



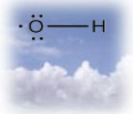

Update on Non-CO_2 Emissions and Budgets

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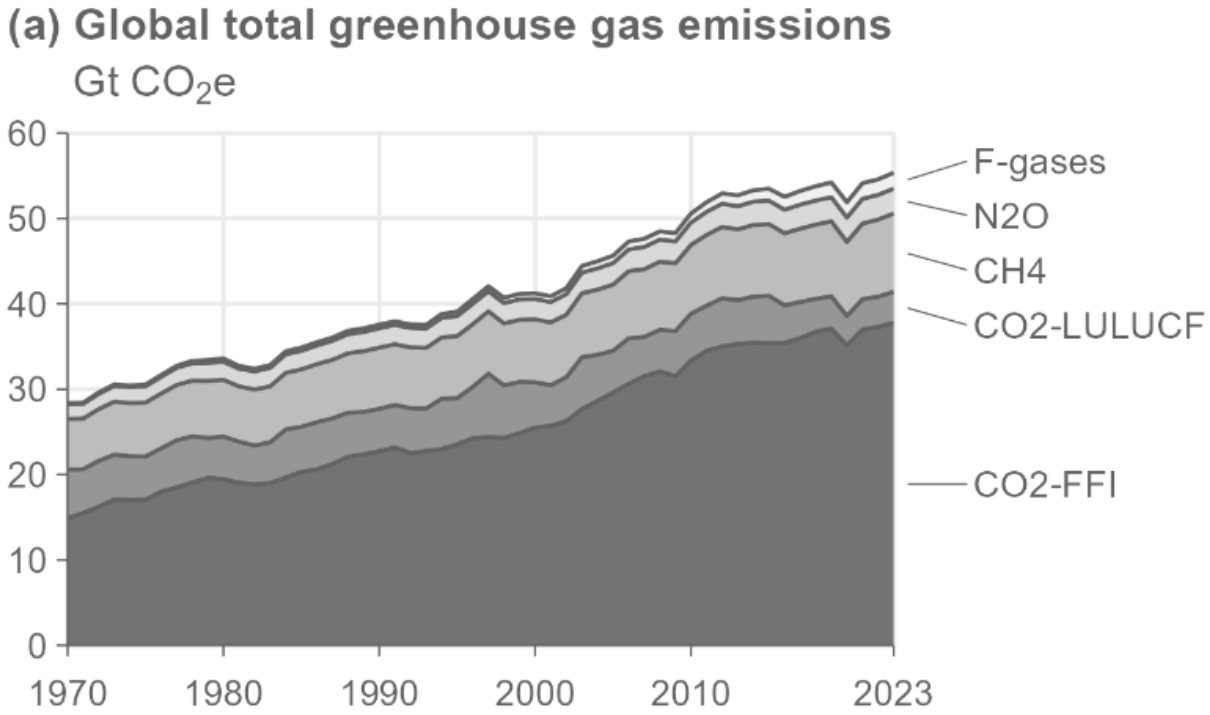
Potsdam Institute for Climate Impact Research, Germany

