README document for the FLEXPART dust aerosol L4 global daily 1 x 1 degrees V1 (DUSTFLEXPART), available at the GES DISC, https://dx.doi.org://10.5067/3QGSHO836JHP.

File naming convention.
FLEXPART_dust_aerosol_L4_global_daily_1x1_degrees_V1_xxxx.nc, where xxxx refers to year, from 2008 to 2015.

Dataset description. This is a global simulation of mineral dust aerosol concentrations and daily deposition (wet+dry) from the FLEX-ible PARTicle (FLEXPART) Lagrangian particle dispersion model version 10.4 (Pisso et al., 2019) for the years 2008-2015. The FLEXPART model code are open source and freely available at https://www.flexpart.eu/. The source code updates on this web page for FLEXPART version 10.4 are described in Pisso et al. (2019). In the simulations presented here, the model was forced by ERA-Interim meteorological fields from the European Centre for Medium-Range Weather Forecasts (ECMWF) at 1° x 1° spatial and 3-hourly temporal resolution. In addition to dry and wet deposition, FLEXPART accounts for turbulence (Cassiani et al., 2015), unresolved mesoscale motions (Stohl et al., 2005) and includes a deep convection scheme (Forster et al., 2007). Gravitational settling, dry deposition and in-cloud and below-cloud scavenging are also included (Grythe et al., 2017).

Emissions of mineral dust were calculated with the FLEXDUST emission model (Groot Zwaaftink et al., 2016) and include local Arctic sources. Dust aerosols were split in 10 size classes for particles with upper diameters of 0.2, 0.5, 1, 1.5, 2.5, 5, 7.5, 12.5, 15, and 20 μm. Emitted dust is assumed to follow the Kok (2011) size distribution. Details on FLEXPART Arctic dust aerosol distributions are discussed in Groot Zwaaftink et al. (2016) and Zamora et al. (2022). Observations of dust aerosol data in the high Arctic are limited, but comparisons to FLEXPART dust are presented in Groot Zwaaftink et al. (2016; 2017) and in Zamora et al. (2022).

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Dataset usage. Dust aerosol information is provided at daily 1° x 1° resolution with global coverage for the years 2008-2015. Corresponding latitudes (-89.5

to 89.5 degrees North) and longitudes (-178.5 to 180.5 degrees East) for grid cell centers are also provided. Output includes 'Dust daily deposition' and 'Daily dust concentrations', the latter of which has upper vertical layer boundaries of 10, 100, 250, 500, 750, 1000, 1500, 2000, 4000, 6000, 8000, 10,000, 15,000, and 20,000 m above ground level.

Dataset availability. Dust aerosol deposition and concentrations from 2008-2015 are available from the Goddard Earth Sciences Data and Information Services Center (GES DISC; https://dx.doi.org://10.5067/3QGSHO836JHP).

Dataset variables:

- **latitude** an array of latitude centers from -89.5 to 89.5 with each center corresponding to a row of the concentration and deposition grids. Units are degrees north. Dimensions: [180].
- **longitude** an array of longitude centers from -178.5 to 180.5 with each center corresponding to a column of the concentration and deposition grids. Units are degrees east. Dimensions: [360].
- **altitude** an array of upper vertical layer boundaries of 10, 100, 250, 500, 750, 1000, 1500, 2000, 4000, 6000, 8000, 10000, 15000, and 20000 m. Units are meters above ground level. Dimensions: [14].
- **time** an array of time values. Units are days since 1970-01-01 00:00 UTC. Dimensions: [either 365 or 366, depending on the number of days in the year].
- **dust_depo_001, dust_depo_002, dust_depo_003, dust_depo_004, dust_depo_005, dust_depo_006, dust_depo_007, dust_depo_008, dust_depo_009, dust_depo_010** dust daily wet + dry deposition rate grids at 1 x 1 degree resolution for dust bins 1-10, respectively. Dust bin sizes correspond to particles with diameters of 0.2, 0.5, 1, 1.5, 2.5, 5, 7.5, 12.5, 15, and 20 μm, respectively. Units are ng m^{-2}. Each grid has global spatial coverage with grid cell centers from -89.5 to 89.5 degrees north latitude and -178.5 to 180.5 degrees east longitude. Dimensions: [360, 180, 365] or [360, 180, 366] depending on the time array length for each year.
- **dust_conc_001, dust_conc_002, dust_conc_003, dust_conc_004, dust_conc_005, dust_conc_006, dust_conc_007, dust_conc_008, dust_conc_009, dust_conc_010** dust concentration grids for dust bins 1-10, respectively. Output are presented at 1° x 1° horizontal resolution with upper vertical layer boundaries of 10, 100, 250, 500, 750, 1000, 1500, 2000, 4000, 6000, 8000, 10,000, 15,000, and 20,000 m above ground level. Dust bin sizes correspond to particles with diameters of 0.2, 0.5, 1, 1.5, 2.5, 5, 7.5, 12.5, 15, and 20 μm, respectively. Units are ng m^{-3}. Each grid has global spatial coverage with grid cell centers from -89.5 to 89.5 degrees north latitude and -178.5 to 180.5 degrees east longitude. Dimensions: [360, 180, 14, 365] or [360, 180, 14, 366] depending on the time array length for each year.

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