CCCma CMIP6 Model Updates

Atmosphere

- model levels increased from 35 to 49
- aerosol updates (1st and 2nd indirect effects)
- improved treatment of volcanic aerosol
- improved aerosol radiative effects for black and organic carbon
- subgrid scale lakes added (FLAKE)

Land Surface

- land-surface scheme updated CLASS2.7→CLASS3.6
- improved treatment of snow and snow albedo
- land biogeochemistry → wetlands added with methane emissions
- new mineral dust parameterization

Ocean

- new ocean model based on NEMO3.4 (ORCA1)
- LIM2 sea-ice component
- new in-house coupler developed

Ocean Biogeochemistry

- new parameterization, the Canadian Ocean Ecosystem model, CanOE
- double the number of biogeochemical tracers
- increase number of classes of phytoplankton, zooplankton and detritus from one to two
- prognostic iron cycle

CanESM Functionality

- new "relaxed CO_2" option for specified CO_2 concentration simulations

Other issues:

1. We are currently in the process of migrating to a new supercomputing system – being installed now and should be running on it over the next few months.

2. Global climate model development is integrated with development of operational seasonal prediction system, decadal prediction system, and regional climate downscaling system.

3. We are also increasingly involved in aspects of ‘climate services’ – providing multi-model climate scenario information to impact and adaptation users, decision-makers, policy-makers, etc.

CCCma MIP Interest

	Short name of MIP	Long name of MIP	CanESM	
1	AerChemMIP	Aerosols and Chemistry Model Intercomparison Project	0	←
2	C4MIP	Coupled Climate Carbon Cycle Model Intercomparison Project	1	
3	CFMIP	Cloud Feedback Model Intercomparison Project	1	
4	DAMIP	Detection and Attribution Model Intercomparison Project	1	
5	DCPP	Decadal Climate Prediction Project	1	
6	FAFMIP	Flux-Anomaly-Forced Model Intercomparison Project	1	
7	GeoMIP	Geoengineering Model Intercomparison Project	1	
8	GMMIP	Global Monsoons Model Intercomparison Project	1	
9	HighResMIP	High Resolution Model Intercomparison Project	0	←
10	ISMIP6	Ice Sheet Model Intercomparison Project for CMIP6	1	
11	LS3MIP	Land Surface, Snow and Soil Moisture	1	
12	LUMIP	Land-Use Model Intercomparison Project	1	
13	OMIP	Ocean Model Intercomparison Project	1	
14	PDRMIP	Precipitation Driver and Response Model Intercomparison Project	0	←
15	PMIP	Palaeoclimate Modelling Intercomparison Project	0	←
16	RFMIP	Radiative Forcing Model Intercomparison Project	1	
17	ScenarioMIP	Scenario Model Intercomparison Project	1	
18	SolarMIP	Solar Model Intercomparison Project	N/A	
19	VolMIP	Volcanic Forcings Model Intercomparison Project	1	
20	CORDEX	Coordinated Regional Climate Downscaling Experiment	1	
21	DynVar	Dynamics and Variability of the Stratosphere-Troposphere System	1	
22	SIMIP	Sea-Ice Model Intercomparison Project	1	
23	VIAAB	VIA Advisory Board for CMIP6	2	?

Model Name: CanESM5; Institution: CCCma; Country: Canada

Forcing Dataset	Will be used (YES/NO)	Pre-industrial	Historical
SLCF Emissions			
Biomass Burning	??		
GHG Emissions			
Land-use			
GHG concentrations			
Ozone concentrations			
Nitrogen deposition	Ocean only (?)		
Simple plume aerosol	Only for specific MIP		
Solar			
Stratospheric aerosol			
AMIP SST and SIC	Only for specific MIP		AMIP run only

KEY: **OK** | **Testing** | **Preliminary** | **Unknown**

See CMIP Panel website at https://www.wcrp-climate.org/wgcm-cmip/wgcm-cmip6 for details

Questions on Forcing Table:

1. We weren't clear on the purpose of this table, nor how some forcing are separated, nor why only historical and preindustrial were included, …

2. Biomass burning – separate from GHG and SLCF?
   a. Seems to be forest fires, grassland fires, etc., but are these explicitly excluded from 'GHG' and 'SLCF' forcing (e.g. SO2, N2O, BC, …)

   b. How will this be handled in the forcing for ScenarioMIP? All will be harmonized with historical forcings? The CMIP6 forcing page does not obviously have future analogs of biomass burning and SLCF.

3. Iron or dust deposition on ocean (any prospect of this being available?)

Data Request Issues:

- We are having difficulty reconciling the data list resulting from Martin Jukes' software and the papers appearing in the GMD MIP papers. For example, for DCPP we find ~50% error rate in variables requested (up from 10-20% when this test was applied to an earlier version). For DynVar, error rate is ~30%.

- Is there some automated way to do this kind of testing? How will we know if errors are introduced by later software updates (which seem to be frequent)?

- Timeline for finalizing data request and software is unclear.

- Documentation is very technical and in many cases not all that clear for a user. How many groups are currently using this software, and how?

- How will overall data request be streamlined and rationalized (across certain MIPS)? E.g. focus on historical run as the basis for a core data request that should at least be included in control, scenario runs, D&A runs, etc.

Larger Data archive and dissemination Issues:

- How is feedback from modelling centres and ESGF users being obtained and used? Lessons learned and problems experienced in CMIP5 for example.

- There seem to be several WIP position papers in draft(?) form, covering issues some of us have been concerned about for a long time (like version control of the CMIP archive). But they don't seem to have been circulated for comment or really made public.

Scinocca white paper …