

# Emission Inventories

## Format of emission files

If you are creating new emissions files, please copy the format of existing emissions files to be sure they are used properly by the model. Some key features:

- Emissions files require the 'date' variable, with 'time' dimension (and 'datesec' if you have sub-daily emissions); the model does not use the 'time' variable, but you can include it.
- All 3D (time,lat,lon) variables in the file will be read. If you have a 'total' or 'sum' in addition to individual sectors, all variables will be read and you will have twice the emissions you expected!
- In 'vertical' emissions, you may include whatever vertical structure you want (1 km, 0.25 km, regular or irregular grid), but both 'altitude' and 'altitude\_int' variables must be included.
- The MAM (modal aerosol model) number emissions in the emissions files are in the units of '(particles/cm2/s)(molecules/mole)(g/kg)'. This is because when emissions are read in CAM they are scaled by Avogadro's number and (1kg/1000g), which is needed for most emissions that are read as (molecules/cm2/s). More information available at: [Aerosols section of this wiki](#).

## Combined emission files

Preprepared emission files with all or some of the required source sectors.

Inventory name and reference	Source sectors available	Coverage	Base resolution	CAM-chem resolution	Version	Dates available, temporal resolution
HTAPV2  <a href="#">Janssens-Maenhout et al., 2015</a>	1. Anthro, Ocean, BB 2. Anthro, Ocean	global	0.1° x 0.1°	0.5° x 0.5°  0.9° x 1.25°  1.9° x 2.5°	v2.2	2008, 2010

## Separated emission files

This table lists emissions inventories for anthropogenic and biogenic inventories. Starting with CAM5, multiple emissions files for each species can be read (specified in the namelist). Care must be taken not to forget or double-up on any sources when modifying the emissions list in user\_nl\_cam.

### Anthropogenic

Inventory name and reference	Coverage	Base resolution	CAM-chem resolution	Version	Dates available, temporal resolution	location of files on Cheyenne
Coupled Model Intercomparison Project Phase 6 ( <a href="#">CMIP6</a> ): developed with the Community Emissions Data System (CEDS)  <a href="#">Hoesly et al., GMD, 2018</a>	global	0.5° x 0.5°	0.9°x1.25° (f 09)	v2017-05-18	1750-2014, monthly	/glade/p/cesmdata/cseg/inputdata/atm/cam/chem/emis/
SSPs	global	0.5° x 0.5°	0.9°x1.25° (f 09)		2015-2100, monthly for each decade	/glade/p/cesmdata/cseg/inputdata/atm/cam/chem/emis/
<a href="#">DICE Africa</a>  <a href="#">Marais and Wiedinmyer et al. (2016)</a>	Continental	0.1° x 0.1°	0.9° x 1.25°		2006 and 2013, annual average	
<a href="#">CAMS-GLOB-ANT</a>  <a href="#">Soulié et al. 2023</a>	global	0.1° x 0.1°	0.9°x1.25° (f 09)  ne30np4	4.2_R1.1  4.2  5.1	2008-2020, monthly  2000-2020, monthly  2000-2021, monthly	/glade/campaign/acom/acom-weather/MUSICA/emissions/cams
<a href="#">CAMS-GLOB-ANT_v5.1</a>  merged with <a href="#">CONFORM</a> v2 daily lockdown adjustments for 2020.	global	0.1° x 0.1°	0.9°x1.25° (f 09)	5.1	monthly: 2000-2020  daily: 2020 with lockdown.	/glade/campaign/acom/acom-weather/MUSICA/emissions/cams/CAMS-GLOB-ANTv5.1_with_2020lockdown

[Spreadsheet with more comprehensive information and availability instructions.](#)

