

Paleoclimate Modelling

PMIP

Intercomparison Project

A BRIEF HISTORY OF THE PMIP DATABASE

Jean-Yves Peterschmitt – LSCE

And LOTS of famous PMIP scientists

... AND LOTS of anonymous sysadmins and software engineers

Dataman

Working with the PMIP community since 1994



Funded position at LSCE since 1994
Helping people with data... mostly PMIP!



- Key points from a 1997 talk ...
- Data size and complexity increase, problems are the same
 - Need as much **standard data** as possible for model intercomparison
 - Data must be **correct**, and *easily* usable

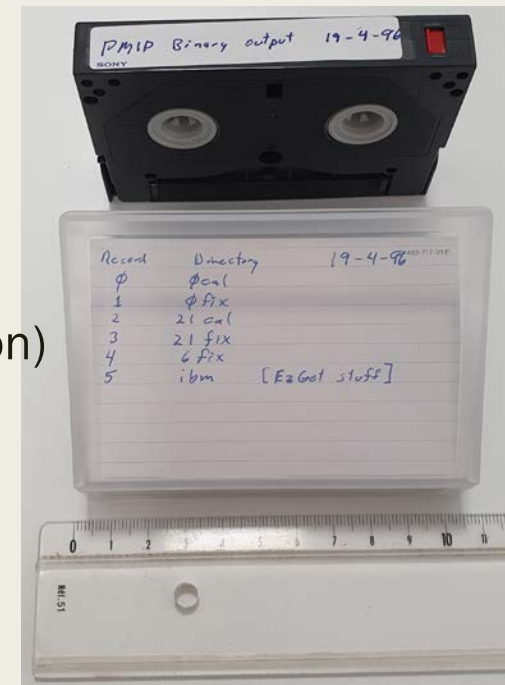


**When you get caught
with
WRONG DATA...**

What is the PMIP DB?

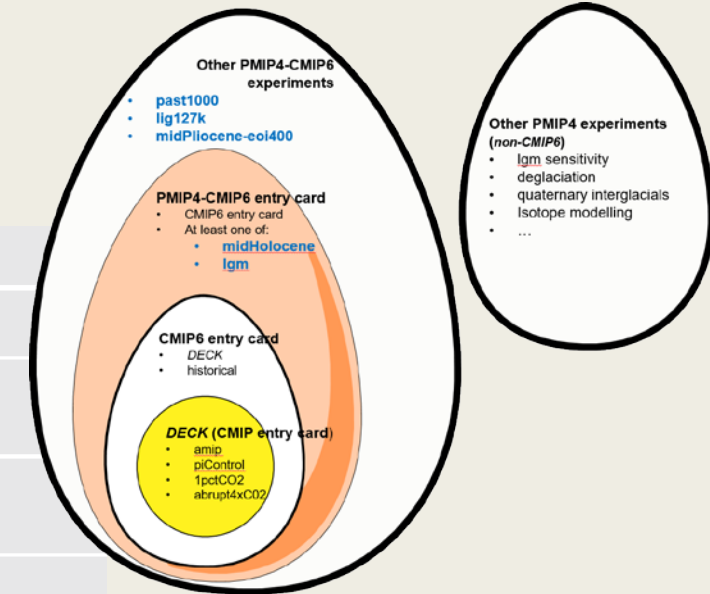


- Lots of data files following **community defined standards**
 - **PMIP(1)** started collaborating early with **PCMDI** and adopted the **AMIP standards**
 - Standards were improved for **PMIP2**, and were merged with **CMIP5&6 DB standards** for **PMIP3** and **PMIP4**
- Data files are available on **remote servers** (in *The Cloud!*)
 - **PMIP1** originally on an *ftp* site at PCMDI
 - **PMIP1** and **PMIP2** DB (and web sites) still online at LSCE!
 - <https://dods.lsce.ipsl.fr/pmip1db/>
 - <https://dods.lsce.ipsl.fr/pmip2db/>
 - **PMIP3** and **PMIP4** data available on ESGF (Earth System Grid Federation)
 - IPSL node: <https://esgf-node.ipsl.upmc.fr/>
 - Look for the **PMIP Activity** in the CMIP6 *Search* interface



