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The LULUCF Data Hub: regional- and national-level discrepancies between independent global datasets and national GHG inventories.

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Land use plays a critical role in achieving the Paris Agreement goals, yet inconsistencies between global carbon models, Earth Observation (EO), and national greenhouse gas inventories (NGHGIs) lead to significant mismatches in CO emission estimates. NGHGIs, reported by countries using IPCC guidelines, guide national policies, while global models and satellite-based Earth Observation estimates support independent evaluations. Ensuring comparability among these datasets is essential.

Here we introduce the LULUCF Data Hub, an interactive platform hosted by the EU Forest Observatory to visualize CO emissions and removals as reported by countries to the UNFCCC, alongside independent global land-use emission datasets. NGHGI data indicate a global net LULUCF sink of -2.3 Gt CO yr¹ (on average 2000-2023), with declining deforestation emissions and increasing forest sinks. For total LULUCF, a good agreement emerges between the translated results from the Global Carbon Budget (GCB 2024, representing the modelling scientific community) and NGHGIs at global level, both in magnitude – with the original gap of 7.2 Gt CO_2 yr^{-1}

(2000-2022 average) reduced to 0.8 Gt CO^2 yr^{-1} – and trend. When combining estimates for forest and deforestation, the translated results from Global Forest Watch (GFW, representing the EO scientific community in this study) also show a similar magnitude than NGHGI, but a divergent trend.

While the translation methodology used here effectively addresses conceptual differences among the studied datasets at the global level and for most countries, we highlight regions and countries where disagreements in estimates persist. We provide insights into possible reasons for these discrepancies and indicate areas where further research is warranted. The ultimate objective of the LULUCF data hub is to stimulate dialogue and foster collaborative efforts across different communities to reach a greater consensus on the magnitude and trends of land use emissions and removals, in support of the implementation of the Paris Agreement and in anticipation of the next UNFCCC Global Stocktake.