

PMIP4 CESM dust data



The conc data files were updated on February 26th 2019 (see *conc* in the 3D part of the [Variables](#) section below). Make sure you use the correct version of the data!

Contact

Information and data provided by [Samuel Albani](#)

Data files

- each variable for each climate period is in a separate file. In the conc (dust concentration) case, which contains the three-dimensional dust concentration in the atmosphere, ancillary variables are also included in the same file, i.e. those necessary to fully describe the vertical coordinate (lev, ilev, hyai, hybi, hyam, hybm, PS)
- file names = PMIP4_DUST_Al bani_<field>_<expt>.nc
 - field = see [Variables](#) section below
 - expt = PI (pre-Industrial), MH (mid-Holocene) or LGM (Last Glacial Maximum)
 - The gaussian weights file does not depend on the experiment:
PMIP4_DUST_Al bani_gw.nc

Dimensions

- nb_time = 12
 - 12 time steps in each file, corresponding to the climatological monthly averages (with the exception of erod, the soil erodibility variable), indicated as days since 2020-01-01 00:00:00. They are assumed to all have equal weight
 - time = [14, 44, 74, ... 284, 314, 344]
- nb_lat, nb_lon = 192, 288 (0.95 x 1.25 degrees)
 - latitude_values = [-90, -89.05759, -88.11518, ... 88.11518, 89.05759, 90]
 - longitude_values = [0, 1.25, 2.5, ... 356.25, 357.5, 358.75]
- size_bin = 4 (dust particle size classes)
 - dust size bin edges = 0.1, 1.0, 2.5, 5.0, 10.0 µm (diameters)
 - size values = [1, 2, 3, 4]
 - 1 = 0.1-1.0 µm, 2 = 1.0-2.5 µm, 3 = 2.5-5.0 µm, 4 = 5.0-10.0 µm (diameters)
- nb_levels = 26 hybrid sigma-pressure levels
 - only for the conc variable
 - check the PMIP4_DUST_Al bani_conc_<expt>.nc files for details about the hybrid coordinates

Variables

2D dust fields

- **erod**: Soil erodibility
 - soil_erodibility
 - dimensions: [latitude, longitude]
 - units: binary (0 or 1)
 - 0 = non-erodible grid cell
 - 1 = erodible grid cell
- **emis**: Dust emission flux (size-resolved)
 - tendency_of_atmosphere_mass_content_of_dust_dry_aerosol_particles_due_to_emission
 - dimensions: [time, size, latitude, longitude]
 - units: kg m⁻² s⁻¹
- **load**: Dust load (size-resolved)
 - atmosphere_mass_content_of_dust_dry_aerosol_particles
 - dimensions: [time, size, latitude, longitude]
 - units: kg m⁻²
- **aot**: Dust Aerosol Optical Thickness (size-resolved) at 550 nm
 - atmosphere_optical_thickness_due_to_dust_dry_aerosol_particles
 - dimensions: [time, size, latitude, longitude]
 - units: 1 (*unitless*)
- **ddep**: Dust dry deposition flux (size-resolved)
 - tendency_of_atmosphere_mass_content_of_dust_dry_aerosol_particles_due_to_dry_deposition
 - dimensions: [time, size, latitude, longitude]
 - units: kg m⁻² s⁻¹
- **wdep**: Dust wet deposition flux (size-resolved)
 - tendency_of_atmosphere_mass_content_of_dust_dry_aerosol_particles_due_to_wet_deposition
 - dimensions: [time, size, latitude, longitude]
 - units: kg m⁻² s⁻¹
- **rfts**: Dust Direct Radiative Forcing (TOA, SW)
 - toa_net_downward_shortwave_radiative_forcing_due_to_dust_dry_aerosol_particles
 - dimensions: [time, latitude, longitude]
 - units: W m⁻²
- **rftl**: Dust Direct Radiative Forcing (TOA, LW)
 - toa_net_downward_longwave_radiative_forcing_due_to_dust_dry_aerosol_particles
 - dimensions: [time, latitude, longitude]
 - units: W m⁻²
- **rfss**: Dust Direct Radiative Forcing (surface, SW)
 - surface_net_downward_shortwave_radiative_forcing_due_to_dust_dry_aerosol_particles
 - dimensions: [time, latitude, longitude]
 - units: W m⁻²
- **rfsl**: Dust Direct Radiative Forcing (surface, LW)
 - surface_net_downward_longwave_radiative_forcing_due_to_dust_dry_aerosol_particles
 - dimensions: [time, latitude, longitude]
 - units: W m⁻²

3D dust field

- **conc**: Dust concentration (size resolved)

The actual units of the conc variable in the downloadable NetCDF files (**$\mu\text{g m}^{-3}$**) were not consistent with the units listed in the files metadata (**kg m^{-3}**) and the variable description below.



