Proposed contributions to CMIP6 with a response to forcing emphasis

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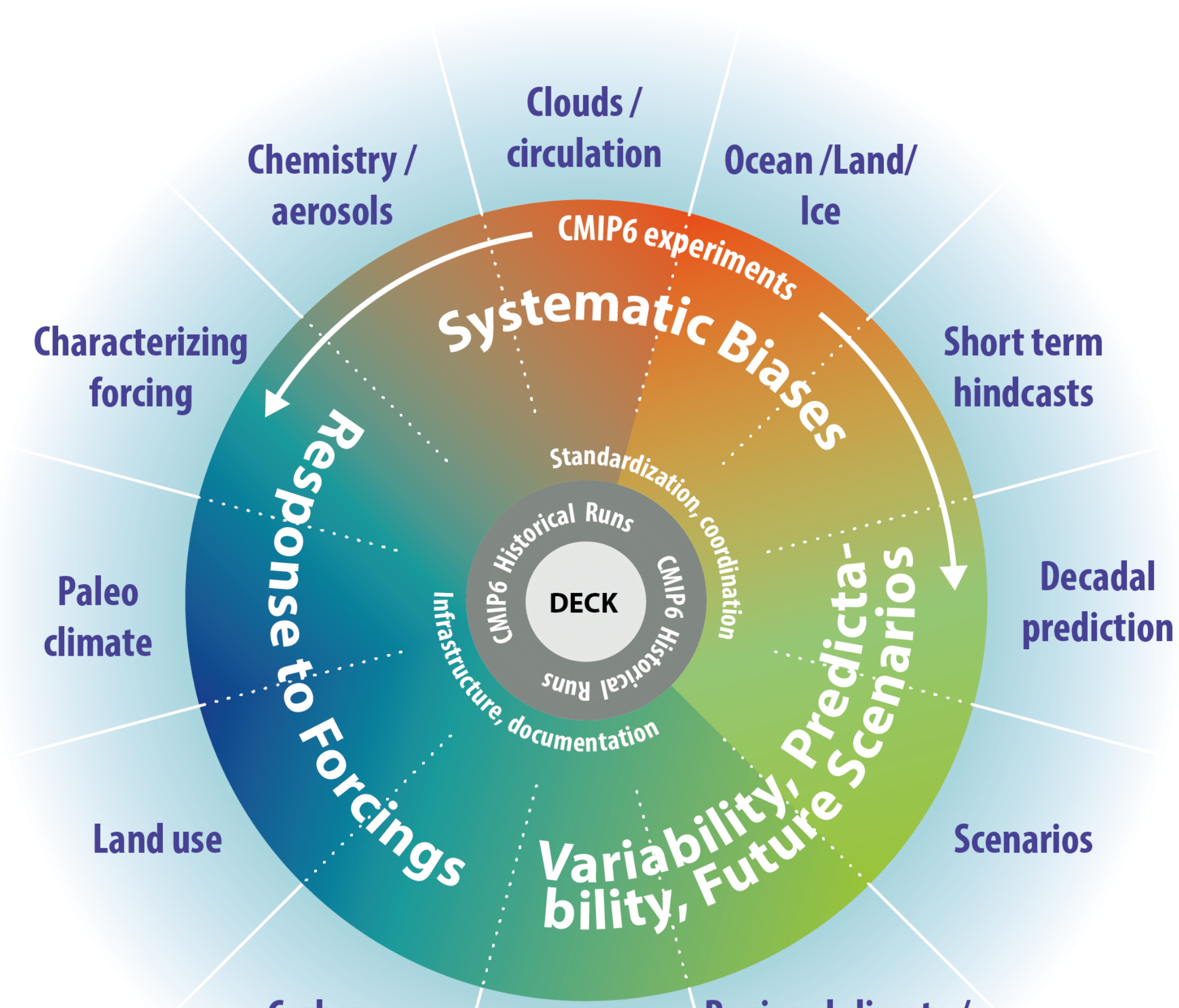
(for the CMIP panel)


Clouds / circulation
Chemistry / aerosols
Ocean /Land/ Ice
Characterizing forcing
Short term hindcasts
CMIP6 experiments
Systematic Biases
Response to Forcings
Standardization, coordination, Infrastructure, documentation
CMIP6 Historical Runs
DECK
CMIP6 Historical Runs
Variability, Predictability, Future Scenarios
Paleo climate
Decadal prediction
Land use
Scenarios
Carbon cycle
Geo-engineering
Regional climate / extremes