## Biomass Burning

Inventory name and reference	Coverage	Base resolution	CAM-chem resolution	Version	Dates available, temporal resolution	location of files on the NCAR HPC filesystem (glade)
Fire INventory from NCAR (FINN) v1.5 (obsolete) <a href="#">Wiedinmyer et al. (2011), GMD</a>	global	Based off of MODIS resolution: 1km	0.9° x 1.25° (f09) ne30	1.5	2002-2019, daily	/glade/p/acom/MUSICA/emissions/finn1.5/
FINNv2.5: MODIS or MODIS+VIIRS <a href="#">Wiedinmyer et al., GMD, 2023</a>	global	1 km	0.9° x 1.25° (f09) ne0CONUSne30x8	2.5	2002-2021	/glade/campaign/acom/acom-weather/MUSICA/emissions/finn2.5/f09/ ./ne0CONUSne30x8/ (only a few years)
FINNv2.5: MODIS or MODIS+VIIRS <a href="https://rda.ucar.edu/datasets/ds312.9/">https://rda.ucar.edu/datasets/ds312.9/</a>	global	0.1° x 0.1°		2.5	2002-2021	/glade/campaign/acom/acom-weather/emmons/emissions_finn/finn2.5_grid_0.1x0.1  (for regridding to other resolutions)
Coupled Model Intercomparison Project Phase 6 (CMIP6) - merge of satellite datasets (GFED4s) with proxies <a href="#">van Marle et al. (2017), GMD</a>	global	GFED: 0.5° x 0.5° Data access: <a href="https://doi.org/10.22033/ESGF/input4MIPs.1117">https://doi.org/10.22033/ESGF/input4MIPs.1117</a>	0.9° x 1.25°	1.2	1750-2015, monthly	/glade/p/cesm/chwg_dev/emmons/CMIP6_emissions_1750_2015_FINAL/
Quick Fire Emissions Dataset (QFED)	global	0.25° x 0.25°	0.9° x 1.25°	2.5	2014-2019, daily	*only CO available for CAM-chem
Composite QFEDv2.5/FINN <sup>1</sup>	global	0.25° x 0.25°	0.9° x 1.25° 0.1° x 0.1° ne30np4 ne0CONUSne30x8	2.5/1.6	Mar. 2000-Jan 2023, daily  Various	/glade/campaign/acom/acom-weather/MUSICA/emissions/qfed2.5_finn/  sub-folders have different resolutions available
Composite QFEDv2.6/FINN <sup>1</sup>  ■ note: 19 days in 2001 were missing files (due to MODIS availability) so started long record in 2002.	global	0.25° x 0.25°  0.1° x 0.1°	0.9° x 1.25° (f09)  0.1° x 0.1° (f01)	2.6/1.6	f09: Jan 1, 2002- Dec 31, 2023, daily  f01: 2020-2023	/glade/campaign/acom/MUSICA/emissions/qfed2.6_finn/
Global Fire Assimilation System (GFAS)  <i>Contains modified Copernicus Atmosphere Monitoring Service Information 2018</i>  <a href="#">Kaiser et al. (2012) BGS</a> <a href="#">Di Giuseppe et al. (2018), ACP</a>	global	0.1° x 0.1°	0.9° x 1.25°	1.2	2014-2017, daily	*only CO available for CAM-chem
Global Fire Emission Dataset (GFED)  <a href="#">van der Werf et al (2017), ESSD</a>	global	0.25° x 0.25°	0.9° x 1.25°	4s	2016-2020, daily  2010-2020, monthly	/glade/campaign/acom/MUSICA/emissions/gfed/  <a href="https://app.globus.org/file-manager?origin_id=66ee0feb-31ab-4268-adf5-6fd29f2e1cde&amp;origin_path=%2F">https://app.globus.org/file-manager?origin_id=66ee0feb-31ab-4268-adf5-6fd29f2e1cde&amp;origin_path=%2F</a>

<sup>1</sup>Composite inventories were created by multiplying CO<sub>2</sub> from the base inventory (QFED) by the FINN emission ratios.

[Spreadsheet with more comprehensive information and availability instructions.](#)

## FINN Emissions

FINNV2.5 emissions are available as text files with emissions for each fire, and as gridded 0.1x0.1 degree files from the [NCAR Research Data Archive \(RDA\)](#). See the [FINN webpage](#) for more information.

To grid the text emissions files, use the 'fire\_emis' gridding program available from: <https://www.acom.ucar.edu/Data/fire/>

You can use this program on casper, with a script such as `/glade/u/home/emmons/EMISSIONS/FINN/script_run_grid_f09.pbs`

## Related Information

[Emission section of the User's Guide.](#)

Change the CAM-chem default input emission files: [see how to implement namelist changes.](#)