

Supplement of Earth Syst. Sci. Data, 17, 1121–1152, 2025  
<https://doi.org/10.5194/essd-17-1121-2025-supplement>  
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Earth System  
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*Supplement of*

## **Global greenhouse gas reconciliation 2022**

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Supplementary Information

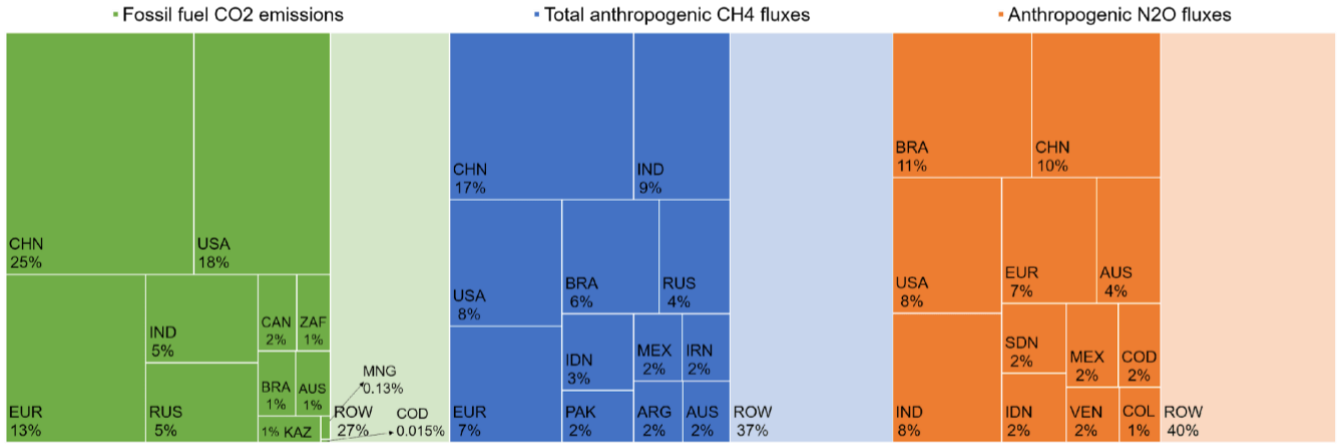


Fig S1. Portion of selected countries' emissions to global fossil CO<sub>2</sub> emissions (green blocks), anthropogenic CH<sub>4</sub> emissions (blue blocks), and anthropogenic N<sub>2</sub>O emissions (red blocks).

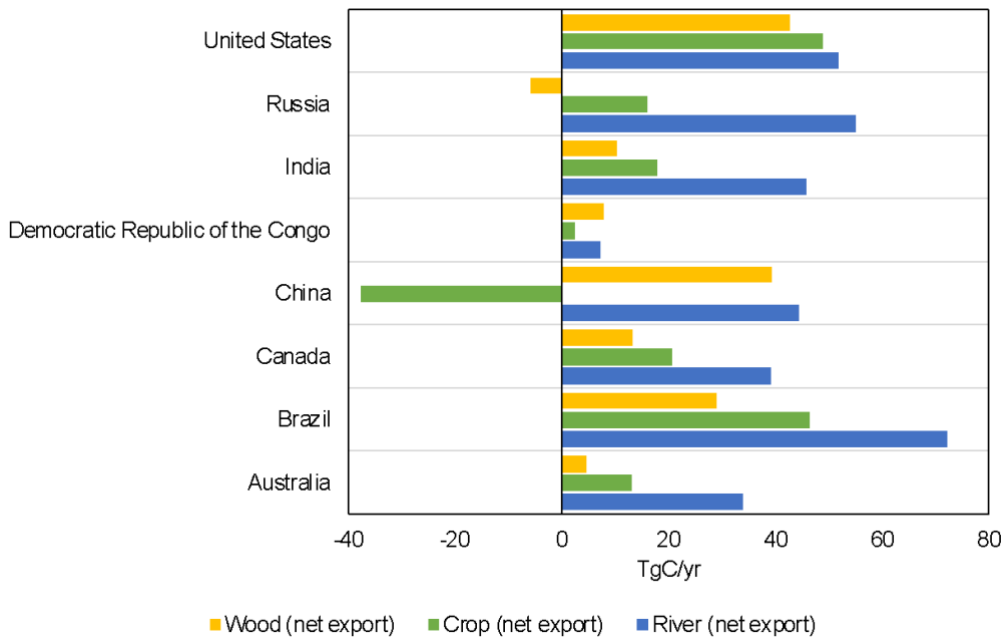


Fig S2. National annual lateral CO<sub>2</sub> flux from wood (yellow bars) and crop (green bars) trade and from river transportation (blue bars) from selected countries.

