Method for generating a global spatially distributed agriculture greenhouse gas (GHG) emissions layer in equivalents on carbon dioxide (CO_2e)

In order to generate a global spatially distributed Ag-GHG emissions layer, this work used the GHG emissions layers from agricultural practices for the year of 2015 of the Emissions Database for Global Atmospheric Research (EDGAR) of the Joint Research Center (JRC). For better data handling, the memos were converted from NetCDF (Network Common Data Form) format to GeoTIFF using a Python language together with the GDAL (Geospatial Data Abstraction Library) raster and vector processing library.

Next, data layers emissions were converted into CO_2 equivalent (CO_2e) by multiplying CH_4 and N_2O emissions by their respective global warming potential (GWP) of the 5th IPCC Assessment Report (IPCC, 2014): CO_2 * 1, CH_4 emission * 28 and N_2O emission * 265. Finally, it was performed the conversion of values from kg / m^2s-1 (base unit of EDGAR data) to Gigaton / cell area (~ $120km^2$) / year (Figure 1).
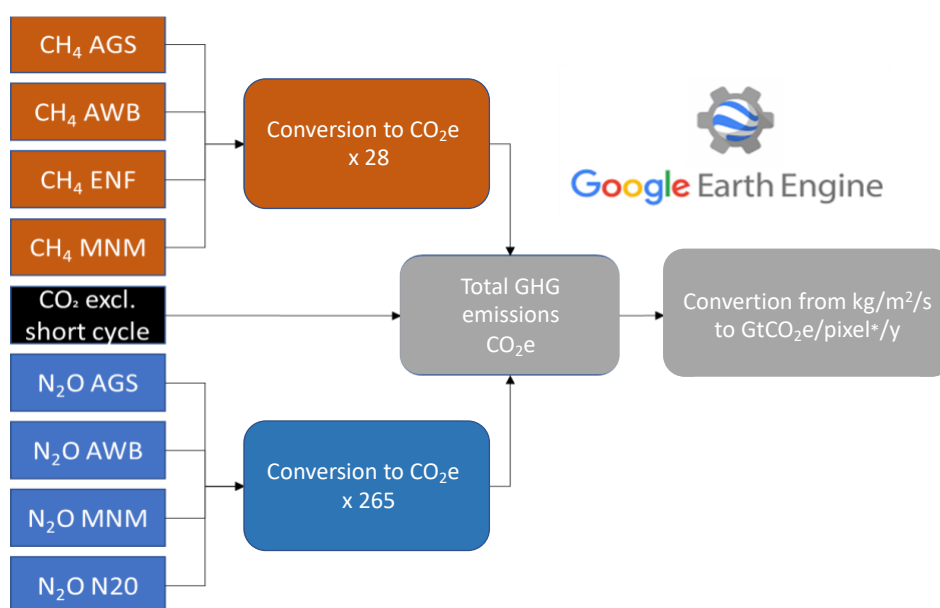

Figure 1. Flowchart exemplifying EDGAR v5.0 GHG (Greenhouse Gases) Emission data processing.

CH_4 AGS: methane emissions from agricultural soils (paddy rice);
CH_4 AWB: methane emissions from agricultural waste burning;
CH_4 ENF: methane emissions from enteric fermentation;
CH_4 MNM: methane emissions from manure management;
CO_2 excl. short cycle: carbon dioxide emissions from lime and urea application to soils;
N_2O AGS: nitrous oxide emissions from agricultural soils;
N_2O AWB: nitrous oxide emissions from agricultural waste burning;
N_2O MNM: nitrous oxide emissions from manure management
N_2O N2O: indirect nitrous oxide emissions from agriculture; *~$120km^2$

Estimates of CO_2e were carried out using total emission values and above the 80th, 85th, 90th and 95th percentiles for countries present in the boundaries provided by the GADM (Global Administrative Area Database) and, aiming at the inclusion of emissions from offshore sources or near the sea, an extension of the limits of coastal countries by 0.1 degrees (~11km) was carried out. Emission estimates were also performed for pasture and agriculture areas, climate hazards, value of production, population and their respective intersections by country.