Overview*

- 12 MIPs
- 25000 years (11000 in T1)
- 310 experiments (174 in T1)

** Less discussion of GDDEX (12 expts, 1950 yrs, high resolution) but can based on interest.*

- **AerChemMIP (Aerosols and Chemistry MIP):** Diagnose forcing and feedbacks of aerosols, ozone and methane; Document and understand past and [sic] future changes in the chemical composition of the atmosphere; provide fields for CMIP6 models.
- **C4MIP (Coupled Carbon Climate Cycle)*:** Understand and quantify future changes in land and ocean carbon storage and fluxes, quantify climate-carbon cycle feedbacks and Transient Climate Response to cumulative Emissions (TCRE).
- **CFMIP (Cloud Feedbacks):** Improve assessments of cloud feedbacks.
- **DAMIP (Detection and Attribution):** Facilitate Estimates of anthropogenic (GHG and nonGHG) and natural forcing.
- **FAFMIP (Flux-Anomaly Forcing):** Quantify differences in patterns of sea level change and ocean heat uptake.
- **GeoMIP (Geo Engineering):** Exploring options for mitigating against GHG warming.
- **ISMIP (Ice Sheet MIP):** Effect of major ice sheets on sea-level rise.
- **LUMIP (Land Use Change):** What are the effects of land-use change on climate and biogeochemical cycling?
- **nonLinMIP (non-linear response):** Quantify and understand non-linear climate responses.
- **PMIP (PaleoMIP):** Evaluate climate feedbacks using observations of pre-instrumental changes.
- **PDRMIP (precipitation drivers):** Compare precipitation response to various drivers (mostly aerosol).
- **RFMIP (Radiative Forcing):** Quantify and understand rad. forcing to which climate models are subject.
- **VolMIP (Volcano):** Assess robust responses to volcanic forcing.

** Tier 1 Simulation request corrected during course of WGCM meeting (9.10.2014)*

Projection on Grand Science Challenges

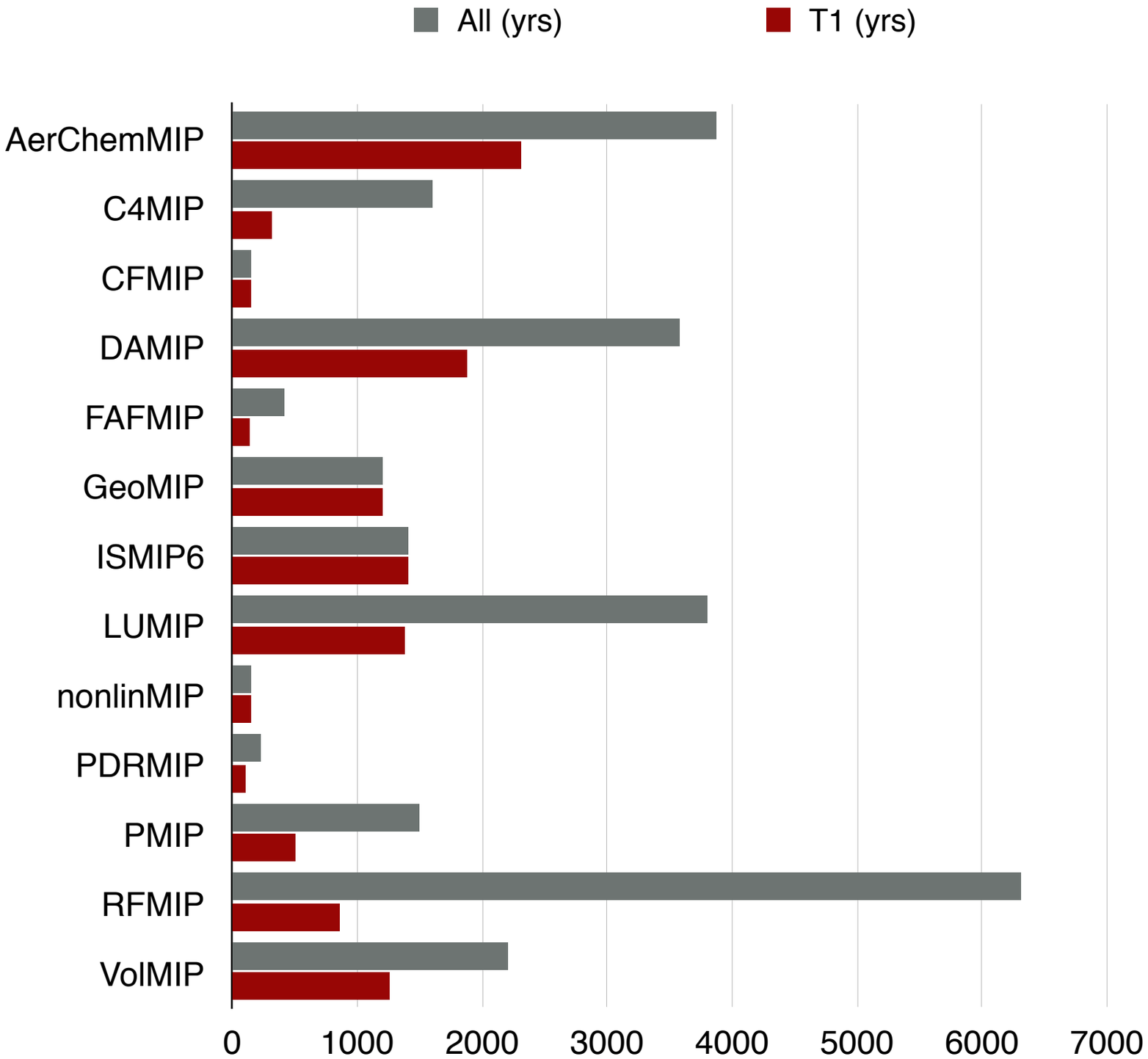
	Short name	# yrs	Cld, Circ, CS	Cryosphere	Extremes	Regional Info	Sea-level Rise	H20 Avail		IGBP
1	AerChemMIP	2303	2	5	3	4	0	0		1
2	C4MIP	310	0	3	0	0	0	2		1
3	CFMIP	155	1	4	6	2	7	3		5
4	DAMIP	1800	4	3	2	1	6	5		7
6	FAFMIP	140	3	4	0	2	1	0		0
8	GeoMIP	1200	1	3	4	2	0	5		6
11	ISMIP	900		1		2	2	3		
14	LUMIP	1400	0	0	4	2	0	3		1
15	nonlinMIP	150	4	7	6	1	3	2		5
17	PDRMIP	1380	1	0	2	4	0	3		0
18	PMIP	300	2	3	5	4	6	7		1
19	RFMIP	180	1	7	4	2	5	6		3
22	VolMIP	1260	1	4	5	3	6	7		2

