

An intro to the DeepMIP model database

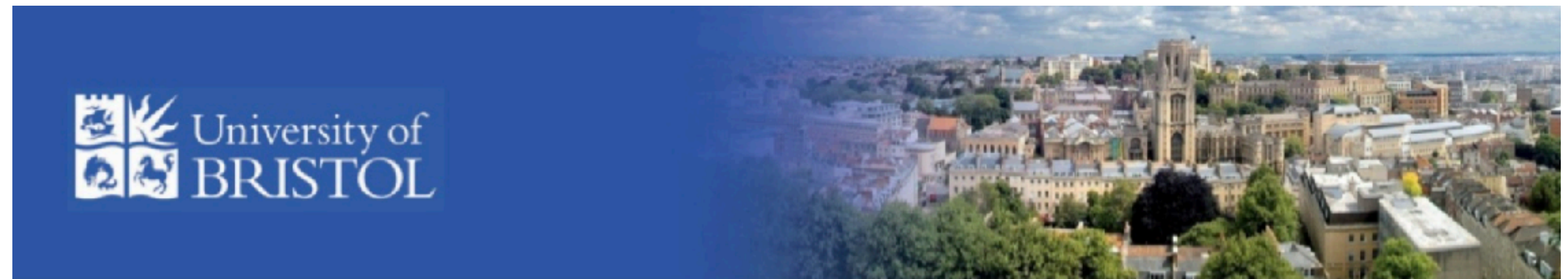
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Outline

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 CO₂
- total of 36 simulations available
- consistent file names and units for atmosphere and ocean data!



Research Data Storage Facility (RDSF)



DeepMIP variable names

Last updated: 19/02/2020

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	$Pa s^{-1}$	
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	$^{\circ}C$	
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	$^{\circ}C$	
Salinity on model levels	so	psu	
Mixed-layer depth	mldst	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^2s^{-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_1xC02/v1.0/HadCM3B_M2.1aN-deepmip_sens_1xC02-tas-v1.0.mean.nc
/HadCM3/HadCM3B_M2.1aN/deepmip_sens_2xC02/v1.0/HadCM3B_M2.1aN-deepmip_sens_2xC02-tas-v1.0.mean.nc
/HadCM3/HadCM3B_M2.1aN/deepmip_stand_3xC02/v1.0/HadCM3B_M2.1aN-deepmip_stand_3xC02-tas-v1.0.mean.nc
```

How to access the data?

○ step 1 : registration

- ask Seb (sebastian.steinig@bristol.ac.uk) to be added as a 'collaborator' on the database
- specify whether you want to just download (User's Database) or also upload model data (Developer's Database)
- click on invitation link to register with University of Bristol - no personal data necessary!
- confirm email address and we will approve your application

○ step 2: access the database

easy

option #1: WebDAV

User: https://webdav.acrc.bris.ac.uk/DeepMIP_Model_Output_read

Developer: https://webdav.acrc.bris.ac.uk/DeepMIP_Model_Output_shared

- easy access via **browser** or within **Windows Explorer** (Windows), **Finder** (OS X) or **Linux**
- 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/>