

Table S1. Colombia 2023 methane emissions

Sector	Hancock et al. (2026)	This work
Total	8.9 (8.7–9.1)	11.0 (9.8–11.9)
Total Anthropogenic	3.2 (3.1–3.2)	3.2 (3.1–3.3)
Livestock	2.0 (1.9–2.1)	2.0 (2.0–2.1)
Waste	0.76 (0.74–0.76)	0.79 (0.73–0.86)
Oil/Gas	0.16 (0.14–0.16)	0.24 (0.22–0.25)
Reservoirs	0.096 (0.076–0.13)	0.12 (0.08–0.14)
Coal	0.094 (0.085–0.095)	0.1 (0.1–0.11)
Other Anthropogenic	0.066 (0.064–0.066)	0.066 (0.061–0.075)
Rice	0.036 (0.035–0.039)	0.031 (0.03–0.033)
Total Natural	6.0 (5.7–6.2)	7.6 (6.3–8.5)
Wetlands	5.7 (5.5–6.0)	7.2 (5.9–8.1)
Termites	0.18 (0.18–0.18)	0.35 (0.34–0.35)
Open Fires	0.050 (0.048–0.053)	0.049 (0.049–0.052)
Seeps	0.021 (0.019–0.022)	0.021 (0.02–0.022)

Colombia Anthropogenic Emissions

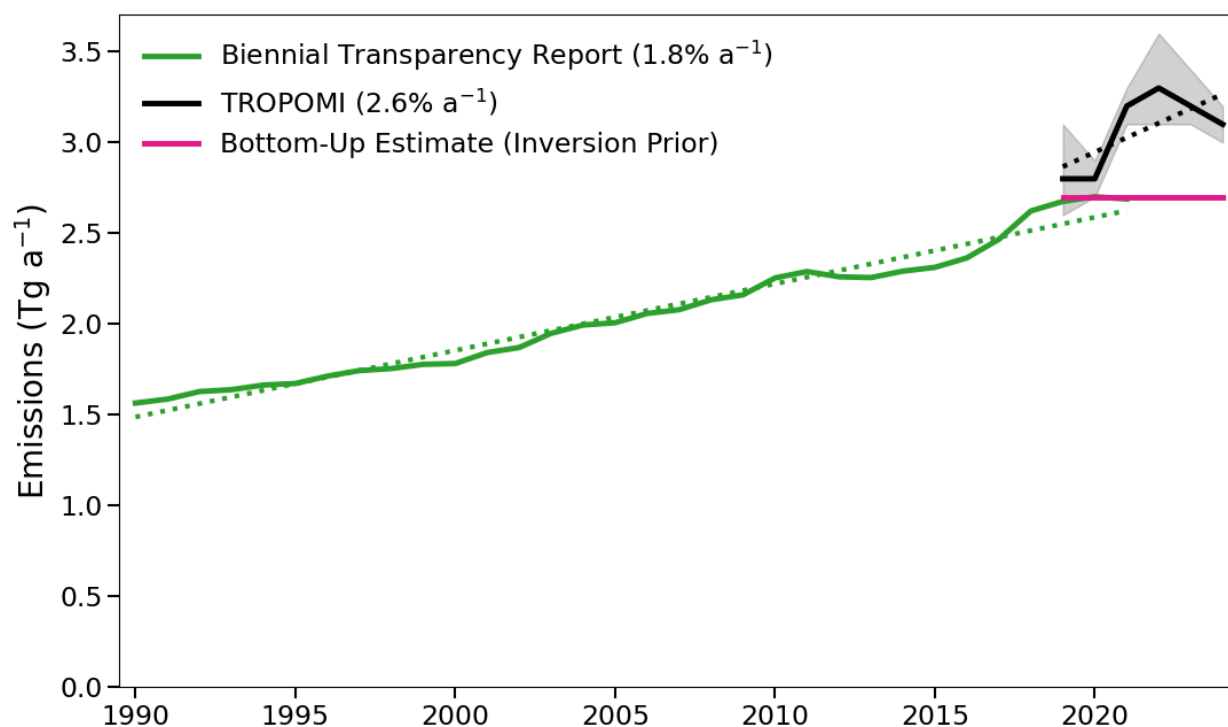


Figure S1: Total anthropogenic methane emissions in Colombia from the Biennial Transparency Report (BTR; green) compared to TROPOMI-based posterior inversion estimates (black) and the bottom-up prior used in the inversion (pink). Shaded regions denote posterior uncertainty. Linear trend lines are shown for the BTR and posterior estimates, with corresponding trends of $1.8\% \text{ a}^{-1}$ and $2.6\% \text{ a}^{-1}$, respectively. The posterior estimates exceed the prior and indicate a more rapid increase in anthropogenic emissions over recent years.

