

# Recent Intensification of wetland methane feedback

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## Science Question

We assess whether global wetland-methane emissions are increasing over the past two decades in response to warming air temperature and changing precipitation patterns from climate change.

## Analysis

We estimate wetland methane emissions using a prognostic wetland model (LPJ-wsl) driven by two different climate datasets, one based on ground meteorological stations (CRU) and one from reanalysis (NASA MERRA2). The emission estimates are compared with simulations using climate projections from the Coupled Model Intercomparison Project 5 (CMIP5).

## Results

- Global mean wetland CH<sub>4</sub> emissions during 2000-2021 have increased by 5-6%, higher than projected emissions using the CMIP5 ensemble (Fig. 1).
- A trend toward increasing wetland methane emissions is emerging, particularly driven by increases in emissions in 2021 and 2022 (Fig. 2).
- Tropical wetlands in Africa and South America, are responsible for most of the increase in global wetland methane emissions, but these regions are also the most data sparse.

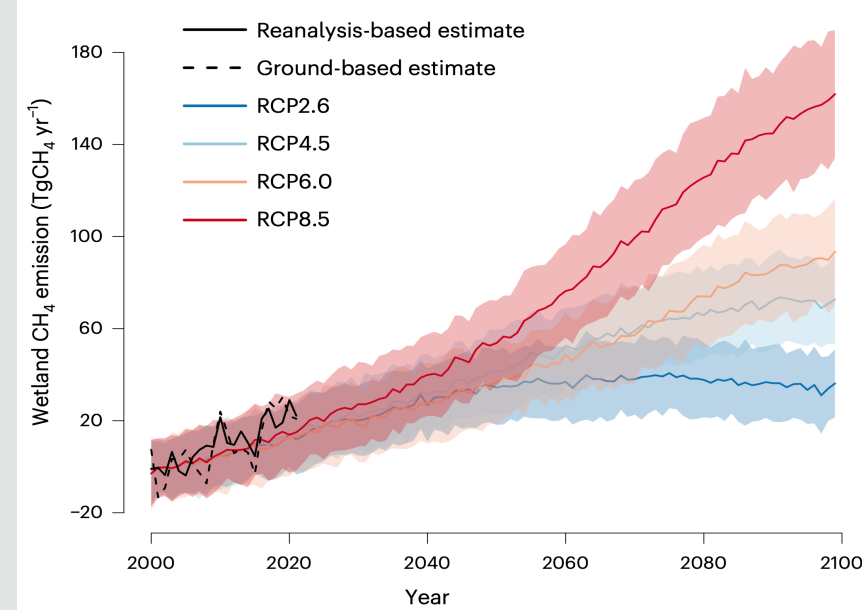


Fig. 1. Temporal variations in wetland CH<sub>4</sub> emission during 2000-2021 relative to the baseline of 2000-2006 level in comparison to a previous future projection study. RCP8.5 represents the most severe climate warming scenario.

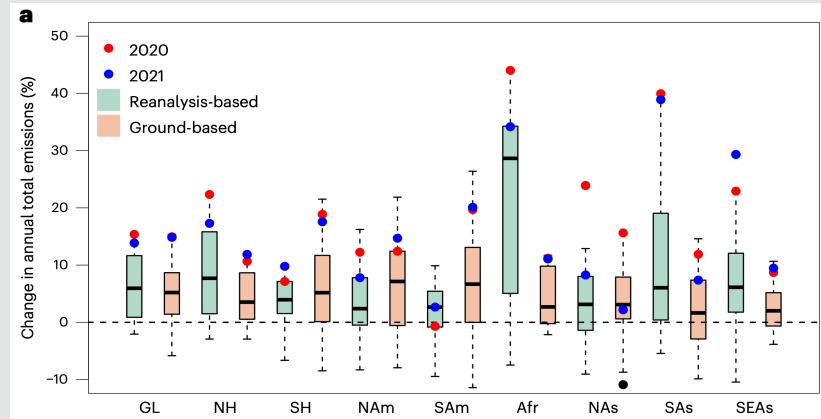


Fig. 2. Regional changes in wetland CH<sub>4</sub> emissions. The spread of data represent interannual variability.

Global; NH, Northern Hemisphere; SH, Southern Hemisphere; NAm, North America; SAm, South America; Afr, Africa; NAs, North Asia; SAs, South Asia; SEAs, Southeast Asia.

## Significance

The study shows that methane emissions from wetlands are responding to climate change. The results highlight the need for sustained monitoring and observations, and coordination between the scientific community to understand drivers of wetland emission increases and the locations.