SUPPLEMENTARY INFORMATION

Multi-gas and multi-source comparison of six global land use emission databases and AFOLU estimates in the Fifth Assessment Report

Short title: AFOLU database comparisons

Authors affiliation:

Rosa Maria Roman-Cuesta[1,2]*, Martin Herold[2], Mariana C. Rufino[1], Todd S. Rosenstock[3], Richard A. Houghton[4], Simone Rossi[5], Klaus Butterbach-Bahl[6,7], Stephen Ogle[8], Benjamin Poulter[9], Louis Verchot[10,11], Christopher Martius[1].

[1] Center for International Forestry Research (CIFOR), P.O Box 0113 BOCBD, Bogor 16000, Indonesia.

[2] Laboratory of Geo-Information Science and Remote Sensing - Wageningen University. Droevendaalsesteeg 3, 6708PB. Wageningen. The Netherlands.

[3] World Agroforestry Centre (ICRAF). PO Box 30677-00100, Nairobi. Kenya.

[4] Woods Hole Reseach Center. 149 Woods Hole Road Falmouth, MA, 02540-1644, US.

[5] Global Environmental Monitoring Unit, Institute for Environment and Sustainability, European Commission, Joint Research Centre, TP. 440 21020 Ispra, Varese 21027, Italy,

[6] International Livestock Research Institute (ILRI) P.O. Box 30709. Nairobi 00100, Kenya

[7] Karlsruhe Institute of Technology, Institute of Meteorology and Climate Research (IMK-IFU), Garmisch-Partenkirchen, Germany

[8] Natural Resource Ecology Laboratory, Campus Delivery 1499, Colorado State University, Fort Collins, Colorado 80523-1499, USA.

[9] Ecosystem Dynamics Laboratory. Montana State University. P.O. Box 172000. Bozeman, MT 59717-2000. USA.

[10] International Center for Tropical Agriculture, Km17 Recta Cali-Palmira, Apartado Aéreo 6713, Cali, Colombia.

[11] Earth Institute Center for Environmental Sustainability, Columbia University, New York, USA.

* Corresponding author. Telephone:+31317485919, Fax: Email: rosa.roman@wur.nl

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	Deforestation	**Wood Harvesting**	**Fire on forests**	**Enteric Fermentation and Manure management**	**Cropland soils**	**Drained histosols**	**Rice**
Hotspots (CO2, CH4, N2O)	Harris *et al.,* (2012) Gross emissions AGB + BGB Hansen *et al.,* (2010) forest cover loss x Saatchi *et al.,* (2012) biomass.	Poulter *et al.,* Fuelwood Industrial roundwood AGB	Van der Werf *et al.,* (2010) for: Peatland fires Forest fires Woodland fires AGB + Soils	Herrero *et al.,* (2013)	Ogle *et al.,* (2013) Synthetic and organic fertilization, residue N. Mineralization and asymbiotic fixation.	Tier 1 Emission Factors (20 $tC.ha^{-1}$)x Masked organic soil agricultural areas for the six crop types considered in Ogle et al. (2013)	Li *et al.,* (2013) Gross emissions and gross removals

FAOSTAT (CO2, CH4, N2O)	Emissions/Land use/Forest Land/ • Net forest conversion AGB + BGB	Forestry Production and Trade/* • Woodfuel non-conifer • Woodfuel conifer • Woodfuel residues • Woodfuel charcoal • Industrial roundwood AGB	Emissions/Land Use/ Burning-Biomass/** • Humid tropical forests • Other forests • Organic soils AGB + Soils	Emissions/Agriculture/ • Enteric Fermentation • Manure Management	Emissions/Agriculture/ • Manure applied to Soils • Manure left on Pastures • Synthetic Fertilizers • Crop Residues	Emissions/land Use/Cropland • Cropland Organic Soil	Emissions/Agriculture/ • Rice Cultivation
EDGAR-	Global Emissions	na	Global	Global	Global Emissions	na	Global

JRC (CO2, CH4, N2O)	EDGAR v4.2 FT2010/CO2-excluding-short-cycle-organic-C/V4.2 FT2010/ • Forest fire decay (5F2)		Emissions EDGAR v4.2 FT2010/CO2-excluding-short-cycle-organic-C/CH4&N2O *** • Forest fires (5A) • Wetland/peat fires and decay (5D)	Emissions EDGAR v4.2 FT2010/CH4&N2O/V4.2 FT2010/ • Enteric Fermentation of cattle (4A) • Manure Management of cattle (4B)	EDGAR v4.2 FT2010/N2O/V4.2 FT2010/ • Direct agricultural emissions (4D)		Emissions EDGAR v4.2 FT2010/CH4/V4.2 FT2010/ • Rice Cultivation (4C)
EPA Non-CO2 only (CH4, N2O)				DataAnnex_Global_NonCO2_Projections_Dec2012.xls	DataAnnex_Global_NonCO2_Projections_Dec2012.xls	na	DataAnnex_Global_NonCO2_Projections_Dec2012.xls