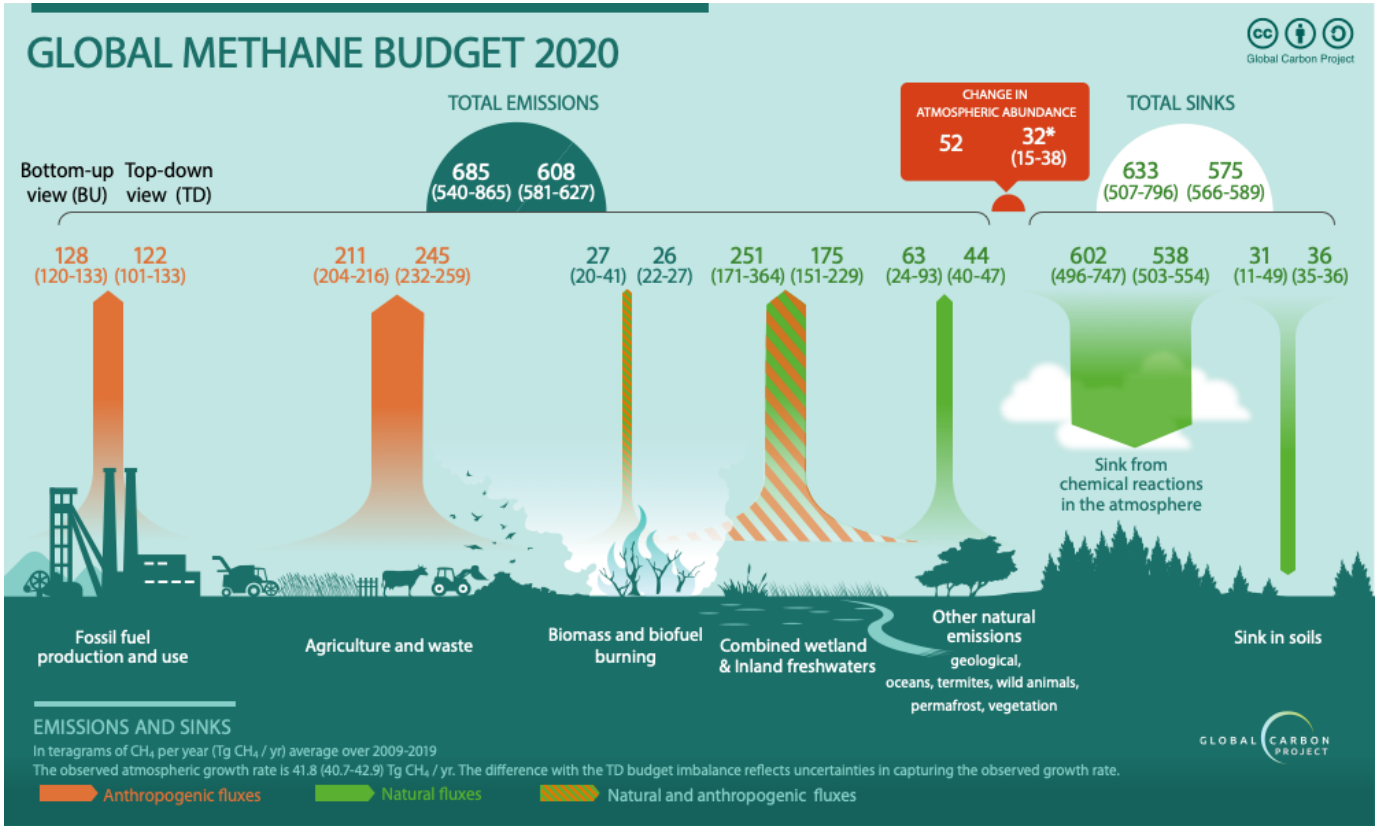
SBSTA, 17th Meeting of the Research Dialogue, 17 June 2025

CH_4 and N_2O emissions account for 22% of global anthropogenic GHG emissions



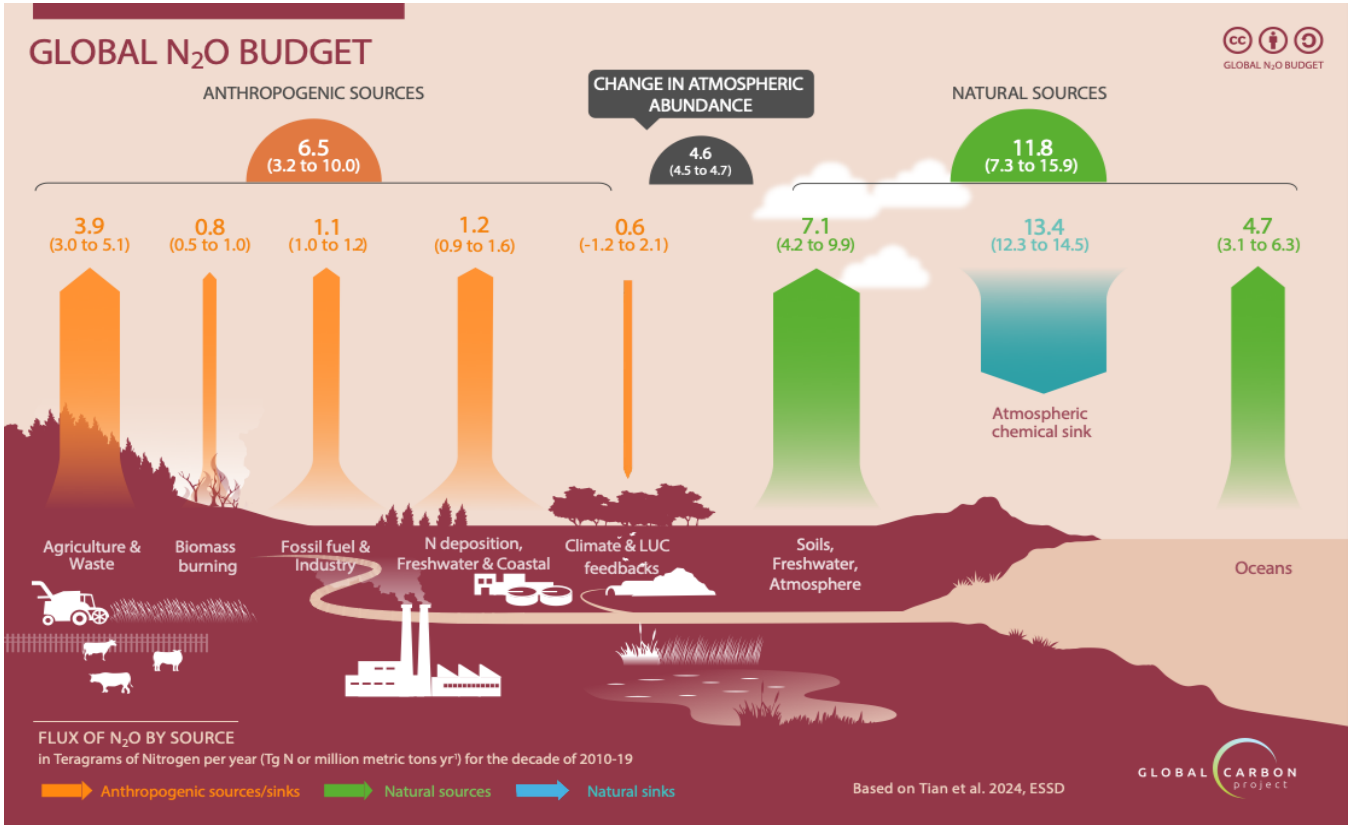
Forster, P. M. *et al.* Indicators of Global Climate Change 2024: annual update of key indicators of the state of the climate system and human influence. *Earth System Science Data Discussions* **2025**, 1–72 (2025).

