Dataset Information:	
Title	**Cultivation of Organic soils**
Abstract	The FAOSTAT domain "Cultivation of Organic soils" contains estimates of nitrous oxide (N_2O) emissions associated with the drainage of organic soils – *histosols* – under cropland and grazed grassland. Data is computed geospatially, using Tier 1 default factors of the 2006 IPCC Guidelines for National GHG Inventories (IPCC, 2006). Estimates are available by country, with global coverage and relative to the period 1990–2017 and projections for 2030 and 2050.
Supplemental	The FAOSTAT domain "Cultivation of Organic soils" disseminates N_2O emissions, implied emission factors and underlying activity data. GHG estimates are available in Gg of N_2O as well as in Gg CO_2eq. Data are available for all countries and territories listed in FAOSTAT and for standard FAOSTAT regional aggregations, plus Annex I and non-Annex I groups. FAOSTAT emissions are estimated by FAO and may not coincide with GHG data reported by member countries to UNFCCC. The database is intended primarily as a service to help member countries assess and report their emissions, as well as a useful international reference.
Creation Date	2012
Last Update	2019
Data Type	Climate Change - Greenhouse Gases
Category	Agriculture; Environment
Time Period	1990–2017, projections to 2030 and 2050
Periodicity	Annual
Geographical Coverage	World
Spatial Unit	Country aggregations from geospatial processing
Language	Multilingual (EN, FR, ES)

Methodology and Quality Information:	
Methods and processing	***Overview*** The FAOSTAT domain "Cultivation of Organic soils" contains estimates of N_2O emissions associated with the drainage of organic soils – *histosols* – under cropland and grazed grassland. Estimates are computed at Tier 1 following IPCC, 2006, Vol. 4, Ch. 11. Activity data and emissions are estimated at pixel level, applying the general formula: GHG = *A* * *EF* where: *GHG* = Annual emissions, in units of kg N_2O–N yr^{-1}; *A* = Activity data, corresponding to the annual area of drained organic soils, in hectares. *EF* = Tier 1, default IPCC emission factors, expressed in units of kg N_2O–N ha^{-1}. Uncertainties in estimates of GHG emissions are due to uncertainties in emission factors, activity data, as well as in the underlying land cover maps used. More detailed information is available in the IPCC guidelines (IPCC, 2006: Vol. 4, Ch. 5, Section 5.2.3.5). Relevant discussion on methods and uncertainties are available in Tubiello et al. (2016). ***Data sources*** Data are obtained through the stratification of the following spatial datasets: *i.* The Harmonized World Soil Database (HWSD-FAO *et al*., 2012). This map is used to estimate the area covered by *histosols*, the latter used as proxy, as per IPCC guidelines, for organic soils.

Methods relevant to the development and use of this spatial layer are discussed in Tubiello et al. (2016) for previous comparable GHG estimates.

ii. Annual land cover maps (for the period 2000-2015) produced by the Catholic University of Louvain Geomatics as part of the Climate Change Initiative of the European Spatial Agency (CCI UCL Geomatics, 2017). The methodology follows primarily a land cover perspective as in the FAOSTAT domain Agri-environmental Indicators "Land Cover" domain.

The cropland area is identified from the CCI-LC yearly maps, applying specific proportions to pixel area in the relevant land cover categories (Table 1).

Table 1. Percentage shares applied to compute the area of Cropland from the CCI-LC classes

CLASS CODE	LABEL	CROPLAND SHARE BY PIXEL
10	Cropland, rainfed	85%
11	Cropland, rainfed, herbaceous cover*	
12	Cropland, rainfed, tree or shrub cover*	
20	Cropland, irrigated or post-flooding	
30	Mosaic cropland (>50%) / natural vegetation (tree, shrub, herbaceous cover) (<50%)	60%
40	Mosaic natural vegetation (tree, shrub, herbaceous cover) (>50%) / cropland (< 50%)	40%

*Level 2 detail of the original CCI-LC legend / where available, regional information.

Likewise, grassland and shrubland cover are identified from CCI-LC yearly maps, applying specific proportions to pixel area in the relevant land cover categories (Table 2).

Table 2. Percentage shares applied to compute the area of Grassland and Shrubland from the CCI-LC classes

CLASS CODE	LABEL	GRASSLAND SHARE BY PER PIXEL
130	Grassland	100% herbaceous cover
140	Lichens and mosses	
120	Shrubland	
121	Evergreen shrubland*	
122	Deciduous shrubland*	
30	Mosaic cropland (>50%) / natural vegetation (tree, shrub, herbaceous cover) (<50%)	30% (20% herbaceous + 10% shrub cover)
40	Mosaic natural vegetation (tree, shrub, herbaceous cover) (>50%) / cropland (< 50%)	40% (20% herbaceous + 20% shrub cover)
100	Mosaic tree and shrub (>50%) / herbaceous cover (<50%)	55% (30% herbaceous + 35% shrub cover)
110	Mosaic herbaceous cover (<50%) / tree and shrub (>50%)	80% (60% herbaceous + 20% shrub cover)
10	Cropland rainfed	5% natural herbaceous cover
11	Herbaceous crops*	

*Level 2 detail of the original CCI-LC legend / where available, regional information

iii. The presence of grazing animals is derived from the spatial distribution of cattle, sheep and goats as mapped in the Gridded Livestock of the World (Robinson et al, 2014). Animal numbers by pixel were first converted in Livestock Units (LU) using the same coefficients as in the domain "Livestock Patterns" of FAOSTAT Agri-environmental Indicators. Pixels with LU values equal or higher than 0.1 (Critchley et al., 2008; Worrall and Clay, 2012) are superimposed to the other spatial layers to identify the grazed grasslands on organic soils.

