FFDAS result fileset readme (version 2.2)

Version 2.2 of the FFDAS results include global fossil fuel CO2 emissions on a 0.1 degree grid for the years 1997-2012. It includes an onroad sector which provides more information to the final results and improves the estimation accuracy.

The following folders are in this directory:

annual/
   this contains the FFDAS version 2.2 annual emissions on the 0.1 degree grid. There is a separate file for each year in addition to a complete time series in a tarball file. These are written in netCDF format. The name convention is "ffdas_flux_YYYY.nc.gz" where YYYY designates the emission year.

   Each file contains the following attributes:

      Flux: a float array of 3600 columns and 1800 rows representing the global annual fossil fuel carbon emissions in units of kgC/m2/year on a 0.1 by 0.1 degree grid.
      LATITUDE: a float array of 1800 values representing latitudes of the center of each grid cell. The range of the values are from -89.9500 to 89.9500 with a 0.1 degree grid spacing.
      LATITUDE_EDGE: a float array of 1801 values representing latitude edges of each grid cell. The range of the values are from -90.0000 to 90.0000.
      LONGITUDE: a float array of 3600 values representing the longitudes of the center of each grid cell. The range of the values are from -179.950 to 179.950 with a 0.1 degree grid spacing.
      LONGITUDE_EDGE: a float array of 3600 values representing longitude edges of each grid cell. The range of the values are from -180.000 to 180.000

   Negative flux values:
      Version 2.2 of FFDAS fossil fuel carbon emissions include 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.

annual/sectors/elec_prod/
      this contains the FFDAS version 2.2 annual output on the 0.1 degree grid for just the electricity production sector. File format identical to base emissions file. Units: kgC/m2/year.

annual/sectors/onroad/
      this contains the FFDAS version 2.2 annual output on the 0.1 degree grid for just the ,Äúonroad,Äù sector (all else). File format identical to base emissions file. Units: kgC/m2/year.

annual/sectors/other/
      this contains the FFDAS version 2.2 annual output on the 0.1 degree grid for just the "other" sector (everything but electricity production and onroad). File format identical to base emissions file. Units: kgC/m2/year.

annual/total_w_av_shp/
      this is the summation of the FFDAS total and the EDGAR aviation and shipping files in order to provide users with an easy single file that should represent the global total fossil fuel CO2 emissions. This is constructed for all years, 1997-2012. EDGAR for 2012 is simply a repeat of 2011. Units: kgC/m2/year.

annual/postuncs/
      this contains the posterior uncertainty values (1 standard deviation) associated with the total FFDAS version 2.2 annual output on the 0.1 degree grid. Units: kgC/m2/year.

annual/postuncs/realizations/
      this contains the 10-member ensembles for the gridded emissions of

each year in the time series (1997-2012). These are used to generate the posterior uncertainty. File format identical to base emissions file. Units: kgC/m2/year.

hourly/
this contains the FFDAS emissions on the 0.1 degree grid but with the monthly, weekly, and hourly fractions present in additional columns. These files are written in csv format. The variables identified in the file are:
- i - the longitudinal index (1-3600). This index starts at the dateline (the left edge of first gridcell is on dateline) and moves in the easterly direction.
- j - the latitudinal index (1-1800). This index starts at the North Pole (the top of the first gridcell is on the pole) and moves in the southerly direction.
- a - grid cell area in square meters (m2).
- f - Carbon emissions per unit area - kgC/m2/year.
- mXX - monthly fractions (from CDIAC). Each value is that month's fractional share of the annual total. The fractions represent January through December.
- wXX - weekly fractions (from TIMES). Each value is that day's fractional share of the week total. The fractions represent Monday through Sunday.
- hXX - hourly fractions (from TIMES). Each value is that hour's fractional share of the day's total. The fractions represent 12 am-1 am through 11 pm-12 am.

hourly/allhours/YYYY/
this contains the FFDAS emissions on the 0.1 degree grid at the hourly timestep. The YYYY folder denotes the year (currently listing 2007-2012). In each of these annual folders, are 365 files in ascii format. There is a separate file for each day of the year (~180 MB each). Each file contains 24 hours of emissions for the global grid. The naming sequence of the file is ,ÄúdXXX.csv,Äù where ,ÄúXXX,Äù represents the day number. The variables identified in the file are:
- i - the longitudinal index (1-3600). This index starts at the dateline (the left edge of first gridcell is on dateline) and moves in the easterly direction.
- j - the latitudinal index (1-1800). This index starts at the North Pole (the top of the first gridcell is on the pole) and moves in the southerly direction.
- hxx - the emission value for each hour xx (1-24) in units of kgC/gridcell/hour.

hourly/total_w_av_ship/allhours/YYYY/
Same as the above fileset but with the aviation and shipping emissions from the EDGAR data product added to the FFDAS results. This currently lists 2007-2012 and is written in netCDF file format. There is a separate file for each day of the year and each file contains 24 hours of fluxes. EDGAR for 2012 is simply a repeat of 2011. Units: kgC/gridcell/hour.

GEOS-chem/
this contains the FFDAS emissions on the two GEOS-chem grids. For the csv formatted files, the monthly, weekly, and hourly fractions are included as additional columns. For the netCDF formatted files, the emissions have the complete time structure embedded in the emission values with some additional smoothing applied to avoid "shocks" assocated with monthly and weekly discretization of the time fractions. More info about the structure and contents of these files can be found in the readme within the 'regrid.time.code.zip' file.

monthly/
this contains the FFDAS emissions on the 0.1 degree grid at a monthly time resolution (no fractions, just monthly emission values). These are written in ascii (.csv) format with a name convention "ffdas.YYYY.monthly.csv.gz". Units: kgC/gridcell/month. The variables identified in the file are:
- i - the longitudinal index (1-3600). This index starts at the dateline (the left edge of first gridcell is on dateline) and moves in the easterly direction.
- j - the latitudinal index (1-1800). This index starts at the North Pole (the top of the first gridcell is on the pole) and moves in the

southerly direction.

mXX - monthly carbon emissions per gridcell. units = kgC/gridcell/month.

The file 'FFDAS_Country_Map.updated.nc' is a netCDF file that contains a 0.1 degree grid of the country maps and boundaries used to create FFDAS fluxes. The netcdf file is in the same format as FFDAS output files. We strongly recommend using this map to extract specific country maps of CO2 fluxes from FFDAS. The netcdf file is accompanied by a list of country code look up table: "FFDAS_Country_lookUpTable.updated.csv". Every country is defined with a code that corresponds to the same codes in the country map grid file.

This work was performed at Arizona State University by Dr. Kevin Robert Gurney, Dr. Salvi Asefi-Najafabady, and at the University of Mebourne - Dr. Peter Rayner. Additional assistance provided by Terry Song (ASU), and Kevin Coltin (ASU).

CONTACTS

Kevin Gurney kevin.gurney@asu.edu