Corrected files (where a scaling factor of $1.e-9$ was applied to the data of the previous files) were uploaded on February 26th March 2019.


The Download section at the end of this page lists both the crossed out md5sum **checksum** of the old files, and the checksum of the new files. The new files also have a new *comment* global attribute saying This file REPLACES the previous file that had a md5sum of xxxxxxxx

- mass_concentration_of_dust_dry_aerosol_particles_in_air
- dimensions: [time, size, lev, latitude, longitude]
- units: kg m-3

The PMIP4_DUST_Al bani_conc_<exp>.nc files also store the ancillary variables necessary to fully describe the vertical coordinate

- **ilev**: hybrid level at interfaces ($1000*(A+B)$)
 - atmosphere_hybrid_sigma_pressure_coordinate
 - dimensions: [ilev]
 - units: 1
 - $p(n,k,j,i) = a(k)*p_0 + b(k)*ps(n,j,i)$
 - a: hyai b: hybi p0: P0 ps: PS
- **PS**: Surface pressure
 - surface_air_pressure
 - dimensions: [time, latitude, longitude]
 - units: Pa
- **hyam**
 - hybrid A coefficient at layer midpoints
- **hybm**
 - hybrid B coefficient at layer midpoints
- **hyai**
 - hybrid A coefficient at layer interfaces
- **hybi**
 - hybrid B coefficient at layer interfaces

References



Please cite **at least one** of the following papers

- Albani, S., Mahowald, N. M., Perry, A. T., Scanza, R. A., Zender, C. S., Heavens, N. G., Maggi, V., Kok, J. F., and Otto-Bliesner, B. L.: **Improved dust representation in the Community Atmosphere Model**, J. Adv. Model. Earth Syst., 6, 541–570, doi:[10.1002/2013MS000279](https://doi.org/10.1002/2013MS000279), 2014.
 - Note: this paper describes the LGM simulation
- Albani, S., Mahowald, N. M., Winckler, G., Anderson, R. F., Bradtmiller, L. I., Delmonte, B., François, R., Goman, M., Heavens, N. G., Hesse, P. P., Hovan, S. A., Kang, S., Kohfeld, K. E., Lu, H., Maggi, V., Mason, J. A., Mayewski, P. A., McGee, D., Miao, X., Otto-Bliesner, B. L., Perry, A. T., Pourmand, A., Roberts, H. M., Rosenbloom, N., Stevens, T., and Sun, J.: **Twelve thousand years of dust: the Holocene global dust cycle constrained by natural archives**, Clim. Past, 11, 869–903, doi:[10.5194/cp-11-869-2015](https://doi.org/10.5194/cp-11-869-2015), 2015.
 - Note: this paper describes the mid-Holocene simulation
- Albani, S., Mahowald, N. M., Murphy, L. N., Raiswell, R., Moore, J. K., Anderson, R. F., McGee, D., Bradtmiller, L., Delmonte, B., Hesse, P. P., and Mayewski, P. A.: **Paleodust variability since the Last Glacial Maximum and implications for iron inputs to the ocean**, Geophys. Res. Lett., 43, doi:[10.1002/2016GL067911](https://doi.org/10.1002/2016GL067911), 2016.
 - Note: this paper describes the pre-Industrial simulation and compares it to the mid-Holocene and LGM simulations in previous papers

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 [PMIP4 CESM dust data download link](#) and then on the file you need.