Weak

Strong

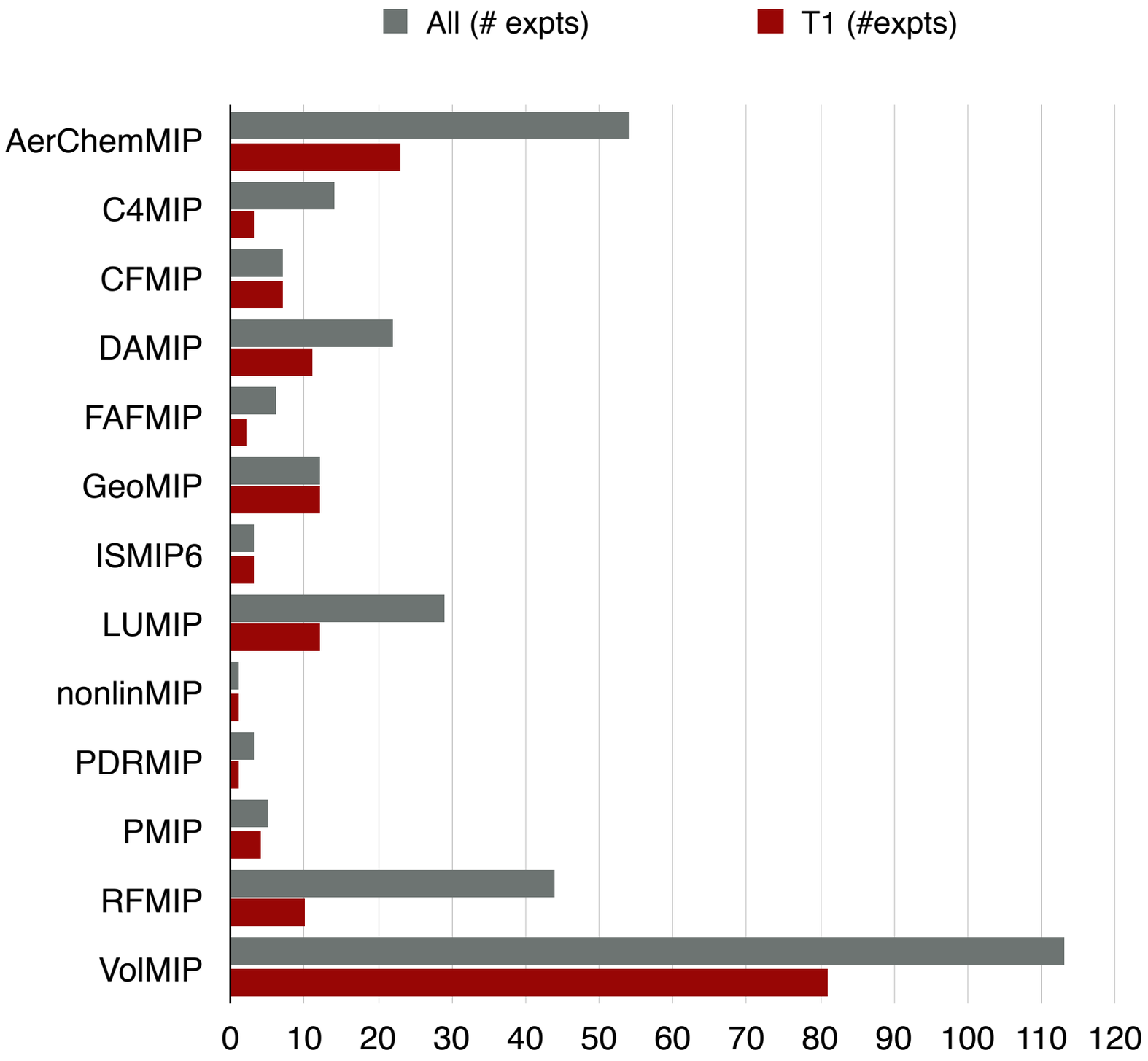
The projection on the cryosphere and water availability grand science challenges is relatively weak. Link to IGBP has a different character, as there is no IGBP grand science challenge.

