Anthropogenic Greenhouse Gas Emissions

ESSENTIAL CLIMATE VARIABLE (ECV) FACTSHEET

GLOBAL CLIMATE OBSERVING SYSTEM
KEEPING WATCH OVER OUR CLIMATE

WMO IOC International Science Council UN environment

ECV IN BRIEF

Domain:	Terrestrial
Subdomain:	Human Use of Natural Resources
Scientific Area:	Biosphere
ECV Stewards:	Greet Maenhout
Products:	Emissions from fossil fuel use, industry, agriculture and waste sectors; Emissions/ removals by IPCC land categories; Estimated fluxes by inversions of observed atmospheric composition – continental; Estimated fluxes by inversions of observed atmospheric composition – national; Hi-res CO_2 column concentrations to monitor point sources

Anthropogenic Greenhouse Gas Emissions

Global anthropogenic emissions of Greenhouse gases (CO_2, CH_4, N_2O and F-gases) continue to be emitted at an annual rate that is not yet significantly decreasing. The global warming potential of each of the greenhouse gases and their long residence time in the atmosphere are causing increased surface temperature and climate change. The scientific community illustrated with inverse models and data assimilation how consistent the reported inventories and the atmospheric observations are, which is taken up also in few national inventory reports (e.g. UK, Switzerland, Australia).

ECV Product[1]

PRODUCT	DEFINITION	REQUIREMENTS				
		FREQ.	RES.	REQ. MEAS. UNCERT.	STAB.	STANDARDS/ REFERENCES
Emissions from fossil fuel use, industry, agriculture and waste sectors	Anthropogenic emissions according to IPCC guidelines	Annual	By country and sector	Globally 5%; Nationally 10%		IPCC (2006); IPCC (2013)

[1] Current Products and Requirements as in the Implementation Plan 2016 (GCOS-200). GCOS is reviewing and will update the requirements until 2022. More information on: gcos.wmo.int and climatedata.wmo.int.

Emissions/ removals by IPCC land categories	Anthropogenic emissions and removals from the LULCF category according to IPCC guidelines	Annual	By country/ region	Globally 15%; Nationally 20%		IPCC (2006); IPCC (2013)
Estimated fluxes by inversions of observed atmospheric composition – continental	GHG emission/ removals (modelled using inversion of atmospheric composition), continental scale	Annual	1000 - 10,000 km	10%		
Estimated fluxes by inversions of observed atmospheric composition - national	GHG emission/ removals (modelled using inversion of atmospheric composition), national scale	Annual	100-1000 km	30%		
Hi-res CO2 column concentrations to monitor point sources	Spatially resolved GHG emission plume around local source	4 hourly	1 km	1ppm		

Data Sources[2]

- United Nations Framework Convention on Climate Change inventory data
  http://wgms.ch/ http://di.unfccc.int/time_series
- Emissions Database for Global Atmospheric Research (Edgar)
  http://edgar.jrc.ec.europa.eu/s/
- Open-Data Inventory for Anthropogenic Carbon dioxide (ODIAC)
  http://db.cger.nies.go.jp/dataset/ODIAC/
- Carbon Dioxide Information Analysis Center
  https://cdiac.ess-dive.lbl.gov/
- The Global Carbon Project (GCP)
  https://www.globalcarbonproject.org/
- Open-Data Inventory for Anthropogenic Carbon dioxide (ODIAC)
  http://db.cger.nies.go.jp/dataset/ODIAC/
- Community Emissions Data System (CEDS)
  http://www.globalchange.umd.edu/ceds/
- FLUXNET
  https://fluxnet.ornl.gov/fluxnetdb

Global CO_2 Emissions

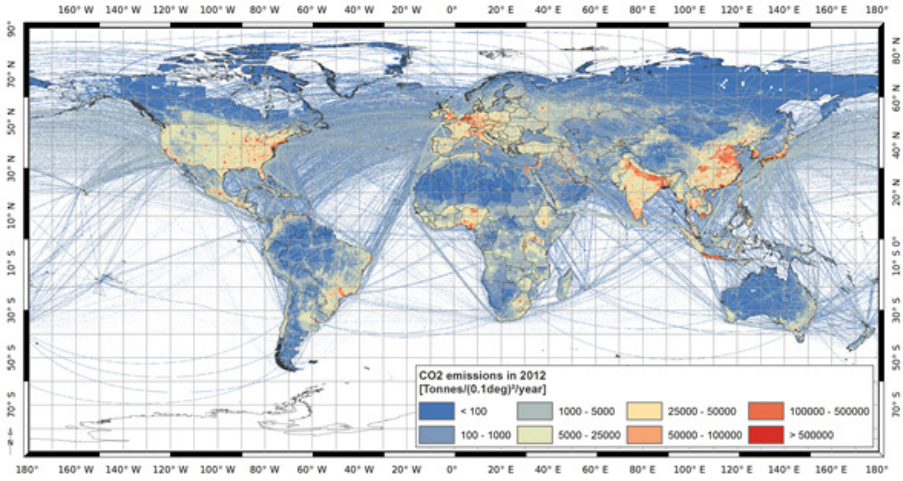

Figure: Gridded total CO2 emissions of EDGARv4.3.2 from anthropogenic sources excluding the land use, land-use change and forestry sectors for 2012 of Janssens-Maenhout et al. (2019).

[2] This list provides sources for openly accessible data sets with worldwide coverage for which metadata is available. It is curated by the respective GCOS ECV Steward(s). The list does not claim to be complete. Anyone with a suitable dataset who would like it to be added to this list should contact GCOS.