| md5sum output | Data file |
|---|--------------------------------|
| 8859ab3b77ce01008785b05fec5cc459 | PMIP4_DUST_Al bani_aot_LGM.nc |
| a99c8627d21cdc67ab989437b0808e00 | PMIP4_DUST_Al bani_aot_MH.nc |
| 118d105d29a7da31e5a443fba87c4e96 | PMIP4_DUST_Al bani_aot_PI.nc |
| 0e8fb61f0eea7dd9beb756312ee440cb Do not use files that have the crossed out md5sum below | PMIP4_DUST_Al bani_conc_LGM.nc |
| 5fa086e300324080614db8175b223220 | |
| 3864a144e192eaaa2f0920a32725ac77 Do not use files that have the crossed out md5sum below | PMIP4_DUST_Al bani_conc_MH.nc |
| e7c929737c681bde8cde11198578af9e | |
| 038ccdb03dd0bf34a96c8912d59d9463 Do not use files that have the crossed out md5sum below | PMIP4_DUST_Al bani_conc_PI.nc |
| bf0baa1a003a2d85d306d62e2b5f20f9 | |
| 3727a77888c8809a0f87c8e51e37668b | PMIP4_DUST_Al bani_ddep_LGM.nc |

| md5sum output | Data file |
|-----------------------------------|---------------------------------|
| 568f5f2ecc516a618b27aebbf6ac8475 | PMIP4_DUST_Al bani_ddep_MH.nc |
| 01db9ba162a3ec1f8bd0d0bc2abcc63a | PMIP4_DUST_Al bani_ddep_Pl.nc |
| d29ad13c7508a0389ef0740c83069d1a | PMIP4_DUST_Al bani_emis_LGM.nc |
| 7ecaf8a616bd31ccb600c8162ad8f815 | PMIP4_DUST_Al bani_emis_MH.nc |
| 5eff212c3cfc96bacc119eedfe0ee91e | PMIP4_DUST_Al bani_emis_Pl.nc |
| e14a6ffba0b74a9211ad67e9642b5987 | PMIP4_DUST_Al bani_erosd_LGM.nc |
| 5d6f767abbca1e560a5fc326e828aee1 | PMIP4_DUST_Al bani_erosd_MH.nc |
| 24e8470134020cecdc552afd2ddd425 | PMIP4_DUST_Al bani_erosd_Pl.nc |
| 1cff6720ad615ad97b50842298fd02f51 | PMIP4_DUST_Al bani_gw.nc |
| 6c7f9d1a84c36540b42ea6bb1eeadf59 | PMIP4_DUST_Al bani_load_LGM.nc |
| 76079e93089a87e3fd128b9895db3297 | PMIP4_DUST_Al bani_load_MH.nc |
| 2e121549b158cf9dad1761ea681ca835 | PMIP4_DUST_Al bani_load_Pl.nc |
| e47e21fa07df86629e1de6b38459eae0 | PMIP4_DUST_Al bani_rfsl_LGM.nc |
| 46a397182b1c0324173a0bd84b8bf9b9 | PMIP4_DUST_Al bani_rfsl_MH.nc |
| f9bb094451dd31a8b6d92ba320944307 | PMIP4_DUST_Al bani_rfsl_Pl.nc |
| 1359e872a421df6970da5e3e50f453cd | PMIP4_DUST_Al bani_rfss_LGM.nc |
| cfb9261506308e84d90d1041a8cafb19 | PMIP4_DUST_Al bani_rfss_MH.nc |
| 6b3e529f314775270fd87007c45d4e1b | PMIP4_DUST_Al bani_rfss_Pl.nc |
| a43755b757169c516d2aad9cdfa1456 | PMIP4_DUST_Al bani_rftl_LGM.nc |
| fb7474a2c61668f9f2b5d88199fdf03b | PMIP4_DUST_Al bani_rftl_MH.nc |
| b2de8b84a236764234a9abc9cbd3bbb7 | PMIP4_DUST_Al bani_rftl_Pl.nc |
| dfc96dbbe1bf33fc6f9e0cf7a16b8f2a | PMIP4_DUST_Al bani_rfts_LGM.nc |
| 5ad9e6586b2bc7771a7b1b0688767476 | PMIP4_DUST_Al bani_rfts_MH.nc |
| 98b9b2a122b9b9c86bd432e6d1dac502 | PMIP4_DUST_Al bani_rfts_Pl.nc |
| 182e86d78be48fc5c2c1ec57f13aa021 | PMIP4_DUST_Al bani_wdep_LGM.nc |
| f83c22185608042a92107609f59ef658 | PMIP4_DUST_Al bani_wdep_MH.nc |
| 1dc20b285c666765cf9ea61e53a20549 | PMIP4_DUST_Al bani_wdep_Pl.nc |

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Last update: **2019/11/18 10:44**

