# PMIP4-CMIP6 ice-sheet data

You will find on this page the boundary condition data that you have to use for the Last Glacial Maximum and the Last Deglaciation experiments

Please make sure to read the HOWTO section in order to use the data correctly!

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

| | |
|---|---|
| Masa Kageyama | LGM |
| Ruza Ivanovic | Last Deglaciation |
| Didier Roche | LGM, Last Deglaciation |
| Jean-Yves Peterschmitt | Technical questions |

## How to use the data

- Choose the type of boundary condition you want to use. Look at the available data below, and at the ice-sheet gallery page.
    - Do not forget to document what you have chosen!
- blahblah
- After processing the boundary condition data, send a copy the BC data *as seen by your model* to Jean-Yves Peterschmitt: netCDF file and plot

## Ice-sheet data

The input data for the boundary conditions is available in **netCDF files** provided by Dick Peltier and Lev Tarasov. You will find below some technical details about the data, and the related publications to cite

### Data history

The data files may change a bit (rename or standardize the data, etc...) and you will find the change list below

### Peltier ICE-6G-C for PMIP4

#### Grid

- nb_lat, nb_lon = 1080, 2160 (regular 10 minutes intervals)
- latitude_values = [ -89.91667175, -89.75, -89.58334351, ... 89.58333588, 89.75 , 89.91666412 ]

- longitude_values = [ 0., 0.16666667, 0.33333334, ... 359.5, 359.66668701, 359.83334351 ]
- NO time axis (1 time step per file)

### Time steps and data files

- 48 time steps in 48 files, from 0k to 26k BP : data every 500 years from 0k to 21k BP, then every 1000 years till 26k BP
- file names = `I6_C.VM5a_10min.<time_slice>.nc`
  with <time_slice> in [0, 0.5, 1, ..., 20, 20.5, 21, 22, 23, 24, 25, 26]
- all the variables for the same time step are in the same file

### Variables

- **Topo**: Topography (Point-value altitude), meters
  - on continents: surface altitude (including grounded ice sheet)
  - on ice-free oceans, and where there is floating ice (ice shelves): bathymetry
- **Orog**: Orography (Point-value surface altitude), meters
  - on continents: altitude (including grounded ice sheet)
  - on ice-free oceans: 0.0 (zero)
  - on ice-shelves: surface altitude
- **sftlf**: Point-value Landmask, %
  - values are `0` (not land) or `100` (land)
  - does not include floating ice
- **sftgif**: Point-value Icemask, %
  - values are `0` (not ice) or `100` (ice)
  - floating ice is included

Notes:

- Computing the `sftlf-sftgif` difference yields:
  - 100: where there is land without ice
  - -100: where there is floating ice-sheet
  - 0: elsewhere

### References

Please cite **all** following papers:


- Describe the new Antarctic component of the model: Argus, D.F., Peltier, W.R., Drummond, R. and Moore, A.W. - **The Antarctica component of postglacial rebound model ICE-6G_C (VM5a) based upon GPS positioning, exposure age dating of ice thicknesses, and relative sea level histories**. Geophys. J. Int., 198, 537-563, 2014, 10.1093/gji/ggu140
- Describe the complete model: Peltier, W.R., Argus, D.F. and Drummond, R. (2015) **Space geodesy constrains ice-age terminal deglaciation: The global ICE-6G_C (VM5a) model**. J. Geophys. Res. Solid Earth, 120, 450-487, doi:10.1002/2014JB011176

### Download

You will find below a table with all the available data files, and their *md5sum* checksum (if you want to check that you download was OK, you can just type `md5sum file.nc` and compare the result to what is displayed in the table).

