

Dataset Information:

Title	Crop residues
Abstract	Greenhouse Gas (GHG) emissions from crop residues consist of nitrous oxide gas from decomposition of nitrogen in crop residues left on managed soils. Computed at Tier 1 following the 2006 IPCC Guidelines for National GHG Inventories (IPCC, 2006); available by country, with global coverage and relative to the period 1990 onwards, with annual updates.
Supplemental	<p>This domain contains data on GHG emissions, associated emission factors and underlying activity data.</p> <p>The FAOSTAT Emissions data are estimates by FAO and do 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 benchmark. The FAOSTAT Emissions data are disseminated publicly to facilitate continuous feedback from member countries.</p>
Creation Date	2012
Last Update	2013
Data Type	Climate Change - Greenhouse Gases
Category	Environment
Time Period	1990 onwards
Periodicity	Annual
Geographical Coverage	World
Spatial Unit	Country
Language	Multilingual (EN, FR, ES)

Methodology and Quality Information:

Methods and processing	<p>Greenhouse gas (GHG) emissions from crop residues consist of direct and indirect nitrous oxide (N₂O) emissions from nitrogen (N) in crop residues and forage/pasture renewal left on agricultural fields by farmers. Specifically, N₂O is produced by microbial processes of nitrification and de-nitrification taking place on the deposition site (direct emissions), and after volatilization/re-deposition and leaching processes (indirect emissions). The FAOSTAT data are estimated at Tier 1 following IPCC, 2006, Vol. 4, Ch. 2 and 11.</p> <p><u>Direct</u> emissions are estimated at country level, using the formula:</p> $Emission = A * EF$ <p>where:</p> <p><i>Emission</i> = GHG emissions in units of kg N₂O yr⁻¹;</p> <p><i>A</i> = Activity data, representing the total amount of N in crop residues in kg N yr⁻¹ (1);</p> <p><i>EF</i> = Tier 1, default IPCC emission factors, expressed in kg N₂O-N/kg N yr⁻¹ (2).</p> <p>(1) Crop yield and harvested area are taken from FAOSTAT (domain: Production) and used to estimate the amount of biomass N in above and below-ground residues by crop and by country, using IPCC, 2006: Vol.4, Ch. 11, Eq. 11.6 default crop values in Tab. 11.2. In a few cases where default parameters were not provided (N content of below-ground residues for Rice and Millet, and Ratio of below-ground residues to above-ground biomass for Millet, Sorghum, Rye, and Drybean) the correspondent default values for crops with similar biophysical characteristics were used. The crops used include: wheat, maize, rice, barley, millet, oats, rye, sorghum, soybeans, potatoes, dry beans. This biomass N amount is then reduced by the fraction of crop residue burnt on site—assumed to be 10% by area, following IPCC, 2000: Ch. 4, Section 4A.2.1.1 —with specified combustion coefficients by crop, as per IPCC, 2006: Vol.4, Ch. 2, Tab. 2.6. Finally, all N in crop residues, net of amount burnt, is assumed to remain on the field, as per IPCC, 2006: Vol.4, Ch. 11, Eq. 11.6.</p> <p>(2) Global default EF values taken from IPCC, 2006: Vol. 4, Ch. 11, Tab. 11.1.</p>
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Indirect emissions are estimated at country level, using the formula:

$Emission = A * EF$ where:

$Emission$ = GHG emissions, in units of Gg N₂O yr⁻¹;

A = Activity data, representing the fraction of N in crop residues forage/pasture renewal that is lost through runoff and leaching in kg N yr⁻¹ (3);

EF = Tier 1, default IPCC emission factors, expressed in kg N₂O-N / kg N yr⁻¹ (4).

(3) Obtained through the leaching factor in IPCC, 2006: Vol.4, Ch. 11, Tab. 11.3.

(4) Global IPCC default EF values from IPCC, 2006: Vol.4, Ch. 11, Tab. 11.1.

Dimensionless conversion factors used are:

10⁻³, to convert the activity data from kg to tonnes;

44/28, to convert the emissions from kg N₂O-N to kg N₂O gas;

10⁻⁶, to convert the emissions from kg N₂O to Gg N₂O; and

GWP-N₂O = 310 (100-year time horizon global warming potential), to convert Gg N₂O to Gg CO₂eq (IPCC, 1996: Technical Summary, Tab. 4 pg. 22).

The crop residues domain contains the following data categories available for download: country-level GHG emissions, provided as total, direct and indirect amounts in both Gg N₂O and Gg CO₂eq; implied emission factors; and activity data. Data are available for all countries and territories, as well as for standard FAOSTAT regional aggregations, plus Annex I and non-Annex I groups. The data period is 1990 onwards, with annual updates.

Uncertainties in estimates of GHG emissions are due to uncertainties in emission factors and activity data. They may be related to, inter alia, natural variability, partitioning fractions, lack of spatial or temporal coverage, spatial aggregation. In the case of crop residues more detailed information is available in the guidelines (IPCC, 2006: Vol.4, Ch. 11, Section 11.2.1.4 for direct emissions, and Section 11.2.2.4 for indirect emissions).

Key References

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.

IPCC. 2000. Good practice guidance and uncertainty management in national greenhouse gas inventories. In: J. Penman et al. (Eds.), IPCC National Greenhouse Gas Inventories Programme, Technical Support Unit, Hayama, Japan.

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.

Data Collection Method	Computed
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Completeness	100%
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Links	www.fao.org/climatechange/micca/ghg/ www.ipcc-nggip.iges.or.jp/public/
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