				• Enteric Fermentation • Manure Management	• Agricultural soils		• Rice emissions
Houghton (CO_2 only)	Global_land-use_flux-1850_2005.xls S+C America Trop.Africa S+SE Asia Net C emissions result from:	Shifting cultivation in Latin America/ tropical Asia, and wood harvest, AGB, BGB, soil, CWD, litter					

	Gross emissions from deforestation, biomass burning, harvested wood products, woody debris decay, SOC from cultivated soils. Gross sinks from forests recovering from wood harvest, and forests in the fallow cycle of shifting cultivation						

Baccini	Gross emissions AGB Hansen *et al.*, (2010) forest cover loss x Baccini *et al.*, (2012) biomass	Gross emissions AGB for: • Wood harvesting • Biomass burning • Shifting cultivation					

* Wood fuel:Coniferous Non-Coniferous Roundwood that will be used as fuel for purposes such as cooking, heating or power production. It includes wood harvested from main stems, branches and other parts of trees (where these are harvested for fuel) and wood that will be used for the production of charcoal (e.g. in pit kilns and portable ovens), wood pellets and other agglomerates. The volume of roundwood used in charcoal production is estimated by using a factor of 6.0 to convert from the weight (mt) of charcoal produced to the solid volume (m3) of roundwood used in production. It also includes wood chips to be used for fuel that are made directly (i.e. in the forest) from roundwood. It excludes wood charcoal, pellets and other agglomerates. It is reported in cubic metres solid volume underbark (i.e. excluding bark).

Industrial roundwood: Coniferous Non-Coniferous of which non-tropical of which tropical All roundwood except wood fuel. In production statistics, it is an aggregate comprising sawlogs and veneer logs; pulpwood, round and split; and other industrial roundwood. It is reported in cubic metres solid volume underbark (i.e. excluding bark). The customs classification systems used by most countries do not allow the division of Industrial Roundwood trade statistics into the different end-use categories that have long been recognized in production statistics (i.e. sawlogs and veneer logs, pulpwood and other industrial roundwood). Thus, these components do not appear in trade.

**Greenhouse Gas (GHG) emissions from burning of biomass consist of methane and nitrous oxide gases from biomass combustion of forest land cover classes 'Humid and Tropical Forest' and 'Other Forests', and of methane, nitrous oxide, and carbon dioxide gases from combustion of organic soils. Emissions are computed at Tier 1 following the 2006 IPCC Guidelines for National GHG Inventories. They are available by country, with global coverage and relative to the period 1990 to present, with annual updates.

*** "CO2-excluding-short-cycle-organic-C/" was then changed by CH4, and N2O on the selectable tabs in EDGAR-JRC's web data portal.

