An intro to the DeepMIP model database

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Outline

1. What is available?

2. What is the file structure?

3. How to access the data?

what is available?

- database hosted in Bristol

- 8 different modeling groups

- all models provide pre-industrial control run

- early Eocene simulations ranging between 1x to 9x CO_2

- total of 33 simulations available

- consistent file names and units for atmosphere and ocean data!

Research Data Storage Facility (RDSF)

Advanced Computing Research Centre

http://www.bris.ac.uk/acrc

data.bris

DeepMIP variable names

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Atmosphere

Description	Name	Units	Comments
Near-surface (1.5 m) air temperature	tas	K	
Surface skin temperature	ts	K	
Precipitation	pr	$kgm^{-2}s^{-1}$	
Total evaporation	evspsbl	$kgm^{-2}s^{-1}$	
Total cloud cover	clt	[0,1]	
Surface downwelling longwave radiation	rlds	Wm^{-2}	
Surface upwelling longwave radiation	rlus	Wm^{-2}	
Surface downwelling shortwave radiation	rsds	Wm^{-2}	
Surface upwelling shortwave radiation	rsus	Wm^{-2}	
TOA incident shortwave radiation	rsdt	Wm^{-2}	
TOA outgoing shortwave radiation	rsut	Wm^{-2}	
TOA outgoing longwave radiation	rlut	Wm^{-2}	
Sensible heat flux (upward)	hfss	Wm^{-2}	
Latent heat flux (upward)	hfls	Wm^{-2}	
Near-surface eastward wind	uas	ms^{-1}	
Near-surface northward wind	vas	ms^{-1}	
Surface eastward wind stress	tauu	Nm^{-2}	
Surface northward wind stress	tauv	Nm^{-2}	
Mean sea-level pressure	psl	Pa	
Surface pressure	ps	Pa	
Eastward wind on model levels	ua	ms^{-1}	
Northward wind on model levels	va	ms^{-1}	
Vertical wind on model levels	wa	ms^{-1}	
Eastward wind on pressure levels	uap	ms^{-1}	
Northward wind on pressure levels	vap	ms^{-1}	
Vertical wind on pressure levels	wap	Pas^{-1}	
Geopotential height on pressure levels	zg	m	
Temperature on pressure levels	ta	K	
Specific humidity on pressure levels	hus	$kgkg^{-1}$	

Table 1: *DeepMIP core atmospheric variables*

Ocean

Description	Name	Units	Comments
Sea-surface temperature	tos	$°C$	
Sea-ice fraction	siconc	[0,1]	
Eastward velocity on model levels	uo	cms^{-1}	
Northward velocity on model levels	vo	cms^{-1}	
Vertical velocity on model levels	wo	cms^{-1}	
Potential temperature on model levels	thetao	$°C$	
Salinity on model levels	so	psu	
Mixed-layer depth	mlotst	m	
Barotropic streamfunction	sftbarot	Sv	
Global overturning streamfunction	sftmyz	Sv	

Table 2: *DeepMIP core ocean variables and availability for HadCM3 models*

Boundary conditions

Description	Name	Units	Comments
Land-sea mask	sftlf	[0,1]	on atmospheric grid
Topography	orog	m	
Bathymetry	deptho	m	

Table 3: *DeepMIP boundary conditions*

Ocean circulation

Description	Name	Units	Comments
Surface eastward wind stress (on ocean grid)	tauuo	Nm^{-2}	
Surface northward wind stress (on ocean grid)	tauvo	Nm^{-2}	
Net surface heat flux (on ocean grid)	hfno	Wm^{-2}	
Net surface freshwater flux (on ocean grid)	wfno	$kgm^{2}s^{-1}$	
Sea surface height	zos	m	
Vertical ocean tracer diffusivity	difvto	m^2/s	
Vertical ocean momentum diffusivity	difvmo	m^2/s	

Table 4: *Additional ocean circulation variables*

Clouds and energy balance

Description	Name	Units	Comments
Surface downwelling longwave radiation (clear sky)	rldscs	Wm^{-2}	
Surface downwelling shortwave radiation (clear sky)	rsdscs	Wm^{-2}	
Surface upwelling shortwave radiation (clear sky)	rsuscs	Wm^{-2}	
TOA outgoing shortwave radiation (clear sky)	rsutcs	Wm^{-2}	
TOA outgoing longwave radiation (clear sky)	rlutcs	Wm^{-2}	
Cloud cover on pressure levels (or low/medium/high amount)	cl(cll/clm/clt)	[0,1]	
Surface snow cover	snc	[0,1]	
Leaf area index	lai	1	

Table 5: *Additional radiation variables*

Variable names follow CMIP5 naming convention, but without the metadata hassle!

DeepMIP file structure

- one variable per file + all information in filename

mean: monthly mean clim last 100 years

std: monthly mean std deviation last 100 years

time_series: monthly fields last 100 years

v1.0: latest data

```
/{Model_Family}/{Model}/{Experiment}/{Version}/{Model}-{Experiment}-{Variable}-{Version}.{Statistic}.nc
```

from Lunt et al. (2017)

variable_names_DeepMIP.pdf

- **Example:** near-surface air temperatures for the four HadCM3B-M2.1aN experiments:

```
/HadCM3/HadCM3B_M2.1aN/piControl/v1.0/HadCM3B_M2.1aN-piControl-tas-v1.0.mean.nc
/HadCM3/HadCM3B_M2.1aN/deepmip_sens_1xCO2/v1.0/HadCM3B_M2.1aN-deepmip_sens_1xCO2-tas-v1.0.mean.nc
/HadCM3/HadCM3B_M2.1aN/deepmip_sens_2xCO2/v1.0/HadCM3B_M2.1aN-deepmip_sens_2xCO2-tas-v1.0.mean.nc
/HadCM3/HadCM3B_M2.1aN/deepmip_stand_3xCO2/v1.0/HadCM3B_M2.1aN-deepmip_stand_3xCO2-tas-v1.0.mean.nc
```

How to access the data?

○ **step 1 : registration**

- ask Dan (d.j.lunt@bristol.ac.uk) to be added as a 'collaborator' on the database

- click on invitation link to register with University of Bristol - no personal data necessary!

- confirm email address and Dan will approve your application

○ **step 2: access the database**

easy

option #1: WebDAV
https://webdav.acrc.bris.ac.uk/DeepMIP_Model_Output_shared

- easy access via **browser** or within **Windows Explorer** (Windows) or **Finder** (OS X)

- drag & drop files to your local computer

- step-by-step guide: https://data.blogs.bristol.ac.uk/information-for-collaborators-webdav/

advanced

option #2: SFTP
sftp.acrc.bris.ac.uk

- useful for transferring **larger amounts of data**

- additional step: upload public key to your account (https://data.bris.ac.uk/collaborator/accounts/sign_in)

- step-by-step guide for SFTP clients: https://data.blogs.bristol.ac.uk/information-for-collaborators/