If you want to download a file, click on the ice_sheet download link and then on the file you need

Groups running the lgm experiment have to use the `I6_C.VM5a_10min.sftlf.21_CASPIAN.nc` file, where the Caspian sea has been set to the modern Caspian sea in the land-sea mask variable

| md5sum output | Data file |
|---|---|
| 5ba8c0df48a12132238ffcbf675578e0 | I6_C.VM5a_10min.0.nc |
| 85ab7bf8b90ce0567ada52368c11ddd8 | I6_C.VM5a_10min.0.5.nc |
| c35409318de8d68a8e0731915897e8cd | I6_C.VM5a_10min.1.nc |
| adefdf757b495b0701470ee10539ba2b | I6_C.VM5a_10min.1.5.nc |
| c212e04194ffa3deca47e19d206521fb | I6_C.VM5a_10min.2.nc |
| 5d4194ae75b1d7f5427809f3bc15de0b | I6_C.VM5a_10min.2.5.nc |
| 1e39cba575afc871f8017f04154b4dd8 | I6_C.VM5a_10min.3.nc |
| 1371cc7980cc7f58c6d095b906781dc2 | I6_C.VM5a_10min.3.5.nc |
| cc1b10682a3aad6fece52fa64df7053b | I6_C.VM5a_10min.4.nc |
| 10fa8a511560c8f422c5a49aee3490a4 | I6_C.VM5a_10min.4.5.nc |
| 6e2c7e647dd3870f633f5523fec451eb | I6_C.VM5a_10min.5.nc |
| cb0e2c9ed3d344b0e9f46b8bab2261d6 | I6_C.VM5a_10min.5.5.nc |
| d75beb9612b3281adf48c2c1556e80ed | I6_C.VM5a_10min.6.nc |
| 59f0986a7718bf2501a56f4d78aa82e2 | I6_C.VM5a_10min.6.5.nc |
| 6286cc8b473a8b9eb518d198313165b6 | I6_C.VM5a_10min.7.nc |
| f322a34a64ac22dfac51f51a09de10b2 | I6_C.VM5a_10min.7.5.nc |
| 2e79dd041bd2bb6a2a4cdc60e721bfa1 | I6_C.VM5a_10min.8.nc |
| efdc2808b7b89ca87817f5ec5da70d17 | I6_C.VM5a_10min.8.5.nc |
| dd88ee2889bf4f63ac376ec697d9ad83 | I6_C.VM5a_10min.9.nc |
| 24743df87baf8553526fdc36575e50a1 | I6_C.VM5a_10min.9.5.nc |
| 061a5facad371878e23abf268185e35a | I6_C.VM5a_10min.10.nc |
| 160b84499c8bf45015bdbf9dabbac153 | I6_C.VM5a_10min.10.5.nc |
| 7c01dcc26051ad7c326ac9051c4c405a | I6_C.VM5a_10min.11.nc |
| 6d7161ac4ea2e712b6f9663e5fe21179 | I6_C.VM5a_10min.11.5.nc |
| e742322517320d9ff61c5d9fca8e25b9 | I6_C.VM5a_10min.12.nc |
| a7b16f877df9cdf62d4cc2088d8ab2eb | I6_C.VM5a_10min.12.5.nc |
| 429ed0b9eaceaffda43523e011c01fae | I6_C.VM5a_10min.13.nc |
| e3fb84ae29042592369f260d34b85fea | I6_C.VM5a_10min.13.5.nc |
| 832d4e842fc65dc8e07af40ba551e368 | I6_C.VM5a_10min.14.nc |
| 55ddce7c9e237e17a0fa648cd11deddc | I6_C.VM5a_10min.14.5.nc |
| b6b0a51ff9cfc3f30532e6c0e49592bf | I6_C.VM5a_10min.15.nc |
| a47a49626b6778fa387ccc78831a0025 | I6_C.VM5a_10min.15.5.nc |