Agriculture & Waste CH_4 dominates anthropogenic emissions but Livestock and Fossil Fuels emissions are comparable



Jackson et al, 2024, ERL
Saunois et al, 2025, ESSD

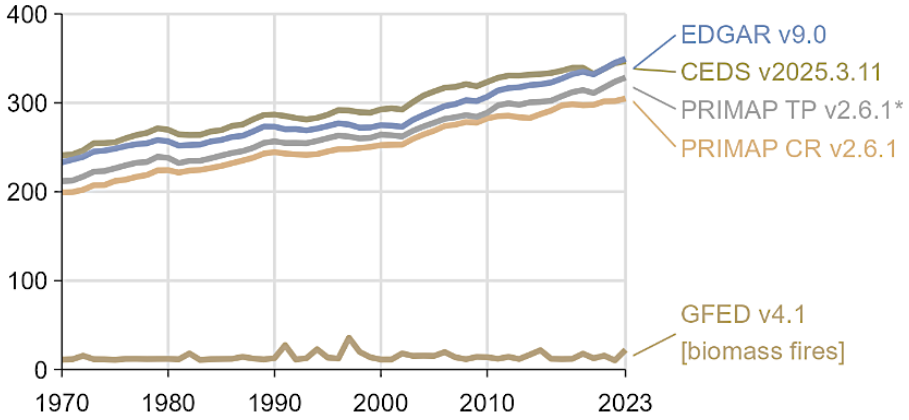
Fertilizers & Manure N_2O emissions are 3x bigger than the next anthropogenic source