Estimates of areas of drained organic soils were thus obtained as the area of non-zero overlap between the two maps defined in *i, ii, and iii* above. For instance in the case of cropland, the estimates are computed for the area of overlap of histolsols and cropland as land cover and with the underlying assumption that organic soils must be drained to allow for crop cultivation activities. In the case of grassland, it is assumed that the trampling of grazing animals on organic soils is associated with drainage and C release from degraded organic soils.

Land cover information is sourced from yearly maps in the period 2000–2015. Values backward to 1990 are filled from the 2000 estimates. Values for 2016, 2017 and for the 2030 and 2050 projections are those of the latest available year (2015).

Emission factors (EF)

The EF values are those specified in IPCC, 2006: Vol. 4, Ch. 11, Tab. 11.1. EF values are climate dependent, and were allocated at pixel level to the relevant climatic zone, as defined in IPCC, 2006: Vol. 4, Ch. 3, Annex 3A.5. The map of climate zones used in the analysis has been developed by the Joint Research Centre of the European Commission (JRC, IPCC climatic zones), following the IPCC guidelines.

The analysis was carried out geospatially in a Geographic Information System (GIS) environment, combining the above datasets. GHG estimates made at pixel level were subsequently aggregated at country level, using the FAO Global Administrative Unit Layers (GAUL) dataset.

Dimensionless conversion factors:

44/28, to convert from kg N_2O-N to kg N_2O;
10^{-6}, to convert from kg to Gg; and

Global Warming Potential (GWP):
GWP-N_2O = 310 (100-year time horizon), to convert Gg N_2O to Gg CO_2eq (IPCC, 1996: Technical Summary, Tab. 4 page 22).

References

Joint Research Centre of the European Commission, IPCC Climatic Zones. Available at: https://esdac.jrc.ec.europa.eu/projects/renewable-energy-directive

IPCC **1996**. Climate Change 1995 - The Science of Climate Change: Contribution of Working Group I to the Second Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press. Available at: https://www.ipcc.ch/ipccreports/sar/wg_I/ipcc_sar_wg_I_full_report.pdf

IPCC **2006**. 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (Eds), IGES, Hayama, Japan. Available at: http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html

Critchley, C., Adamson, H., McLean, B., Davies, O., **2008**. Vegetation dynamics and livestock performance in system-scale studies of sheep and cattle grazing on degraded upland wet heath. Agriculture, ecosystems & environment 128, 59–67.

FAO/IIASA/ISRIC/ISSCAS/JRC, **2012**. Harmonized World Soil Database (version 1.2). FAO, Rome, Italy and IIASA, Laxenburg, Austria. Available at: http://www.fao.org/soils-portal/soil-survey/soil-maps-and-databases/harmonized-world-soil-database-v12/it/

Worrall, F., Clay, G.D., **2012**. The impact of sheep grazing on the carbon balance of a peatland. Science of the Total Environment 438, 426–434.

	Robinson, T.P., Wint G.R.W., Conchedda G., Van Boeckel T.P., Ercoli V., Palamara E., Cinardi G., D'Aietti L., Hay S.I., and Gilbert M., **2014**. "Mapping the Global Distribution of Livestock." PloS One 9 (5): e96084. Available at: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0096084 Tubiello, N.F., Biancalani, R., Salvatore, M., Rossi, S., Conchedda, G., **2016**. A Worldwide Assessment of Greenhouse Gas Emissions from Drained Organic Soils. *Sustainability* 2016, *8* (4). Available at: http://www.mdpi.com/2071-1050/8/4/371 Land Cover CCI Product User Guide Version 2.0, **2017**. UCL Geomatic (Université catholique de Louvain; Friederich-Schille-Universität Jena; Wageningen University; Max-Planck-Institut für Meteorologie; JRC European Commission; Met Office. Deliverable ref: D3.3. Belgium. Available from: http://maps.elie.ucl.ac.be/CCI/viewer/download/ESACCI-LC-Ph2-PUGv2_2.0.pdf.
Data Collection Method	Computed
Completeness	100%
Useful links	http://www.fao.org/economic/ess/environment/en/ http://www.ipcc-nggip.iges.or.jp/public/ http://maps.elie.ucl.ac.be/CCI/viewer/

Distribution Information:	
Owner	FAO
Provider	FAO
Source	FAO
Copyright Policy	Content on www.fao.org, its affiliated websites and specific pages (collectively "the FAO website") is protected by copyright. To ensure wide dissemination of its information, FAO is committed to making its content freely available and encourages the use, reproduction and dissemination of the text, multimedia and data products presented. Except where otherwise indicated, content may be copied, printed and downloaded for private study, research and teaching purposes, or for use in non-commercial products or services, provided that appropriate acknowledgement of FAO as the source and copyright holder is given and that FAO's endorsement of users' views, products or services is not stated or implied in any way. FAO encourages unrestricted use of news releases provided on the FAO website, and no formal permission is required to reproduce these materials. All requests for translation and adaptation rights, and for resale and other commercial use rights should be addressed to copyright@fao.org or submitted via the online Licence Request Form when downloading.
Citation	FAO, 2019. FAOSTAT Emissions Database, Agriculture, Cultivation of Organic Soils http://www.fao.org/faostat/en/#data/GV
Acknowledgements	The FAOSTAT Emissions database is developed and maintained with FAO Regular Programme funding under Strategic Programme SO2. Initial support was kindly provided by Norway and Germany under Trust Funds GCP/GLO/286/GER and GCP/GLO/325/NOR.