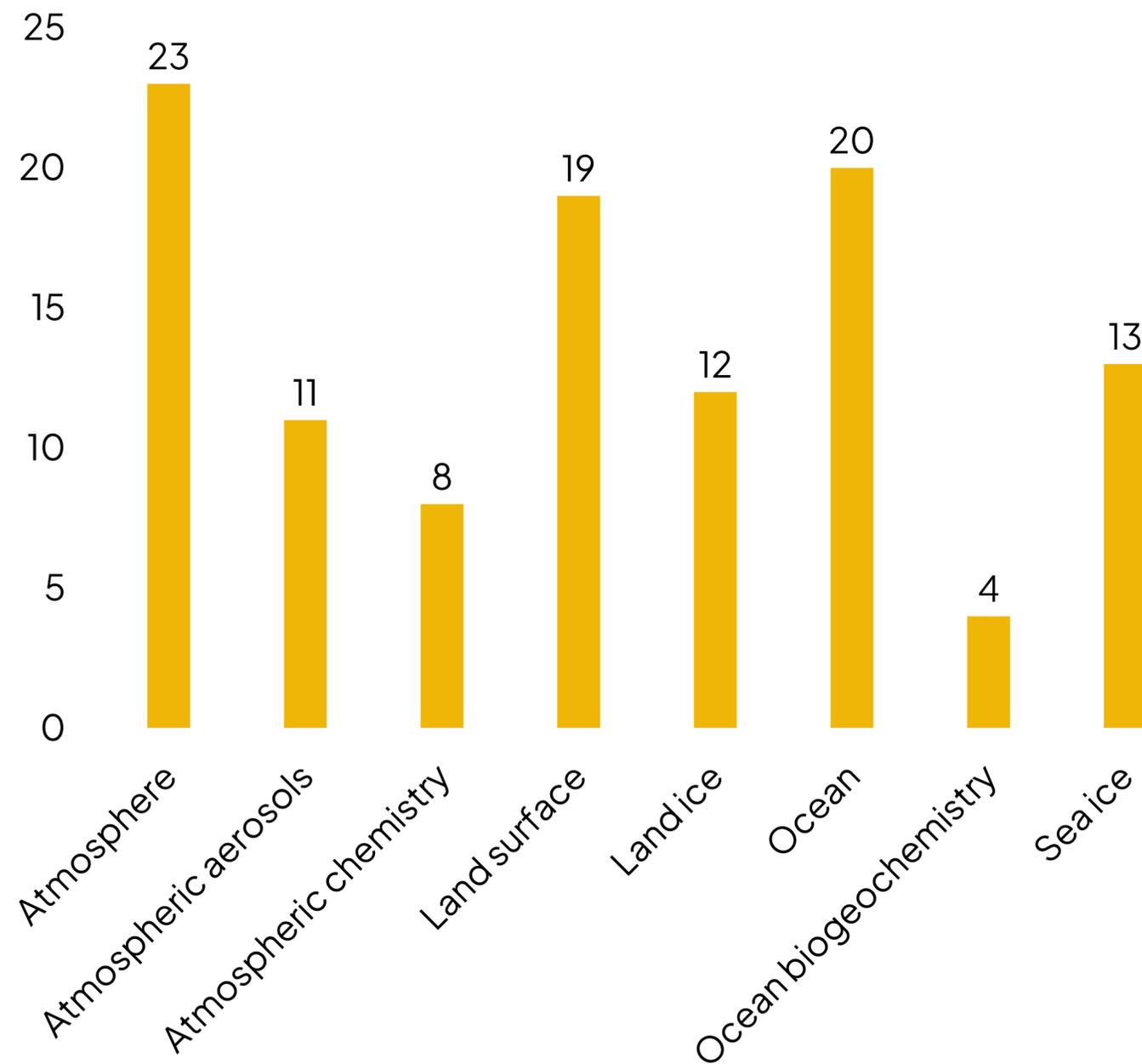
Section 5: Model documentation
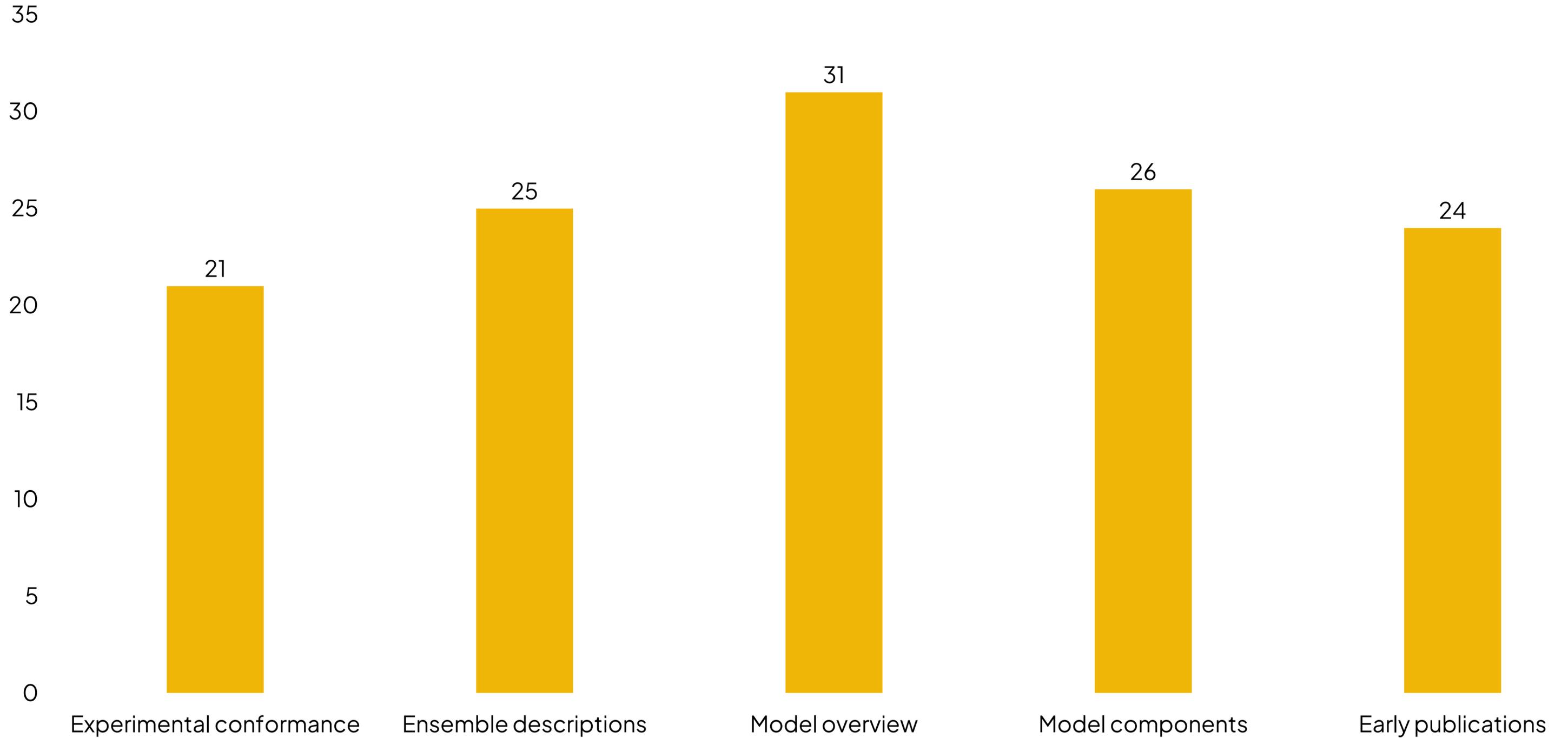
- Considerable detail has been provided in some responses and will be reviewed by Model documentation TT and FE group.