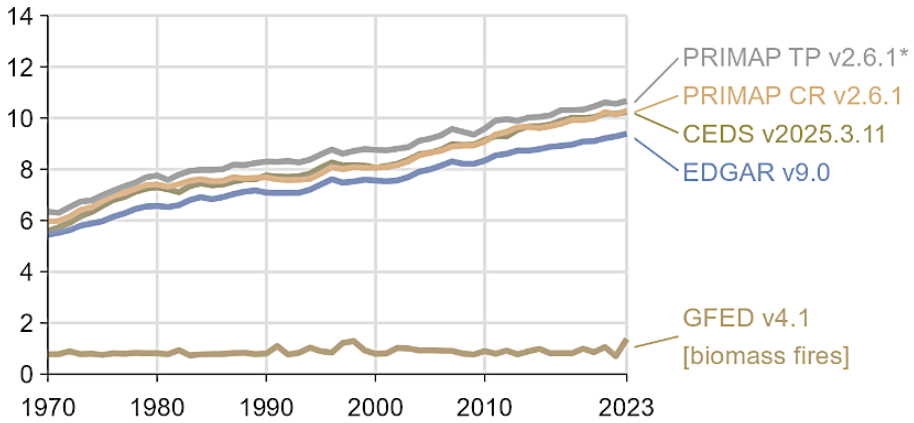
Tian et al. 2024, ESSD

Global anthropogenic CH_4 and N_2O emissions are continuing to grow

Mt CH_4 +1.3% /yr since 2019



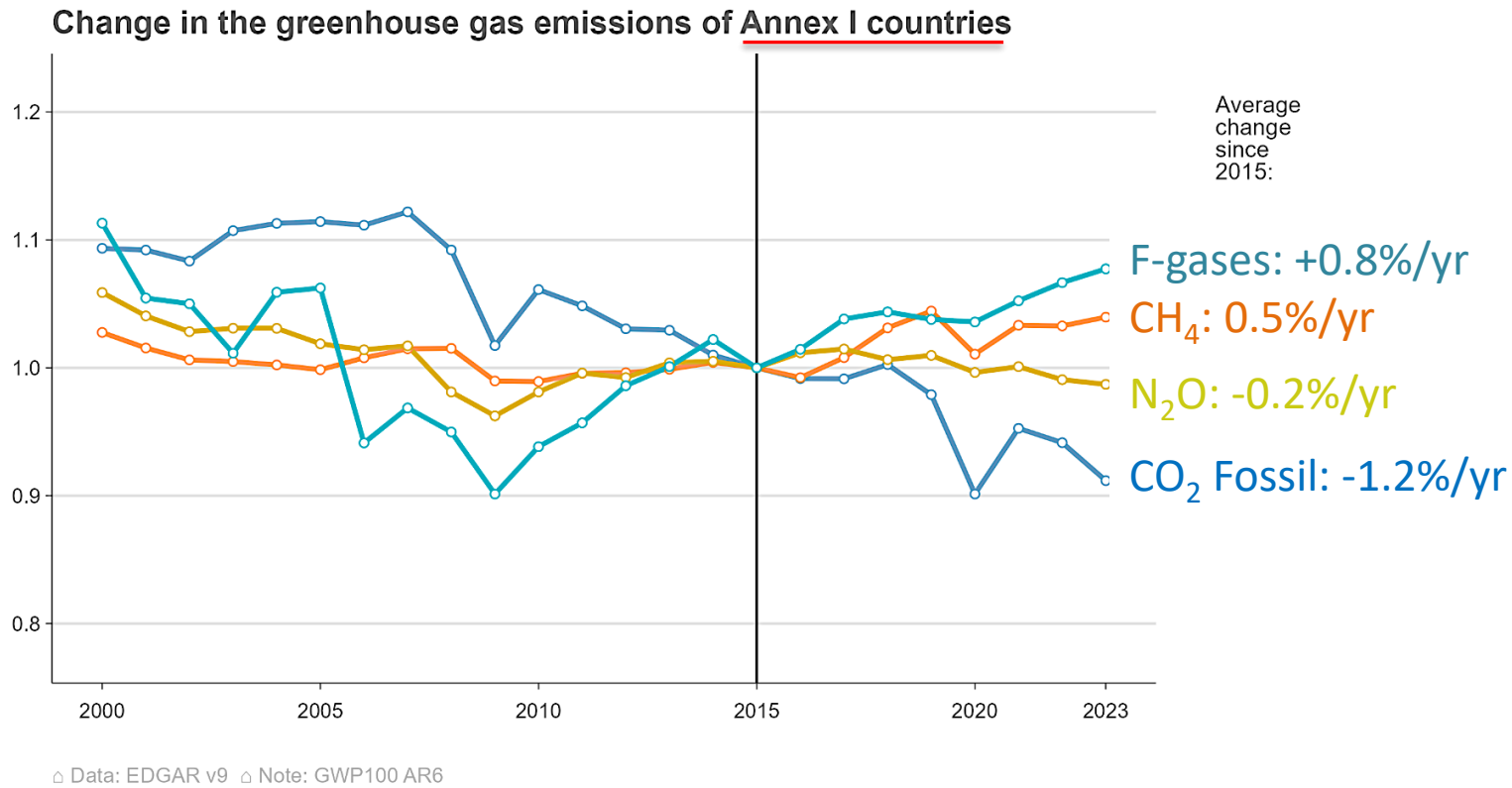
Mt N_2O +0.8% /yr since 2019



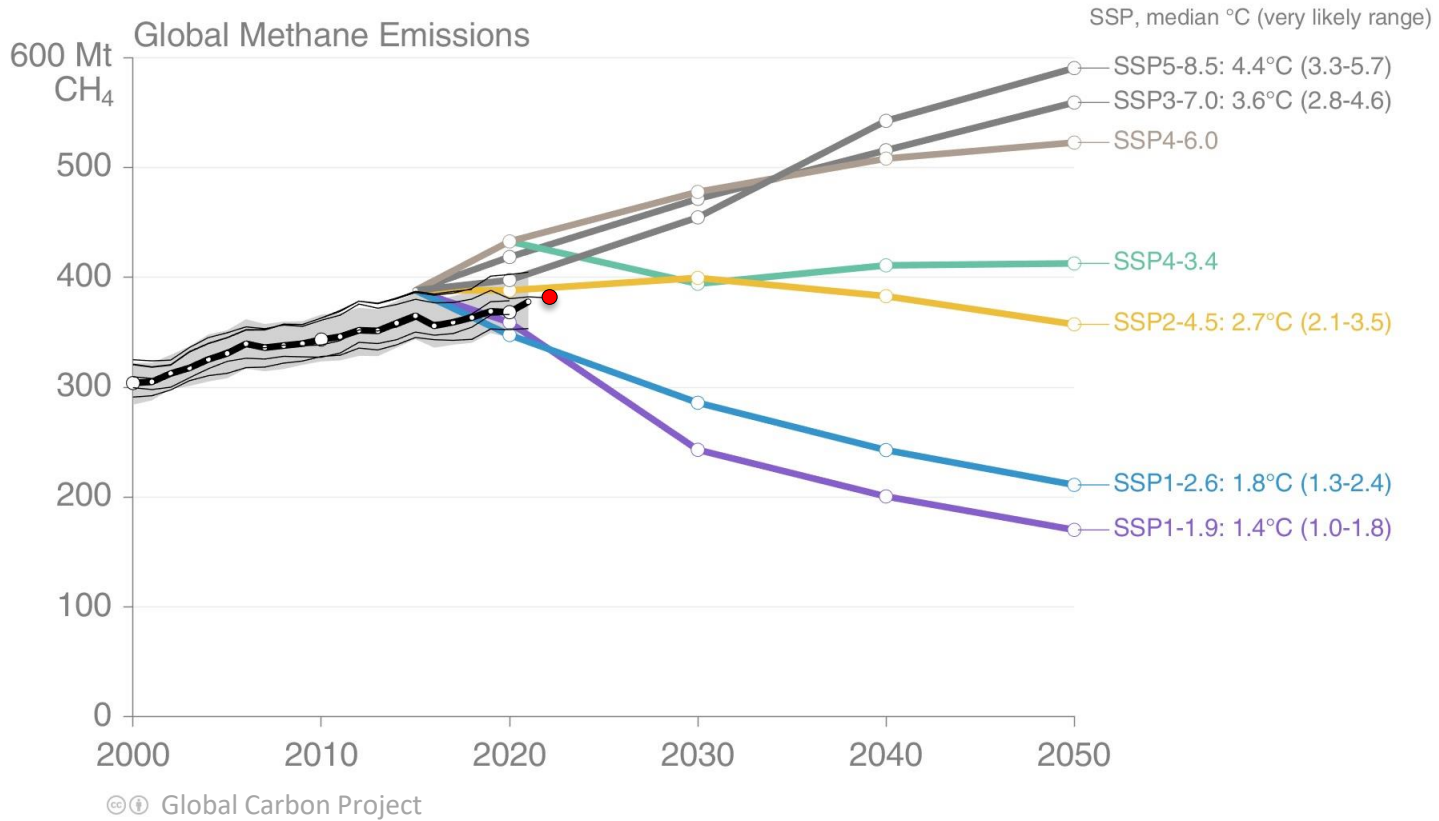
Compared to Fossil CO_2 at 1% /yr since 2019

Forster, P. M. *et al.* Indicators of Global Climate Change 2024: annual update of key indicators of the state of the climate system and human influence. *Earth System Science Data Discussions* **2025**, 1–72 (2025).