The PMIP DB evolution

	PMIP 1	PMIP 2	PMIP 3	PMIP 4
DB online	1996	2005	2011	2018
Number of groups/ models	22	18	25	20
Number of countries	11	10	12	14
Main experiments	0 k 6 k 21 k	Same as PMIP 1	PMIP 2 + Last Millennium	PMIP3 + Last Interglacial + Mid Pliocene Warm Period + Last Deglaciation + DeepMIP
DB Size	1.7 GB	482 GB	distributed several TB	distributed LOTS of TB...
Data distribution	ftp server LSCE (+PCMDI)	DODS server LSCE	CMIP5 ESGF	CMIP6 ESGF
Data format & Convention	NetCDF AMIP/CF	NetCDF CMIP+PMIP2/CF	NetDCF CMIP5/CF	NetCDF CMIP6/CF
Example grid IPSL atmosphere	Imcelmd5 64x50 x L11	IPSL-CM4-V1-MR 96x72 x L19	IPSL-CM5A-LR 96x95 x L39	IPSL-CM6A-LR 144x143 x L79
Example grid NCAR atmosphere	ccsm3 128x64 x L18	CCSM 128x64 x L17	CCSM4 288x192 x L26	CESM2 288x192 x L32



DECK = Diagnosis, Evaluation, and Characterization of Klima Experiments

Data standardization ?

The ONLY way to successfully share MIP data

- PMIP4 follows CMIP6 standards
 - Self-documented binary NetCDF file format
 - Standard file names, metadata, variables' units and axes
 - Climate and Forecast conventions, CMIP6 Data Reference Syntax, CMIP6 Controlled Vocabulary and CMIP6 Data Request
 - The CMOR3 library is designed to help create standard CMIP6 files
 - <https://cmor.llnl.gov/>
- YOUR modelling group HAS TO prepare standard model output and UPLOAD the files to ESGF
- Standard PMIP1 data files in NetCDF format are still accessible and usable!
- **NO STANDARDS and non-official data sharing of multi-model data? → Chaos, errors !**

AMIP Standard Output (Revised)

An important aspect of AMIP is the agreement by participating groups to prepare a common or standard set of output variables, in order to facilitate systematic model validation and intercomparison. As given in the table below, this standard model output consists of the global distribution of a set of surface and two-dimensional variables (Set 1), the global distribution of a set of atmospheric variables at selected pressure levels (Sets 2 and 2a), and the distribution of the zonal averages of a set of variables in the meridional-vertical plane (Set 3). The revisions of this list relative to that distributed at the April 1991 AMIP meeting are inclusion of the surface air temperature in Set 1, the inclusion of the streamfunction and velocity potential in Set 2, the inclusion of the geopotential height at 500 hPa (Set 2a), and the inclusion of the mean meridional streamfunction in Set 3.

The time averages of all quantities are to be calculated for each calendar month of the ten-year period 1979-1988. It should be noted that for some variables (marked by a dagger †) the monthly mean of the daily variance (sampled every six hours for diurnal models and once daily otherwise) is also to be calculated, while other variables (marked by an asterisk *) are to be represented by their total monthly accumulations. These latter quantities will permit the accurate determination of the monthly budgets of momentum, heat and fresh water flux at the surface, as well as the net radiative budget at the top of the atmosphere. (In this connection we may also note that the method II cloud radiative forcing is defined as the difference between the top-of-the-atmosphere

the left) to 90S (on the right), with an overall aspect ratio of 2:1 (latitude/pressure). Since the linear pressure ordinate does not adequately resolve the stratosphere in many models, a useful supplemental WGNF format for meridional cross-sections is one whose ordinate is linear in ln p. If this format is used in addition to the WGNF standard, the ordinate should extend over the pressure range 1000 hPa to 10 hPa, and the display should have an aspect ratio of 2:1 (latitude/pressure) with 90 N on the left. Suggestions for other formats supplemental to the WGNF standards are welcome.

In addition to the production of the standard output described above, each AMIP participating group is expected to prepare a six-hourly history of state (i.e., the distributions of the variables needed for reanalysis, such as velocity, geopotential, temperature, humidity, surface pressure, soil moisture and snow mass), along with the six-hourly accumulations of the appropriate variables for archival storage at PCMDI. In order to be compatible with the standard output, these history variables should be in the same units as indicated above.

AMIP Contacts

Questions, suggestions and comments on AMIP are welcome, and may be directed to the following PCMDI staff:

General information	-- Larry Gates
	tel: (510) 422-7642
	fax: (510) 422-7675

The HUGE work behind the scene Earth System Grid Federation

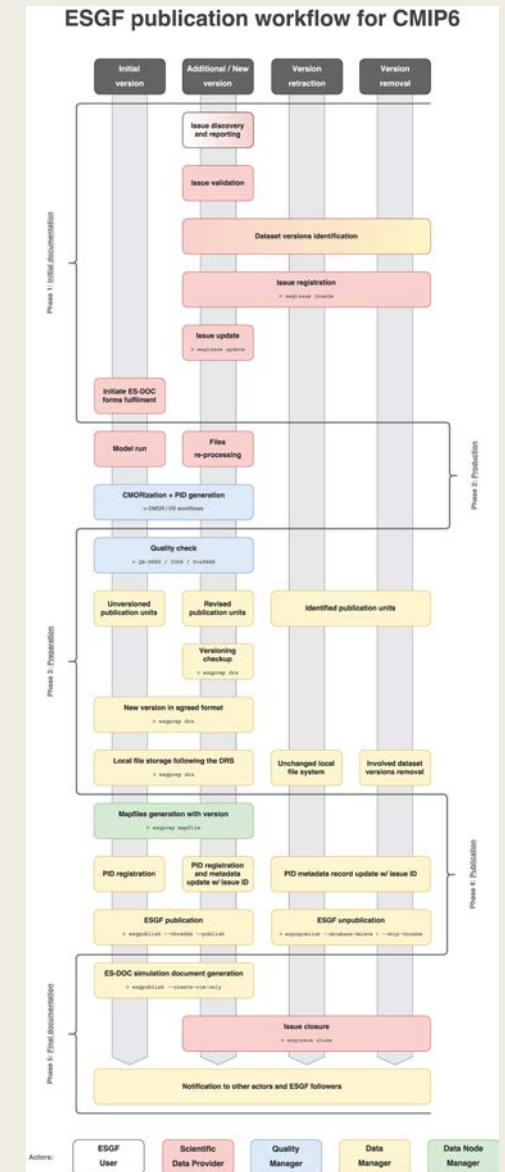


Major ESGF Node Sites

Institution	Gateway URL	Version	Country	Project(s)	Contact
1 CEDA	esgf-index1.ceda.ac.uk	2.4.0	U.K.	CMIP5, CORDEX, Obs4MIPs, SPECS, ESA CCI, EUCLEIA, CLIPC	alan.iwi@stfc.ac.uk
2 DKRZ	esgf-data.dkrz.de	2.4.0	Germany	CMIP5, CORDEX, Obs4MIPs, ISI-MIP	berger@dkrz.de
3 ANU NCI	esgf.nci.org.au	2.4.0	Australia	CMIP5	ben.evans@anu.edu.au
4 NOAA GFDL	esgdata.gfdl.noaa.gov	2.4.0	U.S.	CMIP5, ncpp2013, Obs4MIPs	hans.vahlenkamp@noaa.gov
5 NASA GSFC	esgf.nccs.nasa.gov	2.4.0	U.S.	CMIP5, Obs4MIPs, Ana4MIPs, NEX-GDDP, NEX-DCP30, CREATE-IP	daniel.q.duffy@nasa.gov
6 IPSL	esgf-node.ipsl.upmc.fr	2.4.0	France	CMIP5, CORDEX, Obs4MIPs	sebastien.denvil@ipsl.jussieu.fr
7 NASA JPL	esgf-node.jpl.nasa.gov	2.4.0	U.S.	Obs4MIPs, GASS-YoTC, CMAC	luca.cinquini@jpl.nasa.gov
8 DOE LLNL	esgf-node.llnl.gov	2.4.0	U.S.	CMIP5, CMIP3, input4MIPs, ACME	sasha@llnl.gov
9 LIU	esg-dn1.nsc.liu.se	2.4.0	Sweden	CMIP5, CORDEX, SPECS, CLIPC	pchengi@nsc.liu.se



- Data preparation and distribution is **not easy**, but is **required!**
- Thanks to all the groups that have already shared standard output (or will do it)!



TODO

Wrapping up PMIP4, getting ready for the next 30 years!

- GROUPS: Get all PMIP4 data in standard format and on ESGF
- GROUPS: Check and complete [PMIP4 documentation on es-doc](#)
- USERS: Use the available data for lots of publications
- ESGF: Make it easier for non-programmers to use CMIPn data
- Find a way to store PMIP related publications references (more reliable than the extinct citeulike)
- JYP: Update the main PMIP website...
- YOUNG SCIENTISTS: Get ready for PMIP5/CMIP7 adventure
- ... probably too many other things to list

More useful links!

- PAGES [PMIP 30th Anniversary](#) issue
- PAGES [Lessons learned from 25 years of PMIP model-data distribution](#)
- CMIP6
 - [Participation Guidance for Modellers](#)
 - [CMIP6 Global Attributes, DRS, Filenames, Directory Structure, and CV's](#)
 - [Controlled Vocabulary](#)
 - [Data Request](#)
- ESGF
 - [Home](#)
 - [Data usage and data publication metrics](#)
 - [IPSL search node](#)
 - [es-doc](#) (models' and experiments' documentation)
 - [CMIP Errata-Search](#)
 - [CMIP6 Citation Service](#) (models and experiments DOIs)

BONUS

The PMIP1 SSTs are using too old standards...

