

# README FOR FFDAS DATA RETRIEVAL AND VISUALIZATION

This readme pertains to the FFDAS v2.0 visualization and data for download at <http://hpcg.purdue.edu/FFDAS/Map.php>

## General Notes

- Users can map and retrieve the following aggregates and subsets of the FFDAS fossil fuel carbon dioxide emissions data product:
  - Electricity – the FFDAS version 2.0 fossil fuel CO<sub>2</sub> emissions for the electricity production sector only. Units: kgC/m<sup>2</sup>/year.
  - Other – the FFDAS version 2.0 fossil fuel CO<sub>2</sub> emissions for the “other” sector (all other fossil fuel emissions excepting shipping and aviation). Units: kgC/m<sup>2</sup>/year.
  - Total - the FFDAS version 2.0 annual emissions representing the sum of the electricity and “other” sectors. These DO NOT include the EDGAR layers. Units: kgC/m<sup>2</sup>/year.
  - EDGAR shipping – international and domestic shipping. See additional notes below
  - EDGAR aviation – international and domestic aviation. See additional notes below
  - Uncertainty – the FFDAS version 2.0 fossil fuel CO<sub>2</sub> emissions posterior uncertainty values (1 standard deviation) associated with the total emissions. Units: kgC/m<sup>2</sup>/year.
- Version 2.0 of FFDAS fossil fuel carbon emissions include small negative values for some grid cells. This issue will be addressed in the next version of FFDAS. We recommend users zero out the negative values before aggregation/averaging or use of the dataset in models/simulations.
- NOTE on uncertainties: Posterior uncertainties are provided at 0.1 degree resolution. If you are performing analysis with FFDAS at a coarser resolution we do not recommend aggregating the posterior uncertainties. Instead, we suggest regenerating the posterior uncertainties at lower resolution by first, aggregating the ensemble of fluxes originally used to generate the uncertainties at 0.1 degree, then calculating the uncertainty at the coarser resolution. If you would like to perform the recalculation of posterior uncertainties, please contact the FFDAS contacts listed at the end of this document.

## Data Files

Currently there are 4 file formats available for download: netCDF, text, binary, and CSV.

### 1) NetCDF format (.nc)

[NetCDF \(Network Common Data Form\)](#) is machine-independent data format for array-oriented scientific data. The following variables are included in our NetCDF formatted files:

- *latitude*: a vector of numeric values representing the latitude of the center of each grid cell.
- *latitude\_edge*: a vector of numeric values representing the latitude at the NW corner of each grid cell.
- *longitude*: a vector of numeric values representing the longitude of the center of each grid cell.
- *longitude\_edge*: a vector of numeric values representing the longitude at the NW corner of each grid cell.
- *flux*: 2D array of fossil fuel carbon dioxide emissions/uncertainty in units of kgC/m<sup>2</sup>/year.

### 2) Text format (.txt)

Text format is organized as follows:

- The first line contains the total number of grid cells in the longitudinal and latitudinal direction, respectively. These are represented as two positive integer values.
- The second line contains the longitude and latitude values associated with the center of the grid cell in the upper NW corner of the domain grid (the “origin” grid cell). These are represented as two floating-point numbers in degrees. Positive latitude values are in the northern hemisphere, negative latitude values are in the southern hemisphere. Positive longitude values are east of the prime meridian (Greenwich, UK), negative longitude values are west of the prime meridian (Greenwich, UK).
- The third line contains the size of each grid cell in degrees longitude and degrees latitude. These are represented as two floating-point numbers.
- The remaining lines provide the FFCO<sub>2</sub> emission values in each grid cell of the domain with one line for each grid cell. On each line are three values. The first value represents the grid cell center latitude in degrees. The second value represents the grid cell center longitude. The third value represents the fossil fuel carbon dioxide emissions/uncertainty in units of kgC/m<sup>2</sup>/year. These three values are represented as floating-point numbers.

### 3) Binary format (.bin)

The binary format file structure is identical to the text format. Size of all integers and floats is 4 bytes.

### 4) Comma separated value format (.csv)

The .csv format file structure is identical to the text format.

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## EDGAR files

We include the EDGAR aviation and EDGAR shipping fossil fuel CO<sub>2</sub> emissions fields driven by both domestic and international activity. We have regridded these EDGAR emission fields to the FFDAS grid. The original EDGAR datasets can be found at:

<http://edgar.jrc.ec.europa.eu/overview.php?v=42>

These files come from the EDGAR v4.2 category, "CO<sub>2</sub> excluding short-cycle organic carbon from biomass burning" and reflect the following IPCC sectors:

- international and domestic aviation (1A3a)
- international and domestic shipping (1A3d)

Two EDGAR are represented here. The first is "FFDASgrid\_EDGAR\_v42\_CO2\_excl\_short-cycle\_org\_C\_YYYY\_IPCC\_1A3d.0.1x0.1.nc" which includes the EDGAR annual international and domestic shipping on the FFDAS grid (Units: kgC/m<sup>2</sup>/yr). The second is "FFDASgrid\_EDGAR\_v42\_CO2\_excl\_short-cycle\_org\_C\_YYYY\_IPCC\_1A3a.0.1x0.1.nc" which includes the EDGAR annual international and domestic aviation on the FFDAS grid (Units: kgC/m<sup>2</sup>/yr). YYYY designates the emission year. The EDGAR estimates end at the year 2008 and we have linearly extrapolated the estimate at the gridcell level to add the years 2009 to 2010 to the fileset.

EDGAR reference: European Commission, Joint Research Centre (JRC)/Netherlands Environmental Assessment Agency (PBL). Emission Database for Global Atmospheric Research (EDGAR), <http://edgar.jrc.ec.europa.eu>. contact: [edgar-info@jrc.ec.europa.eu](mailto:edgar-info@jrc.ec.europa.eu)

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