

Design for the Last Deglaciation experiment

Associated publications

Version 1:

Ivanovic, R. F., Gregoire, L. J., Kageyama, M., Roche, D. M., Valdes, P. J., Burke, A., Drummond, R., Peltier, W. R., and Tarasov, L.: Transient climate simulations of the deglaciation 21–9 thousand years before present; PMIP4 Core experiment design and boundary conditions, Geosci. Model Dev. Discuss., 8, 9045–9102, doi:[10.5194/gmdd-8-9045-2015](https://doi.org/10.5194/gmdd-8-9045-2015), 2015.

Version 1 Specifications

Last Glacial Maximum spinup (21 ka)

This spinup simulation is compatible with the PMIP4-CMIP6 LGM experiment, which can also be used as the initialisation state for the fully transient run from 21 ka onwards, provided the ICE-6G_C or GLAC-1D ice sheet reconstructions and associated boundary conditions (orography, coastlines and bathymetry) were used.

| | PMIP4 specifications |
|--------------------------------------|--|
| PMIP4 name | LDv1-LGMspin |
| Astronomical parameters | eccentricity = 0.018994 obliquity = 22.949° perihelion-180° = 114.42° Date of vernal equinox : Noon, 21st March |
| Solar constant | 1361.0 ± 0.51365 W m ⁻² |
| Trace gases | CO₂ = 190 ppm CH₄ = 375 ppb N₂O = 200 ppb CFC = 0 O₃ = Preindustrial (e.g. 10 DU) |
| Ice sheets, orography and coastlines | 21 ka data from either - ICE-6G_C reconstruction [Access to data] - GLAC-1D reconstruction [Access to data] |
| Bathymetry | Keep consistent with the coastlines, using either: - Data associated with the ice sheet - Preindustrial bathymetry |
| Global ocean salinity | + 1 psu, relative to preindustrial |
| All others | As per the PMIP4-CMIP6 LGM experiment |

Transient orbit and trace gases spinup (26-21 ka)

This option for spinning-up the last deglaciation simulation uses transient orbital parameters and trace gases from 26-21 ka.

| | PMIP4 specifications |
|-------------------------|--|
| PMIP4 name | LDv1-transpin |
| Astronomical parameters | All orbital parameters should be transient as per Berger (1978) 26-21 ka [Access to data] |
| Trace gases | All adjusted to the AICC2012 chronology (Veres et al., 2013) 26-21 ka: CO₂ = Transient, as per Bereiter et al. (2015) [Access to data] CH₄ = Transient, as per Loulergue et al. (2008) N₂O = Transient, as per Schilt et al. (2010) |
| All others | As per the LGM (21 ka) spinup type; LDv1-LGMspin |

Transient deglaciation (21-0 ka)

These are the specifications for the full transient run 21-0 ka.

(Note, the period of focus for version 1 of the experiment is 21-9 ka, but all boundary conditions are provided until 0 ka so that groups can extend the run to present if they wish).

| | PMIP4 specifications |
|--------------------------------|--|
| PMIP4 name | LDv1 |
| Initial conditions (pre 21 ka) | Recommended (optional) to use either: - LDv1-LGMspin - LDv1-transpin 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] |
| Solar constant | $1361.0 \pm 0.51365 \text{ W m}^{-2}$ |
| Trace gases | Adjusted to the AICC2012 chronology (Veres et al., 2013) 21-0 ka: CO₂ = Transient, as per Bereiter et al. (2015) [Access to data] CH₄ = Transient, as per Loulergue et al. (2008) N₂O = Transient, as per Schilt et al. (2010) CFC = 0 O₃ = Preindustrial (e.g. 10 DU) |
| Ice sheet | Transient, with a choice of either : - ICE-6G_C reconstruction [Access to data] - GLAC-1D reconstruction [Access to data] 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 |
| Bathymetry | Keep consistent with the coastlines, and otherwise use either: - Data associated with the ice sheet; it is optional how often the bathymetry is updated - Preindustrial bathymetry |
| River routing | Ensure that rivers reach the coastline It is recommended (optional) to use one of the following: - Preindustrial configuration for the model - Transient routing provided with the ice sheet reconstruction (if available) - Manual/model calculation of river network to match topography |

| | PMIP4 specifications |
|-------------------------|--|
| Freshwater fluxes | <p>At participant discretion. Three options are: <i>melt-uniform</i>, <i>melt-routed</i> and <i>no-melt</i>:</p> <ul style="list-style-type: none">- <i>Melt-uniform</i> : use a globally uniform ice meltwater flux, e.g. as associated with one of the ice sheet reconstructions [Access to data]- <i>Melt-routed</i> : use a routed ice meltwater flux, e.g. as associated with one of the ice sheet reconstructions [Access to data]- <i>No-melt</i> : have no ice sheet meltwater in the simulation <p>It is recommended (optional) to run at least one Core simulation with a scenario consistent with the chosen ice sheet reconstruction to conserve salinity.</p> |
| Vegetation & land cover | Prescribed preindustrial cover or dynamic vegetation model |
| Aerosols (dust) | Prescribed preindustrial distribution or prognostic aerosols |

Focused simulations

- Empty
- Empty

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Last update: **2016/06/02 17:35**