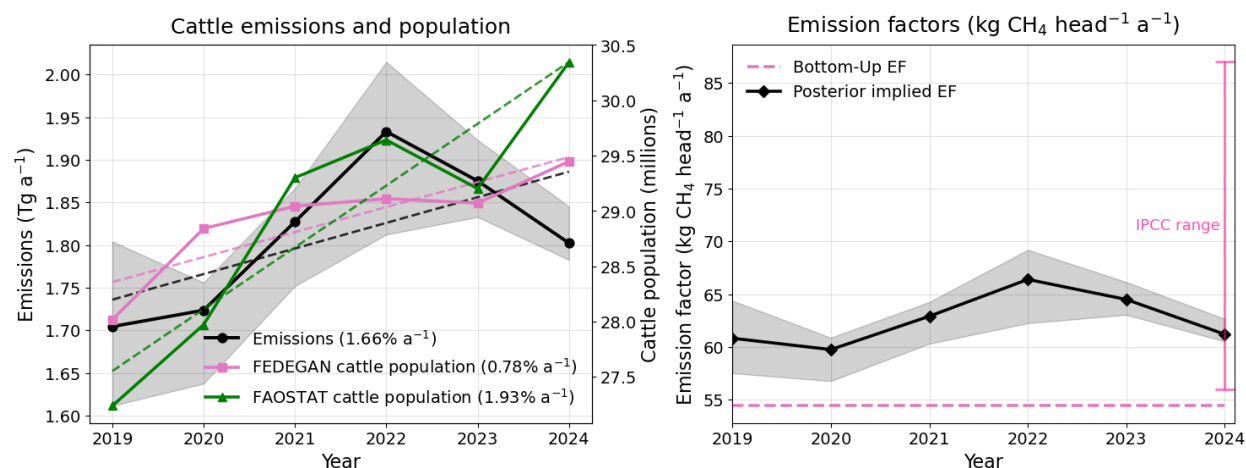
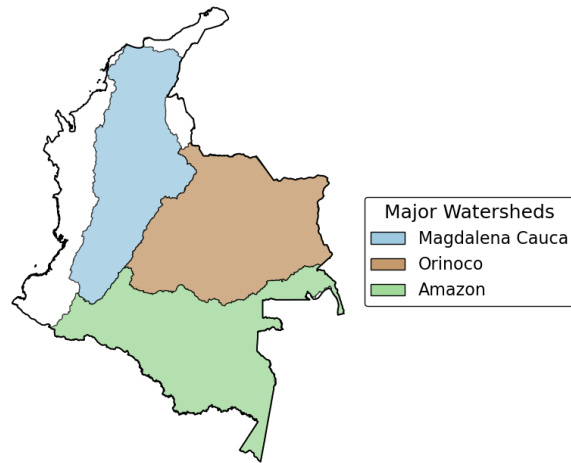


Figure S2: (Left) Posterior livestock methane emissions (black) over 2019–2024 compared to national cattle population estimates (green), with shaded regions indicating posterior uncertainty. Emissions increase in parallel with cattle populations and peak in 2022. (Right) Annual mean enteric fermentation emission factors inferred from the posterior (black) compared to bottom-up values (pink dashed line) and the IPCC default range (pink shading). Posterior emission factors ($60\text{--}65 \text{ kg CH}_4 \text{ head}^{-1} \text{ a}^{-1}$) are consistently higher than bottom-up estimates but show no significant temporal trend, indicating that the observed increase in livestock emissions is driven by population growth rather than changes in emission factors.

Table S2: Correlations between posterior wetland emissions and hydrologic variables



<i>Variable</i>	Magdalena Cauca			Orinoco			Amazon		
	<i>Lag</i>	<i>r</i>	<i>Trend Match</i>	<i>Lag</i>	<i>r</i>	<i>Trend Match</i>	<i>Lag</i>	<i>r</i>	<i>Trend Match</i>
Total Water Storage	1	0.87	Yes	2	0.79	Yes	3	0.6	Yes
Root Zone Soil Moisture	1	0.83	Yes	2	0.78	Yes	3	0.5	Yes
Surface Soil Moisture	2	0.81	Yes	2	0.77	Yes	3	0.49	Yes
Inundation	1	0.78	No	2	0.75	No	4	0.49	Yes
Precipitation	3	0.5	No	3	0.67	No	3	0.32	No
Heterotrophic Respiration	-3	0.49	Yes	-4	0.75	Yes	-4	0.35	No
Temperature	-8	0.21	Yes	-4	0.25	No	-2	0.15	No