| md5sum output | Data file |
|---|---|
| 257b8cd456c7936d2daf4383e92690fe | I6_C.VM5a_10min.16.nc |
| 6c1fe398efeeed143c47d150f0dfeba4 | I6_C.VM5a_10min.16.5.nc |
| 90981cc37069758307d8cdeca9f6b1de | I6_C.VM5a_10min.17.nc |
| f22013d948a4fdd85d8f476574ddab51 | I6_C.VM5a_10min.17.5.nc |
| f4dbbd2742d920e5c0bd324f190885d1 | I6_C.VM5a_10min.18.nc |
| 7a95dc97c4818db719bc1e0008889883 | I6_C.VM5a_10min.18.5.nc |
| 2a6064e417d0b2242956be4ffc4d75f6 | I6_C.VM5a_10min.19.nc |
| 0337c11ea0c15a565d942eec83dce645 | I6_C.VM5a_10min.19.5.nc |
| 516a3530681ba4a7963a5c31a857274f | I6_C.VM5a_10min.20.nc |
| 28bfdccdb9da24aafa5a999ff11e0ee5 | I6_C.VM5a_10min.20.5.nc |
| 9443668583800099ce9e865be90e4ad6 | I6_C.VM5a_10min.21.nc |
| c8a69bd5b3c1d5aa55b361e9b7dea99e | I6_C.VM5a_10min.sftlf.21_CASPIAN.nc |
| dabcbabf06211ccf6bdcdf306a85d3cc | I6_C.VM5a_10min.22.nc |
| da0268feca9fa4d2f2c479e38a72b197 | I6_C.VM5a_10min.23.nc |
| 78b35dd7d1c2d7b39c8eb37feef8ca9b | I6_C.VM5a_10min.24.nc |
| f51db17bc0f90392464df9a0fb83bf59 | I6_C.VM5a_10min.25.nc |
| 489570ddeadd55b3887b43d89f1abfad | I6_C.VM5a_10min.26.nc |

## Tarasov GLAC-1D for PMIP4

### Grid

- nb_lat, nb_lon = 360, 360
- latitude_values = [ -89.75, -89.25, -88.75, ... 88.75, 89.25, 89.75 ]
- longitude_values = [ 0.5, 1.5, 2.5, ... 357.5, 358.5, 359.5 ]
- time axis: see the *Time steps* section below

### Time steps and data files

- 261 time steps in one file, from 0k to 26k : data every 100 years, from 0k to 26k BP
- time_values = [ -26. , -25.9, -25.8, ... -0.2, -0.1, 0. ]
- all the variables and all the time steps are in the same file: `TOPicemsk.GLACD26kN9894GE90227A6005GGrBgic.nc`

### Variables

- **HDC**: GLAC contemp. elevation(masl), meters
  - on continents (including ice sheets) and ice shelves: surface altitude (including ice sheets/shelves)
  - on ice-free ocean: bathymetry
- **HDCB**: GLAC contemp. elevation(masl), bathymetry for floating ice, meters
  - on continents (including ice sheets) and ice shelves: surface altitude (including ice sheets)
  - on ice-shelves: altitude of the bottom of the floating ice
  - on ice-free ocean: bathymetry
- **ICEM**: GLAC ice mask, fraction

    - ice fraction values between 0.0 (no ice) and 1.0 (100% ice)

Notes:

- The land-sea mask can be computed with:
    - HDCB > 0 : ls_mask = 1 (land)
    - HDCB ⇐ 0 : ls_mask = 0 (no land)
- Computing the HDC - HDCB difference yields:
    - ice-shelves thickness where there are ice shelves
    - 0.0 everywhere else

### References

Please cite **all** the following papers:


- L. Tarasov and W. Richard Peltier **Greenland glacial history and local geodynamic consequences**, Geophysical Journal International, 150, 198-229, doi:10.1046/j.1365-246X.2002.01702.x
- Lev Tarasov, Arthur S. Dyke, Radford M. Neal and W.R. Peltier, **A data-calibrated distribution of deglacial chronologies for the North American ice complex from glaciological modeling**, Earth and Planetary Science Letters, Volumes 315–316, 15 January 2012, Pages 30–40, doi:10.1016/j.epsl.2011.09.010
- Robert D. Briggs , David Pollard , Lev Tarasov, **A data-constrained large ensemble analysis of Antarctic evolution since the Eemian**, Quaternary Science Reviews, Volume 103, 1 November 2014, Pages 91–115, doi:10.1016/j.quascirev.2014.09.003
- 4th paper to be added here (Eurasian component)


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