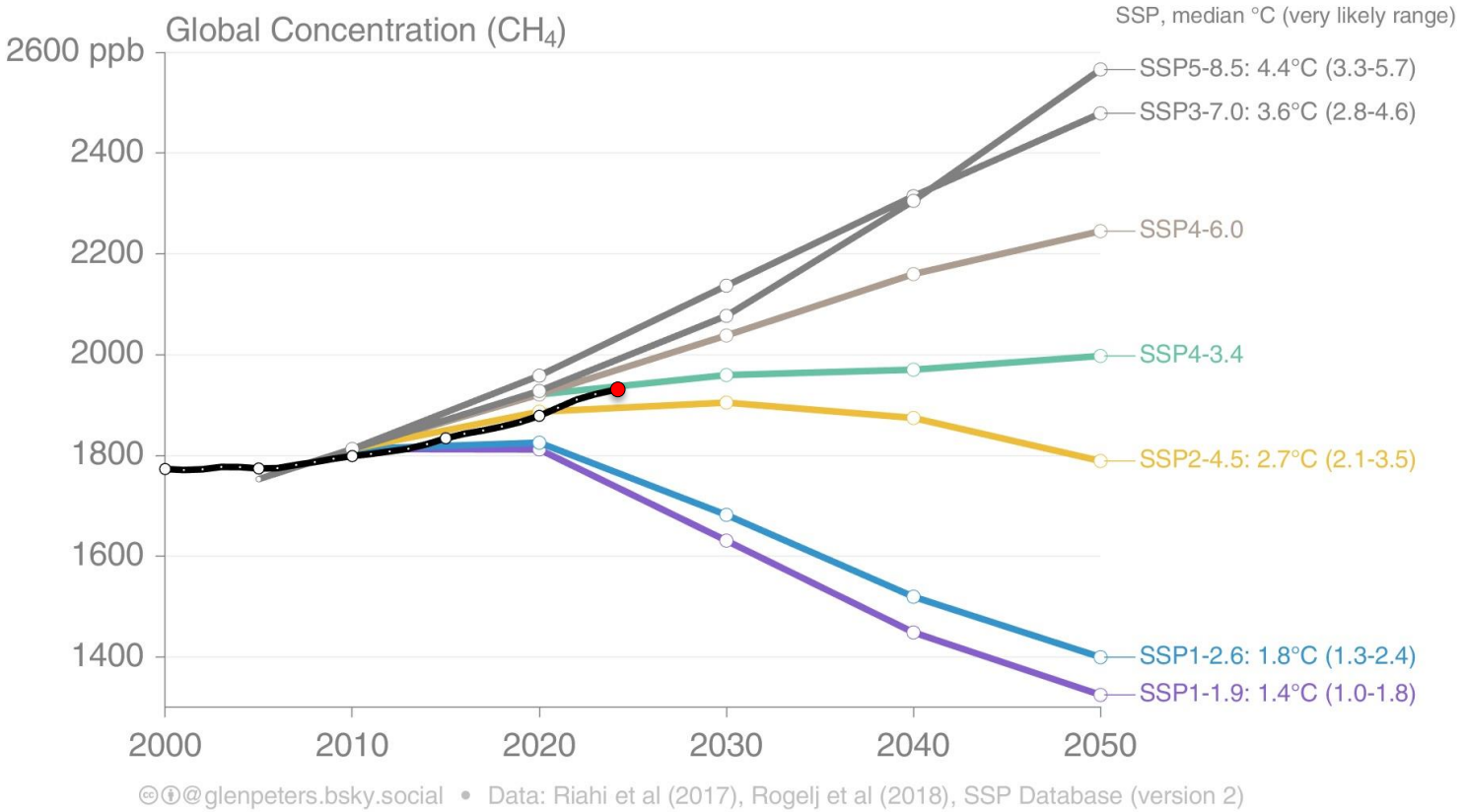
Regional reductions in CH_4 and N_2O emissions are less successful than for CO_2 fossil emissions