- Suggestions included:
  - Addition of preliminary model evaluation results
  - Documentation of forcing datasets
  - QC and consistency between documentation
  - Improved communication/website on errata
  - Documentation requirement for ESGF publication
  - Easily accessible documentation, reduce need to contact modelling centres
  - Indications of model relationships
  - DOI for documentation.

Section 6: Forcings

Around half of all respondents had comments or concerns around forcings delivery

- However, some comments were directed at general Fast Track timing or focused on scenarios.

- General concern over the timeline and expected availability of the forcings datasets with some suggestions for widening pool of providers, increasing support, and operationalisation.

- Consideration of regional modelling should be given.

- Suggestion that it would be very beneficial if the pre-industrial forcings (year 1850) were not changed from the provisional to the final versions of the forcing datasets and were available earlier.

- Support for formal documentation of the datasets.

- Specific comments from MIPs on next slide.

- All comments to be reviewed in detail by Forcing TT and Harmonisation WG (plus fed back to ScenarioMIP as relevant).

MIP specific concerns on forcings	
DAMIP	Emissions-driven historical simulations in ESMs will require fossil fuel and carbonate CO_2 emissions to be made available separately from land-use change emissions, because land use change emissions of CO_2 are calculated interactively in response to specified land-use change in ESMs.
ISMIP7	We hope that extensions to 2300 will be part of the initial delivery of forcing datasets. Also, if the proposed timeline gets behind schedule, we may not have sufficient time to deliver sea level projections from ice sheets.
PMIP	• We need to establish a solid PI forcing that makes sense across MIPs before simulations can start. Please stay in touch with MIPs to foster this discussion, and involve them as much as possible. • From the side of PMIP we have probably different demands than other MIPs that focus on current climate. Our standard protocols have been to use the observed values and keep them fixed. This fits nicely with the previous piControl set-up. We've also had a strong preference to run the models with as many Earth System components turned on as possible. The revised version of the DECK includes either a piControl or an esm-piControl. Therefore, it would be desirable for the ESMs to also run a non-esm piControl (although doing so would be sufficient on community MIP timescales, rather than following the quick turnaround of the FastTrack schedule). • Paleo-emissions are a problem with traditional non-chemistry- and non-biogeochemistry-enabled simulations. One may explore methods of creating alternate PI baselines for non-GHG non-anthropogenic atmospheric constituents (O3, Black Carbon, Sulfates, etc.) that could be used with the paleoclimate simulations, where the atmospheric constituents / aerosols are dialed back to represent the natural background as closely as possible. This could be done via full atmospheric chemistry experiments with PI SST/SICE and all the anthropogenic sources turned off. How broadly such an approach could be applied among the PMIP model ensemble remains to be seen.
RAMIP	AerChemMIP SSPX-SLCF will need to design a new scenario, with a new forcing dataset, after the release of the forcing datasets, but in enough time to run simulations by Jan 2027. Potential delays here means the AerChemMIP future simulation in the Fast Track is very dependent on forcing data being delivered promptly.
RFMIP	The fossil & industrial short-lived climate forcers dataset from CEDS is not as up-to-date as other datasets. The harmonization of datasets (historical to future, and gridding) may also prove to be difficult and time-consuming. We'd really like to see forcing datasets updated in near real-time, which would inform progress towards Global Stocktake and real-time climate monitoring initiatives such as the Climate Indicators project (https://essd.copernicus.org/articles/15/2295/2023/)
SOFIAMIP	Currently anomalous freshwater input from the Antarctic and Greenland ice sheets is a missing forcing in CMIP models. There is currently a community effort to develop an anomalous freshwater forcing for both historical and future scenarios to account for this.
VIACS AB	Forcing datasets should be created also with the regional modelling community in mind (CORDEX), as the downscaled simulations are also frequently used in VIACS applications.

Section 7: Final comments

Final comments reiterated previous points and included:

- Some concern around the Fast Track not being fast enough, particularly to support WGII community, and suggestions to reduce to DECK and scenarios on faster timeline (e.g., modelling centres encouraged to do ScenarioMIP first).

- The Fast Track should be reduced although some highlight need for other experiments such as C4MIP, AerChemMIP etc).

- Number of comments reflecting concern around lack of 1.5C scenario.

- Move to "operationalisation" for some aspects to ensure adequate support of forcing providers, more robust infrastructure and routine benchmarking.

- Enhanced collaboration with high resolution and hybrid modelling communities.

- Consideration of where responsibility/ownership lies between CMIP Panel and MIPs.