

Paleoclimate Modelling



Intercomparison Project

Palaeoclimate Model Intercomparison Project

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Results of my jolly in May

(to Crewe)



Palaeoclimate Modelling

- A climate model gives a global solution to the set of equations governing the climate system
- Expense & awkward to build and run
- It is hard learning to how to run a single model let alone multiple ones



Intercomparison

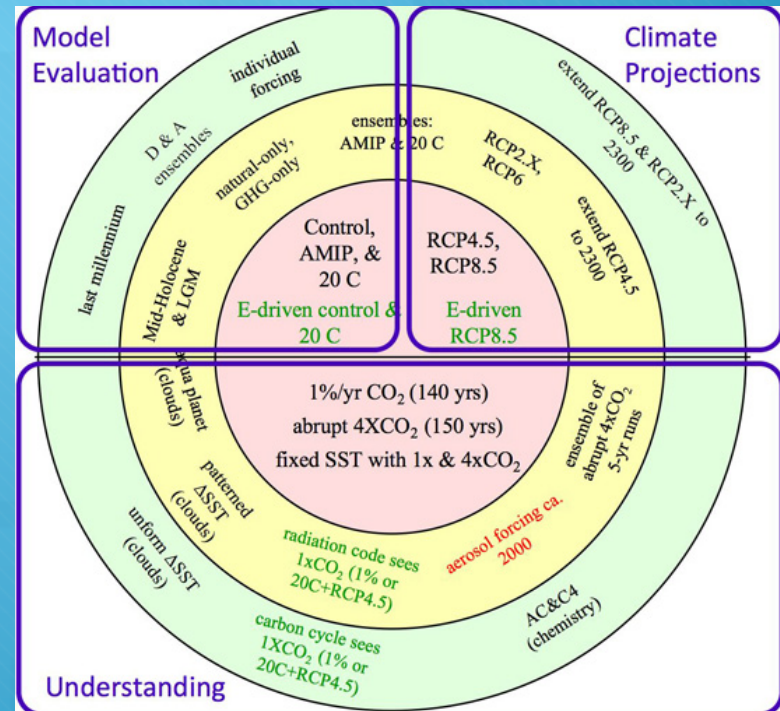
- Different models can give different answers
- Need multiple models to give confidence in your result
- Useful for modellers to compare their solutions to understand causes of differences
- Need to define a single experiment for all models
- Projects doing this given the abbreviation 'MIP'
 - Model Intercomparison Project

PMIP2

- Still being actively researched and will be heavily relied upon in AR5
- 12 Models
- Some summary maps at <http://pmip2.lsce.ipsl.fr/> (Synthesis Maps)
- Pre-industrial Control (0ka)
- Mid-Holocene (6ka)
- Last Glacial Maximum (21ka)
- Data access through Jean-Yves Peterschmitt at PMIP2 website

Next IPCC Runs (CMIP5)

- Better synthesis between the two projects
- Some Palaeo simulations are required by nearly every model
- Other optional Palaeo runs





PMIP3

- As some runs and models are different
- Still maintaining its own webpage and identity
- <http://pmip3.lsce.ipsl.fr/>



Last Millenium (12 models)

- A long simulation, so not as many models
- Orbital parameters & trace gases vary annually
- Volcanic, Solar, Aerosol & Vegetation have differing reconstructions
- Experiment protocol from Schmidt et al. (2009):
<http://www.geosci-model-dev.net/5/185/2012/gmd-5-185-2012.html>



Mid-Holocene (19 models)

- 6,000 year ago
- Defined orbital parameters and GHGs
- Vegetation either interactive or prescribed as preindustrial
- Ice sheets & Landmask at preindustrial



Last Glacial Maximum (18)

- 21,000 year ago
- Defined orbital parameters and GHGs
- Vegetation either interactive or prescribed by protocol
- Ice sheets & Landmask prescribed as a single set by protocol



Where do I get the data?

- Access to the data is through a coordinated series of web server called the “Earth System Grid”
- UK portal run by the British Atmospheric Data Centre at <http://cmip-gw.badc.rl.ac.uk/home.htm>



Last Interglacial

- Run early Eemian, mid-Eemian and glacial inception snap shots
- Possibly transient simulations
- Trace gases and Orbits prescribed
- Rest same as in Preindustrial simulation
- <http://www.paleo.bris.ac.uk/~gqdl/pmip>

PlioMIP

- A comparison using the PRISM3D boundary conditions (~3Ma)
- Not under IPCC auspices, so less rigorous data control
- Access through me or Alan Haywood (Leeds)
- http://geology.er.usgs.gov/eespteam/prism/prism_pliomip.html



EO-MIP

- Collection of Eocene simulations
- Not a formal intercomparison as different boundary conditions
- Lunt, Dunkley-Jones et al. (2012)
- <http://www.clim-past-discuss.net/8/1229/2012/cpd-8-1229-2012-discussion.html>

List of PMIP3/CMIP5 participants
Information as of May 4th 2012

Up to date info: <https://pmip3.lsce.ipsl.fr/wiki/doku.php/pmip3.database.status>

