

Design for the Penultimate Deglaciation experiment

You will find on this page information about the experiment design for the PMIP4 [Penultimate Deglaciation](#) experiments.

This protocol is a product of the *PAGES-PMIP working group on Quaternary Interglacials (QUIGS)*



Please make sure to read the [Associated publications](#) before setting up your experiments or using the output data, and read any *how-to* sections associated with specific boundary conditions.

Get in touch with the following people if you have questions:

Laurie Menviel	Experimental design questions
Emilie Capron	Experimental design questions
Ruza Ivanovic	working group leader
Jean-Yves Peterschmitt	Technical questions or missing data

Associated publications

- **Penultimate Deglaciation experiment design, version 1:**

The penultimate deglaciation: protocol for Paleoclimate Modelling Intercomparison Project (PMIP) phase 4 transient numerical simulations between 140 and 127 ka, version 1.0, Menviel, L., Capron, E., Govin, A., Dutton, A., Tarasov, L., Abe-Ouchi, A., Drysdale, R. N., Gibbard, P. L., Gregoire, L., He, F., Ivanovic, R. F., Kageyama, M., Kawamura, K., Landais, A., Otto-Bliesner, B. L., Oyabu, I., Tzedakis, P. C., Wolff, E., and Zhang, X., *Geosci. Model Dev.*, 12, 3649-3685, [doi:10.5194/gmd-12-3649-2019](https://doi.org/10.5194/gmd-12-3649-2019), 2019

([Supplement](#), Menviel et al, GMD, 2019)

Version 1 Specifications

For general advice on boundary condition implementation in palaeoclimate models, see [Kageyama et al. \(2016\)](#).

Penultimate Glacial Maximum spinup (140 ka)

If possible, this spinup simulation should start from the PMIP4-CMIP6 LGM (21 ka) experiment, as equilibrium would be reached more quickly.

	PMIP4 specifications
PMIP4 name	PDGv1-PGMspin (PDG $\leftrightarrow$ <i>Penultimate DeGlaciation</i> - PGM $\leftrightarrow$ <i>Penultimate Glacial Maximum</i>)
Astronomical parameters	eccentricity = 0.033 obliquity = 23.414° perihelion-180° = 73° Date of vernal equinox : Noon, 21st March
Solar constant	1361.0 $\pm$ 0.51365 W m ⁻²
Trace gases	CO₂ = 191 ppm CH₄ = 385 ppb N₂O = 201 ppb CFC = 0 O₃ = Preindustrial (e.g. 10 DU)
Ice sheets, orography and coastlines	140 ka data from Combined ice-sheet reconstruction (IcIES-NH, GSM-G and GSM-A): [Access to data] (Abe-Ouchi et al 2013; Briggs et al 2014; Tarasov et al 2012)
Bathymetry	Keep consistent with the coastlines, using either: - Data associated with the ice sheet - Preindustrial bathymetry
Global ocean salinity	+ 0.85 psu, relative to preindustrial
All others	See manuscript section 6.1

Transient Penultimate Deglaciation (140-127 ka)

These are the specifications for the full transient run 140-127 ka.

	PMIP4 specifications
PMIP4 name	PDGv1
Initial conditions (140 ka)	Recommended: PDGv1-PGMspin See above for details. The method must be documented, including information on the state of spinup
Astronomical parameters	Transient, as per Berger (1978) [Access to data & README !] (md5sum bein1.dat $\Rightarrow$ 726dfae36b33ae248bdb94f59387a19f)
Solar constant	1361.0 $\pm$ 0.51365 W m ⁻²
Trace gases	CO₂ = Transient, as per the spline of Koehler et al. (2017) : [Access to data] CH₄ = Transient, as per the spline of Koehler et al. (2017) : [Access to data] N₂O = Linear increase from 201 ppb at 140 ka to 218.74 ppb at 134.5 ka then transient, as per the spline of Koehler et al. (2017) : [Access to data] CFC = 0 O₃ = Preindustrial (e.g. 10 DU)
Ice sheet	Transient: Combined ice-sheet reconstruction (IcIES-NH, GSM-G and GSM-A) [Access to data] (Abe-Ouchi et al 2013; Briggs et al 2014; Tarasov et al 2012) How often to update the ice sheet is optional
Orography and coastlines	Transient. To be consistent with the choice of ice sheet. Orography is updated on the same timestep as the ice sheet. It is optional how often the land-sea mask is updated, but ensure consistency with the ice sheet reconstruction is maintained

PMIP4 - <https://pmip4.lsce.ipsl.fr/>

Data

You will find below the data mentioned in Table 3, Table 4, Figure 8 and Figure 9 of the GMD paper

The data files have a version string (_vYYmmDD) in their file name, indicating when they have been uploaded to this site (in case we have to update them later and use a more recent version/date).

You can also check that you have the correct version of the files by computing their checksums (md5sum data_file) and comparing them to the checksums in the table below. Getting a different checksum means that you either have a wrong version of the file, or that the file content was corrupted during the transfer

Data	version string	md5sum
CH69-K09 (txt)	_v190201	4f4edfba575324b504beb20ade0b9d28
MD95-2042 (txt)	_v190201	cc24515a1a59417486e80155c4ebbbaa
ODP976 (txt)	_v190201	6958069100a8df8fde00dd06e0f9bd52
ODP980 (txt)	_v190201	c8310b4db60415e055c131d57b6cfd56
ODP983 (txt)	_v190201	e7cb293ceb7b7f7a8771206ec794c938
ODP1063 (txt)	_v190201	bb075a7f8fe8ffb9bd3778d6584c3924
SU90-03 (txt)	_v190201	445ea11f144843ceb7f8128df5fafaf6
SL_LIG_Dutton2017 (txt)	_v190201	c1151b63ae7c720e7b5b6b3ff2f2451a
d13Cstack (txt) Stack of U1308, CH69-K09 and ODP1063	_v190201	d44b91b35fbf6e2e142dd749200b68e4
IRD-stack (txt)	_v190201	51bf8dd9d019bf76e3a983eddf35782e
Figure 9 data (xlsx)	_v190213	9ec7aae777fdce6e1447a93054622f2c

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Last update: **2020/04/07 17:26**