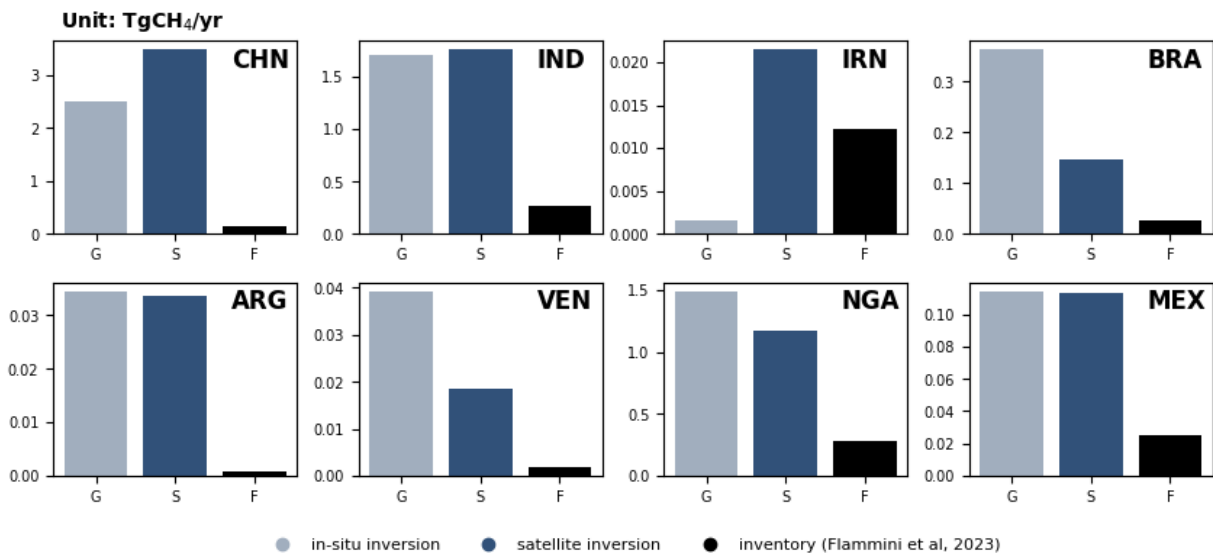
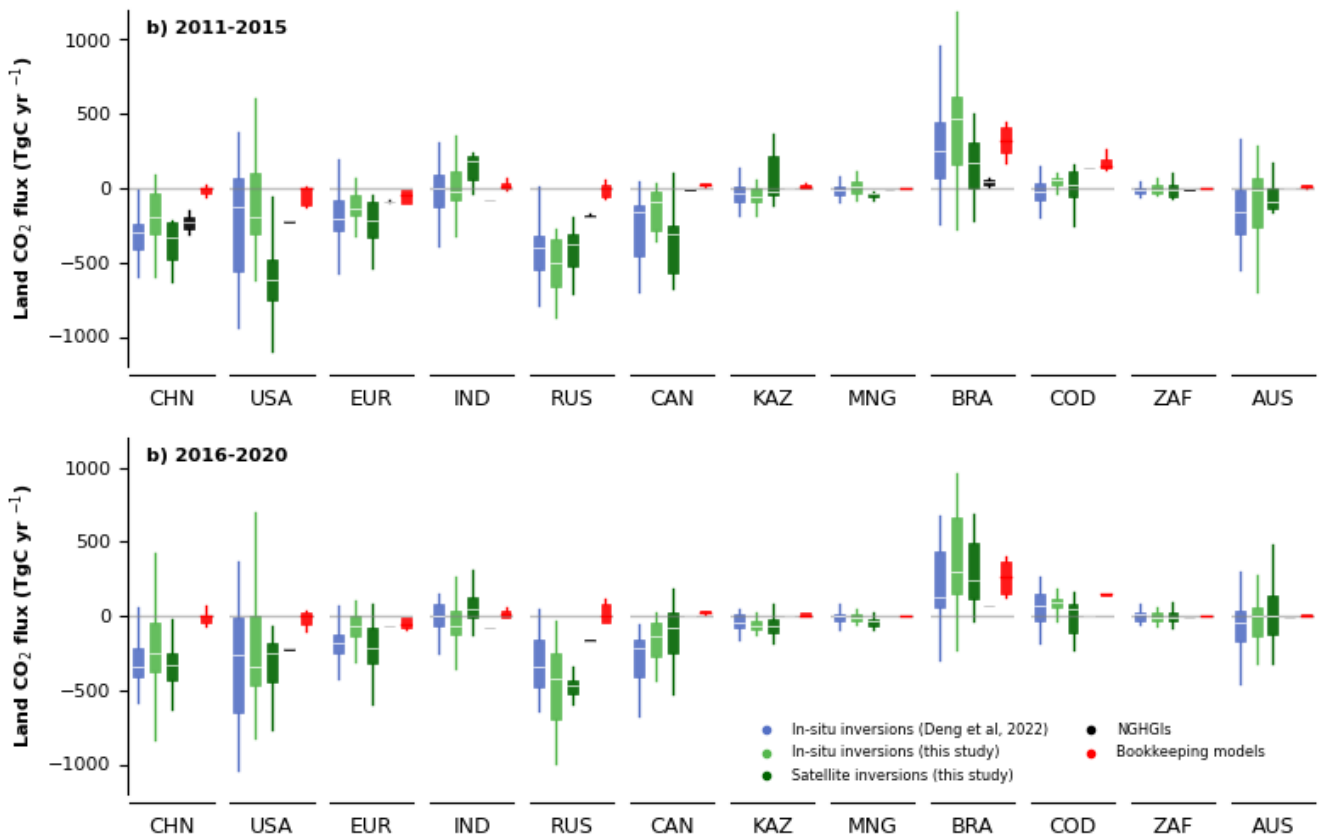