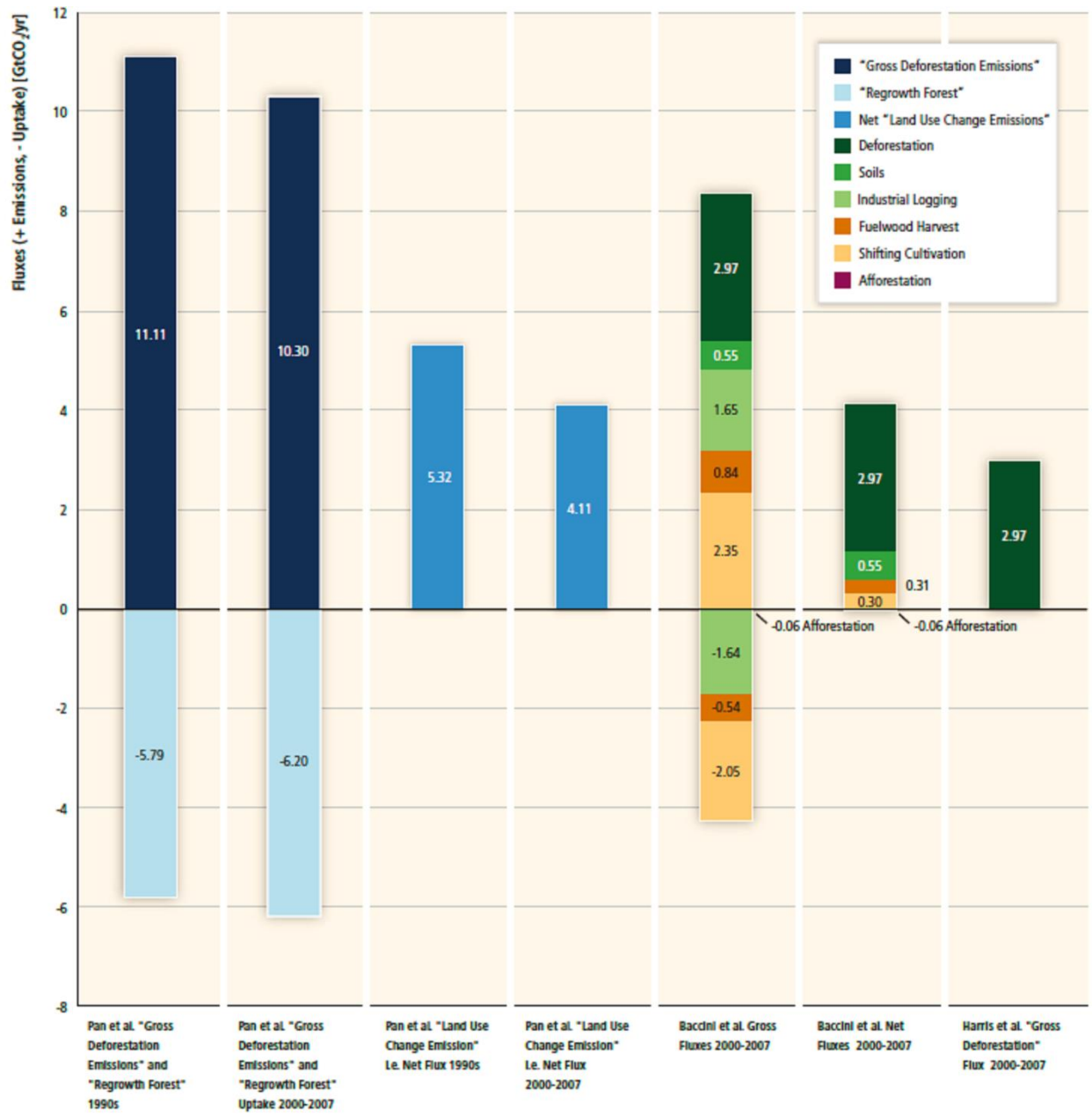

Figure S1: Gross tropical FOLU emissions as exposed in Fig. 11.8 in Chapter 11 of WGIII, IPCC AR5. Source:

https://www.ipcc.ch/pdf/assessmentreport/ar5/wg3/ipcc_wg3_ar5_chapter11.pdf

Table 11.1 | Net global CO_2 flux from AFOLU.

	1750–2011			1980–1989			1990–1999			2000–2009		
	Cumulative $GtCO_2$			$GtCO_2$/yr			$GtCO_2$/yr			$GtCO_2$/yr		
IPCC WGI Carbon Budget, Table 6.1[a]:												
Net AFOLU CO_2 flux[b]	660	±	293	5.13	±	2.93	5.87	±	2.93	4.03	±	2.93
Residual terrestrial sink[c]	−550	±	330	−5.50	±	4.03	−9.90	±	4.40	−9.53	±	4.40
Fossil fuel combustions and cement production[d]	1338	±	110	20.17	±	1.47	23.47	±	1.83	28.60	±	2.20
Meta-analyses of net AFOLU CO_2 flux:												
WGI, Table 6.2[e]				4.77	±	2.57	4.40	±	2.20	2.93	±	2.20
Houghton et al., 2012[f]				4.18	±	1.83	4.14	±	1.83	4.03	±	1.83

Notes: Positive fluxes represent net emissions and negative fluxes represent net sinks.

(a) Selected components of the carbon budget in IPCC WGI AR5, Chapter 6, Table 6.1.

(b) From the bookkeeping model accounting method of Houghton (2003) updated in Houghton et al., (2012), uncertainty based on expert judgement; 90 % confidence uncertainty interval.

(c) Calculated as residual of other terms in the carbon budget.

(d) Fossil fuel flux shown for comparison (Boden et al., 2011).

(e) Average of estimates from 12 process models, only 5 were updated to 2009 and included in the 2000–2009 mean. Uncertainty based on standard deviation across models, 90 % confidence uncertainty interval (WGI Chapter 6).