	Institute	Country	0k <i>piControl</i>	6k <i>midHolocene</i>	21k <i>lgm</i>	LM <i>past1000</i> (1000 years)	1 % CO ₂ <i>1pctCO2</i> (140 years)	CMIP5	PlioMIP	Last Interglacial	Holocene	Carbon cycle	Atm	Ocn	Model id	Term of Use	Data Node	Publish to
1	AWI	Germany	Completed	Completed	Completed			No	Yes	Yes	No	Yes	96x48 x L19	120x101 x L40	COSMOS-aso ?		DKRZ ?	ESG-WDCC ?
2	BCC	China	CMIP5 (500)	CMIP5 (100)		CMIP5	CMIP5			No	No	Yes	128x64 x L26	360x232 x L40	bcc-csm1-1	Unrestricted	BCC	ESG-PCMDI
3	BCCR	Norway	Running Summer 2012	Running Summer 2012	Running Summer 2012	Running Summer 2012	Start April 2012 May 2012	No	Yes	Yes	No	Yes	96x48 x L26	100x116 x L32	NorESM1-L	Unrestricted	DKRZ ?	ESG-WDCC ?
4	CAU-GEOMAR	Germany	Completed	Completed				No	Yes	Yes		No	96x48 x L19	182x149 x L31	KCM1-2-2	Non-commercial only	DKRZ ?	ESG-WDCC ?
5	CNRM-CERFACS	France	CMIP5 (850)	CMIP5 (200)	Running April 2012		CMIP5			No	No	No	256x128 x L31	362x292 x L42	CNRM-CM5	Non-commercial only	CNRM	ESG-PCMDI
6	FUB	Germany	PMIP3 (400)		PMIP3 (600)			No		No	No	Yes	96x48 x L19	120x101 x L40	COSMOS-ASO	Unrestricted	IPSL (DKRZ later?)	ESG-BADC
7	NOAA-GFDL	USA	CMIP5 (470)		Start Spring 2012		CMIP5			No	No	Yes/No	144x90 x L24	360x200 x L50	GFDL-CM3	Unrestricted	GFDL	ESG-PCMDI
8	NASA-GISS	USA	CMIP5 (1163)	Completed	Completed	CMIP5			Yes		Yes	No	144x90 x L40	288x180 x L32	GISS-E2-R	Unrestricted	NCCS	ESG-PCMDI
9	IPSL	France	CMIP5 (1000)	CMIP5 (500)	CMIP5 (200)	Running April 2012	CMIP5		Yes			Yes	96x95 x L39	182x149 x L31	IPSL-CM5A-LR	Unrestricted	IPSL	ESG-BADC
10	KNMI or ICHEC ?	Netherlands	Completed	Completed			?	?	Yes	No	No	No	320x160 x L62	362x292 x L42	EC-Earth-2-2	Unrestricted	BADC or IPSL ?	ESG-BADC
11a	LASG-IAP LASG-CESG	China	CMIP5 (900)	Completed	Completed		CMIP5						128x60 x L26	360x180 x L30	FGOALS-g2	Unrestricted	LASG	ESG-PCMDI
11b			CMIP5 (501)	Completed ?	Started ? End ?				Yes			No	x L26		FGOALS-s2	Unrestricted	LASG	ESG-PCMDI
11c			Completed		Completed								72x45 x L26		FGOALS-gl	Unrestricted	LASG	ESG-PCMDI
12	LOVECLIM	Belgium France Netherlands	Completed	Completed	Completed	Completed		No		Yes	Yes	No	32x64 x L3	122x65 x L20	LOVECLIM1-2	Unrestricted	IPSL	ESG-BADC
13	MIROC	Japan	CMIP5 (531)	CMIP5 (100)	CMIP5 (100)	CMIP5	CMIP5		Yes			Yes	128x64 x L80	256x192 x L44	MIROC-ESM	Non-commercial only	DIAS	ESG-PCMDI
14	MPI-M	Germany	CMIP5 (1156)	CMIP5 (100)	CMIP5 (100)	CMIP5	CMIP5					No	196x98 x L47	256x220 x L40	MPI-ESM-P	Unrestricted	DKRZ	ESG-WDCC
15	MRI	Japan	CMIP5 (500)	CMIP5 (100)	Running April 2012	Not started July 2012?	CMIP5		Yes	No	No	No	320x160 x L48	364x368 x L51	MRI-CGCM3	Non-commercial only	DIAS	ESG-PCMDI
16	NCAR	USA	CMIP5 (501)	CMIP5 (301)	CMIP5 (101)	CMIP5	CMIP5		Yes			No	288x192 x L26	320x384 x L60	CCSM4	Unrestricted	NCAR	ESG-NCAR
17	OSUVic	USA	Completed	Running May 2012	Running May 2012			No		No	No	No	128x64 x L10	100 x 100 x L19	OSUVic-0-3	Unrestricted	?	?
18	CSIRO-QCCCE	Australia	CMIP5 (500)	CMIP5			CMIP5					No	192x96 x L18	192x192 x L31	CSIRO-Mk3-6-0	Non-commercial only	NCI	ESG-NCI
19	UK Groups (UBRS/LEEDS/EDINB URGH - Hadley)	UK	CMIP5 (497)	CMIP5 (-ES: 102 -CC: 35)	Not started Spring 2012	Running Summer 2012	CMIP5		Yes	Yes	Yes	Yes	192x145 x L38	360x216 x L40	HadGEM2-ES HadGEM2-CC	Unrestricted	BADC	ESG-BADC
20	UNSW	Australia	PMIP3 (1000)	PMIP3 (500)	Running June 2012	PMIP3	PMIP3	No	Yes	Yes	Yes	No	64x56 x L18	128x112 x L21	CSIRO-Mk3L-1-2	Non-commercial only	IPSL (NCI later?)	ESG-BADC
21	UofT	Canada	Running June 2012		Running June 2012			No		No	No	No	256x128 x L26	320x386 x L40	UofT-CCSM3	Unrestricted	?	?

Legend

Status expected completion date	Available in CMIP5 DB (nb years in CMIP5 DB)
No	Available in PMIP3 DB (nb years in PMIP3 DB)
Yes	

PMIP3 + PlioMIP groups: Note that the models used for PlioMIP are often not (exactly) the same as the ones used for PMIP3/CMIP5

PlioMIP-only (not in the table): LPAP, UoM