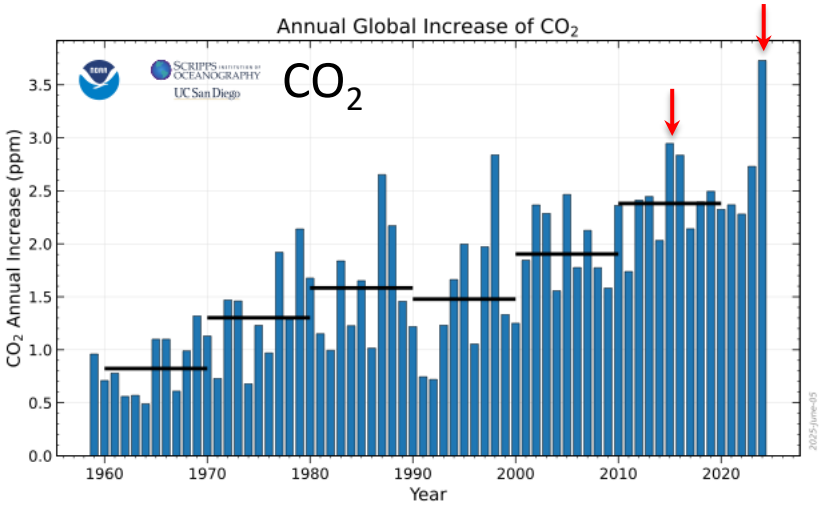


Current CH_4 **emission** trajectory is not consistent with the Paris Agreement



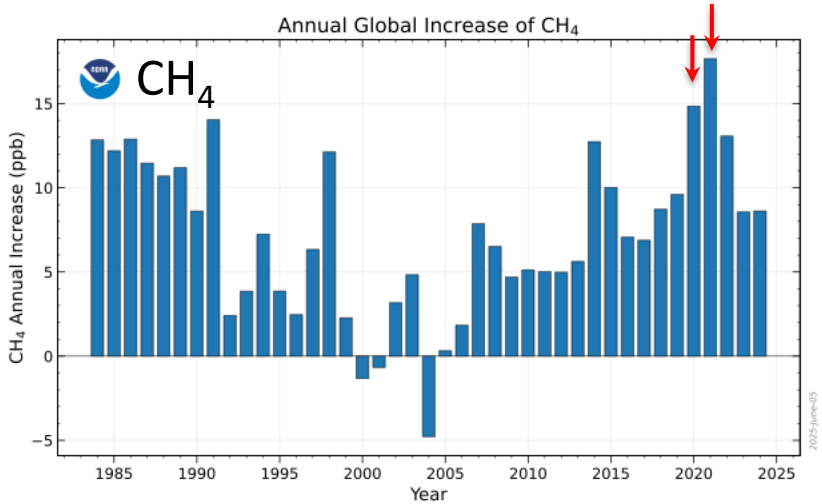
Current **CH_4 concentration** trajectory is not consistent with the Paris Agreement

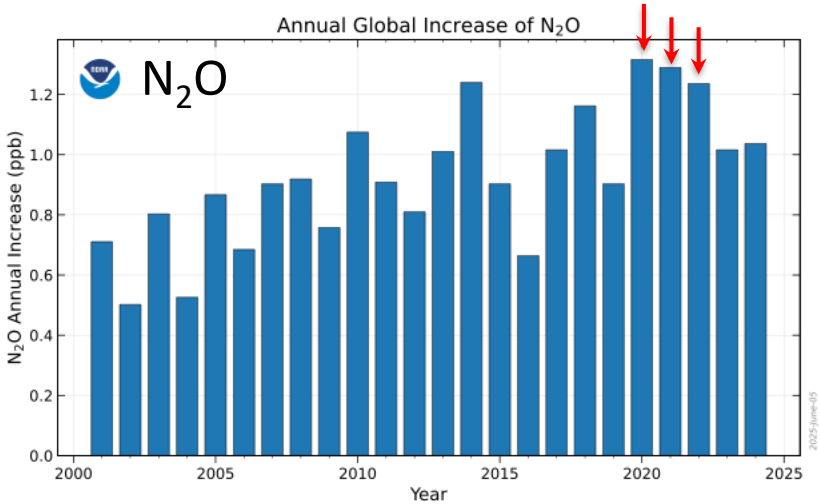




Unprecedented Atmospheric Growth Rates

- Responses of the Natural Cycles to higher emissions, pollution, and warmer and more variable climate