(f) Average of 13 estimates including process models, bookkeeping model and satellite/model approaches, only four were updated to 2009 and included in the 2000–2009 mean. Uncertainty based on expert judgment.

Fig S2: Table 11.1 on net AFOLU balances in Chapter 11 of WGIII, IPCC AR5. Source:

https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_chapter11.pdf

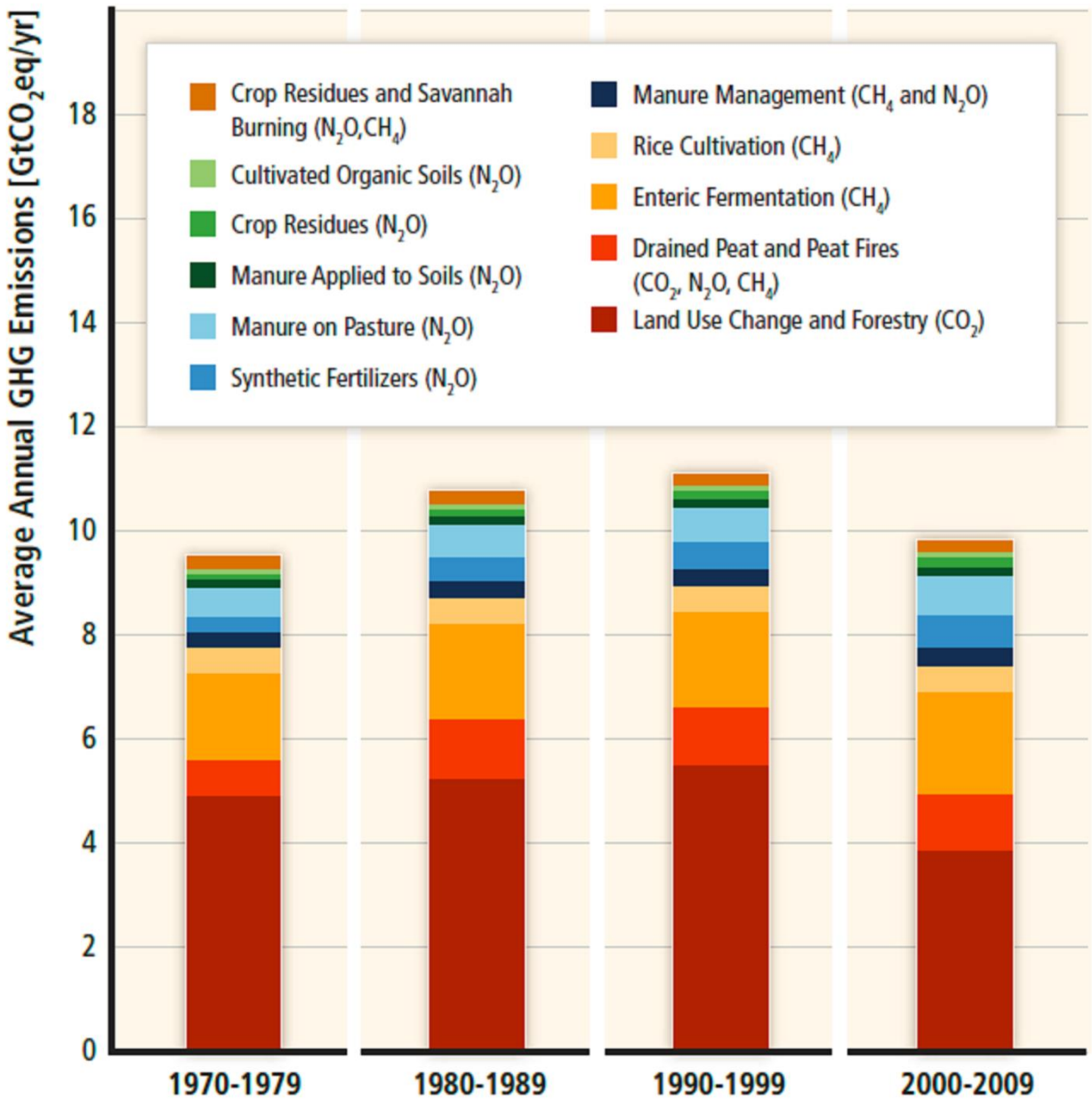

Fig S3: Net global AFOLU emissions for different decades as published in Fig. 11.2 in Chapter 11 of WGIII, IPCC AR5. Source: https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_chapter11.pdf