Requested Simulation Years



- C4MIP, LUMIP, RFMIP and PMIP show strong prioritization, modest prioritization in DAMIP, AerChemMIP and VolMIP.
- Large number of T1 years in AerChemMIP, DAMIP, DAMIP has a relatively simple experimental design.

Requested Simulations Numbers



- Very many experiments in VolMIP and AerChemMIP
- VolMIP has large ensembles, AerChemMIP also more ensembles

Some MIPs are Easy

C4MIP, CFMIP, FAFMIP, PMIP, RFMIP, nonLinMIP:

- All have high-priority experiments with a clear and proven experimental design.
- All are strongly linked to modelling centers.
- All are asking for relatively little (together their Tier 1 request amounts to about 2000 years, and a total of 25 simulations). The other MIPs each request 1200 to 2300 years of high priority simulations, usually with more complex configurations and 149 additional simulations.
- Each is strongly linked to a grand challenge (covering four of six) and/or a CMIP6 science question.

relatively little interest has been expressed in FAFMIP and nonLinMIP, perhaps reconsider?

Question Mark

RFMIP

- Offline radiation calculations (and perhaps snapshot provision) could be labor intensive.

PDRMIP

- Could be easy, but description and experiments not well defined (positive recommendation based on faith)

COSP and tendency diagnostics in DECK

- this actually is simplified compared to last time, but not trivial.

Straightforward (but heavier)

ISMIP (1400 yrs), DAMIP (1800 yrs)

- relatively clear and proven experimental design.
- builds strongly on existing work.
- relatively small number of experiments (three different types in C4MIP, four in DAMIP)
- Benefits of having OCMIP, and deforestation LUMIP run separate from C4MIP?
- GDDEX also fits in this category

More Question Marks

VolMIP (1260 yrs)

- very large ensemble sizes (is the signal worth finding?).
- opportunities for synergy with GeoMIP, RFMIP, and AerChemMIP.
- some aspects of experimental design appear unproven.
- Quite interesting to SPARC, perhaps less overlap with grand challenges.

GeoMIP (1200 yrs)

- No prioritization; grand challenge overlap is weak (should ask the regional information GC).
- Becoming rather more elaborate, and the more elaborate simulations have a strong overlap with AerChemMIP and ScenarioMIP.
- Design is centered around old scenarios for many experiments.
- Could more be gained by very simple experiments (solar only, surface albedo only)?

AerChemMIP (2303 yrs)

- Heavy in every respect.
- Are we running before we can walk (i.e., the D&A component)?
- Overlap with scenarios, but also VolMIP, GeoMIP, RFMIP?
- Further prioritization useful?

LUMIP (1400 yrs)

- Some questions about experimental design (runs are new)
- Overlap with other MIPs?