Fig S3. Comparison of the adjusted CH<sub>4</sub> inversion flux from the biomass and biofuel burning sector (after excluding wildfires in this study, G: in-situ inversion ensembles; S: satellite-based inversion ensembles) with the bottom-up calculated wood fuel

*emissions from Flammini et al. (2023) (F). The analysis includes eight countries: China (CHN), India (IND), Iran (IRN), Brazil (BRA), Argentina (ARG), Venezuela (VEN), Nigeria (NGA), and Mexico (MEX). The wood fuel emissions reported by Flammini et al. are generally lower than our estimated emissions. This discrepancy can be attributed to the broader scope of our methane inversion results. Flammini et al. estimate wood fuel emissions for 125 countries using the UNSD Energy Statistics database, focusing specifically on the non-renewable biomass fraction utilized in cooking. In contrast, our study encompasses a wider range of emissions, including anthropogenic sources such as agricultural residues and dung cakes, while excluding wildfires. This methodological difference likely accounts for the observed variations in emissions estimates.*



**Fig S4.** Net CO<sub>2</sub> land fluxes during the period of a) 2011-2015; and b) 2016-2020 in China (CHN), United States (USA), European Union (EUR), Russia (RUS), Canada (CAN), Kazakhstan (KAZ), Mongolia (MNG), India (IND), Brazil (BRA), Democratic Republic of the Congo (COD), South Africa (ZAF), and Australia (AUS). The red boxes denote the national land use change emissions from three global bookkeeping models (i.e., BLUE, H&N2017 and OSCAR) from (Friedlingstein et al., 2023) Other legends are same as Fig 8.

**Table S1.** Glossary of country abbreviations.

Gas	Super Sector	Country List
CO <sub>2</sub>	Net Land Flux	AUS: Australia, BRA: Brazil, CAN: Canada, CHN: China, COD: Democratic Republic of the Congo, EUR: European Union, IND: India, KAZ: Kazakhstan, MNG: Mongolia, RUS: Russia, USA: United States, ZAF: South Africa
CH <sub>4</sub>	Anthropogenic	ARG: Argentina, AUS: Australia, BRA: Brazil, CHN: China, EUR: European Union,

**IDN:** Indonesia,  
**IND:** India,  
**IRN:** Iran,  
**MEX:** Mexico,  
**PAK:** Pakistan,  
**RUS:** Russia,  
**USA:** United States

*Fossil*

**CHN:** China,  
**EUR:** European Union,  
**GULF:** Gulf countries (Saudi Arabia + Oman + United Arab Emirates + Kuwait + Bahrain + Iraq + Qatar),  
**IDN:** Indonesia,  
**IND:** India,  
**IRN:** Iran,  
**KAZ&TKM:** Kazakhstan + Turkmenistan,  
**MEX:** Mexico,  
**NGA:** Nigeria,  
**RUS:** Russia,  
**USA:** United States,  
**VEN:** Venezuela

*Agriculture and Waste*

**ARG:** Argentina,  
**BGD:** Bangladesh,  
**BRA:** Brazil,  
**CHN:** China,  
**EUR:** European Union,  
**IDN:** Indonesia,  
**IND:** India,  
**MEX:** Mexico,  
**PAK:** Pakistan,  
**RUS:** Russia,  
**THA:** Thailand,  
**USA:** United States

**N<sub>2</sub>O**     *Anthropogenic*

**AUS:** Australia,  
**BRA:** Brazil,  
**CHN:** China,  
**COD:** Democratic Republic of the Congo,  
**COL:** Columbia,  
**EUR:** European Union,  
**IDN:** Indonesia,  
**IND:** India,  
**MEX:** Mexico,  
**SDN:** Sudan,  
**USA:** United States,  
**VEN:** Venezuela

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