Inverse modeling of 2010-2022 satellite observations shows that inundation of the wet tropics drove the 2020-2022 methane surge

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Poster

Atmospheric methane concentrations rose rapidly over the past decade and surged in 2020-2022 but the causes are unclear. We find from inverse analysis of GOSAT satellite observations that emissions from the wet tropics drove the 2010-2019 increase and the subsequent 2020-2022 surge, while emissions from northern mid-latitudes decreased. The 2020-2022 surge is principally contributed by emissions in Africa (49%) and Equatorial Asia (41%). Wetlands are the major drivers of the 2020-2022 emission increases in Africa and Equatorial Asia because of tropical inundation associated with La Niña conditions, consistent with trends in the GRACE terrestrial water storage data. In contrast, emissions from major anthropogenic emitters such as the US, Russia, and China are relatively flat over 2010-2022. Concentrations of tropospheric OH (the main methane sink) show no long-term trend over 2010-2022, but a decrease over 2020-2022 that contributed to the methane surge.

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