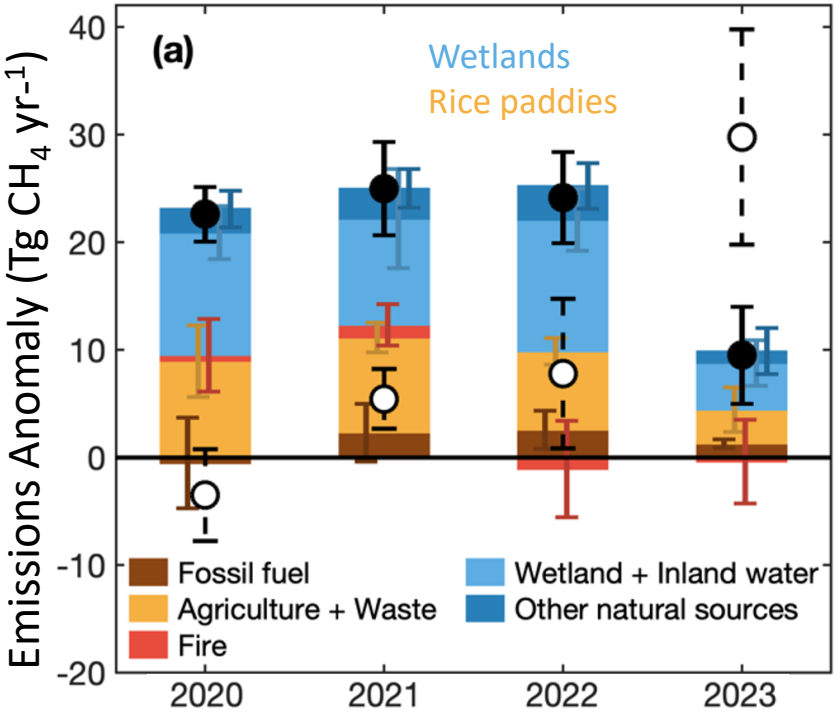


Why did methane surge in the atmosphere during the early 2020s?

80% due to variations of the chemical capacity of the atmosphere to destroy CH_4

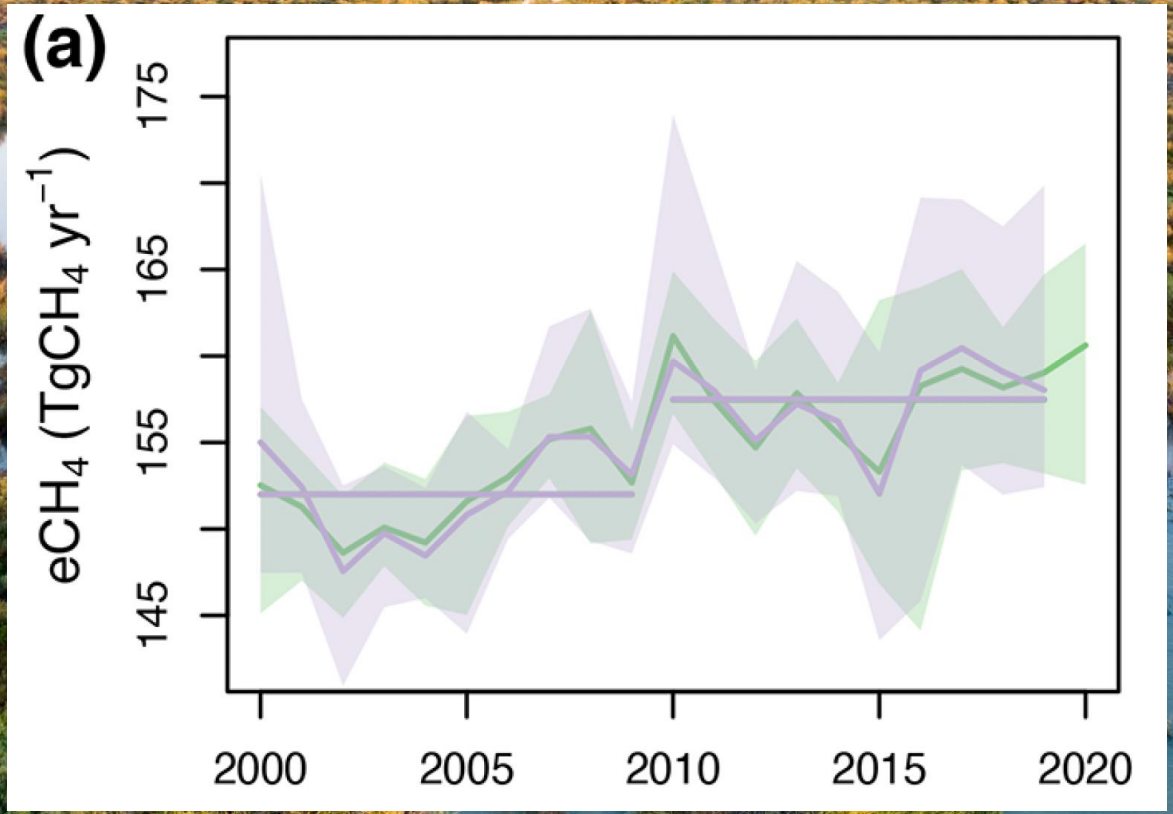
due to reduced pollutants from Covid19 lockdowns (e.g. NOx, Ozone)

20% due to changes in emissions



Ciais et al. 2025, in review

Global Wetland Methane Emissions have Increased with Warming (decreased with drying)



Zhang et al. 2025, Biogeosciences

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