Accelerated growth in methane emissions due to human activities and climate change feedbacks

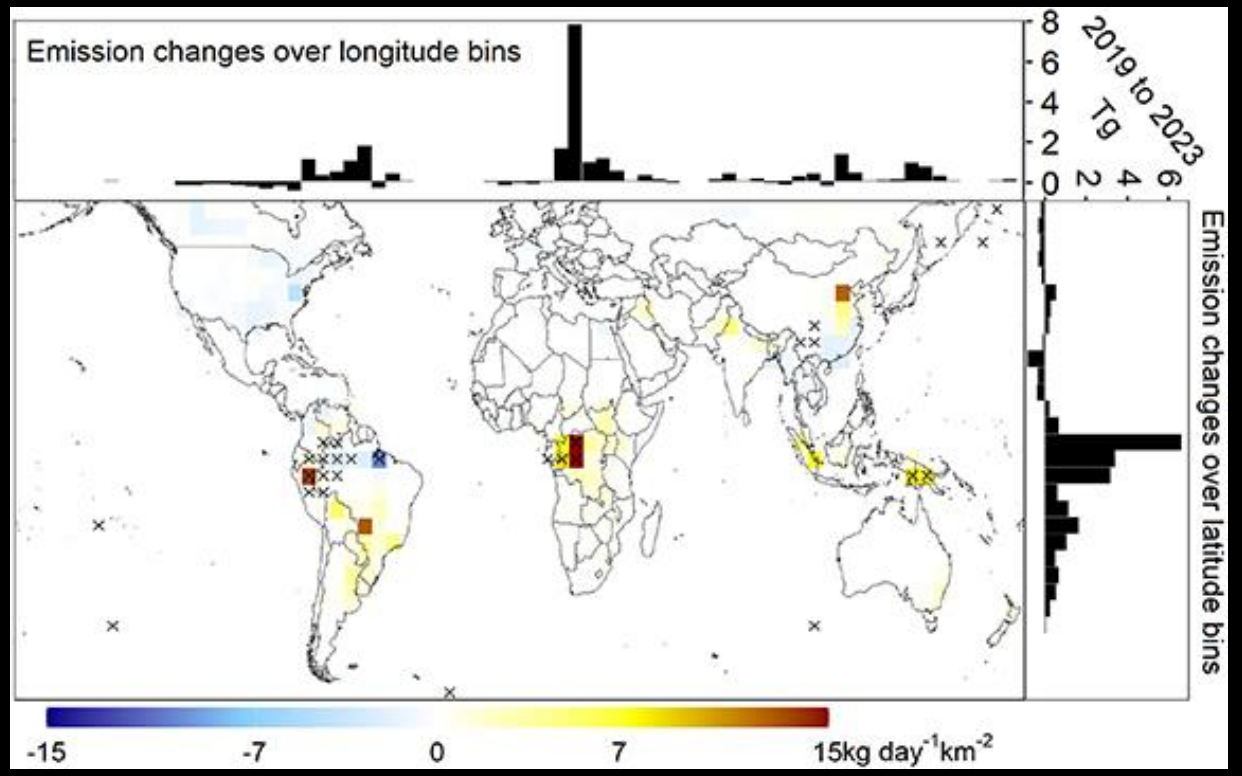
Despite an increasing policy focus on the greenhouse-gas methane (CH_4), its growth in the atmosphere has accelerated in recent years. Atmospheric CH_4 concentrations are now more than two-times higher than pre-industrial levels, and have contributed a quarter to half of warming to date.

Methane is a 'superpollutant', with a global warming potential 80 times more than CO_2 over 20-years and also acts as precursor to tropospheric ozone formation. The lifetime of a methane molecule in the atmosphere is around 11 years (compared to 100-1000s of years for CO_2), which means that climate action to reduce CH_4 emissions would quickly mitigate future warming.

The third Global Methane Budget[1] provides an updated and detailed assessment of global CH_4 emissions and removals through 2020. Using inventories and satellite data, emissions of CH_4 from fossil fuel, agriculture and landfills account for two-thirds of global sources, with the remainder mainly from wetlands.

The acceleration in the growth of atmospheric CH_4, where the annual growth in concentrations doubled in 2020 over 2019, appears to be connected with increasing air temperatures over the tropics and boreal regions, driving increased wetland and fire-related CH_4 emissions, respectively[2].

These papers provide insight into the current status of understanding and uncertainties in CH_4 emissions and the role that climate-feedbacks are having on natural emissions. The work provides a baseline for measuring the effectiveness of climate policies such as the Global Methane Pledge.



Global distribution of changes in methane emissions (kg d^{-1} km^{-2}) for the difference between emissions in 2023 minus emissions in 2019 (a four-year interval) based on satellite-derived inversions (TROPOMI).

Papers: (1) Human activities now fuel two-thirds of global methane emissions - IOPscience and (2) Recent methane surges reveal heightened emissions from tropical inundated areas – Nature Communications

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