On the detection of COVID-driven changes in atmospheric CO_2

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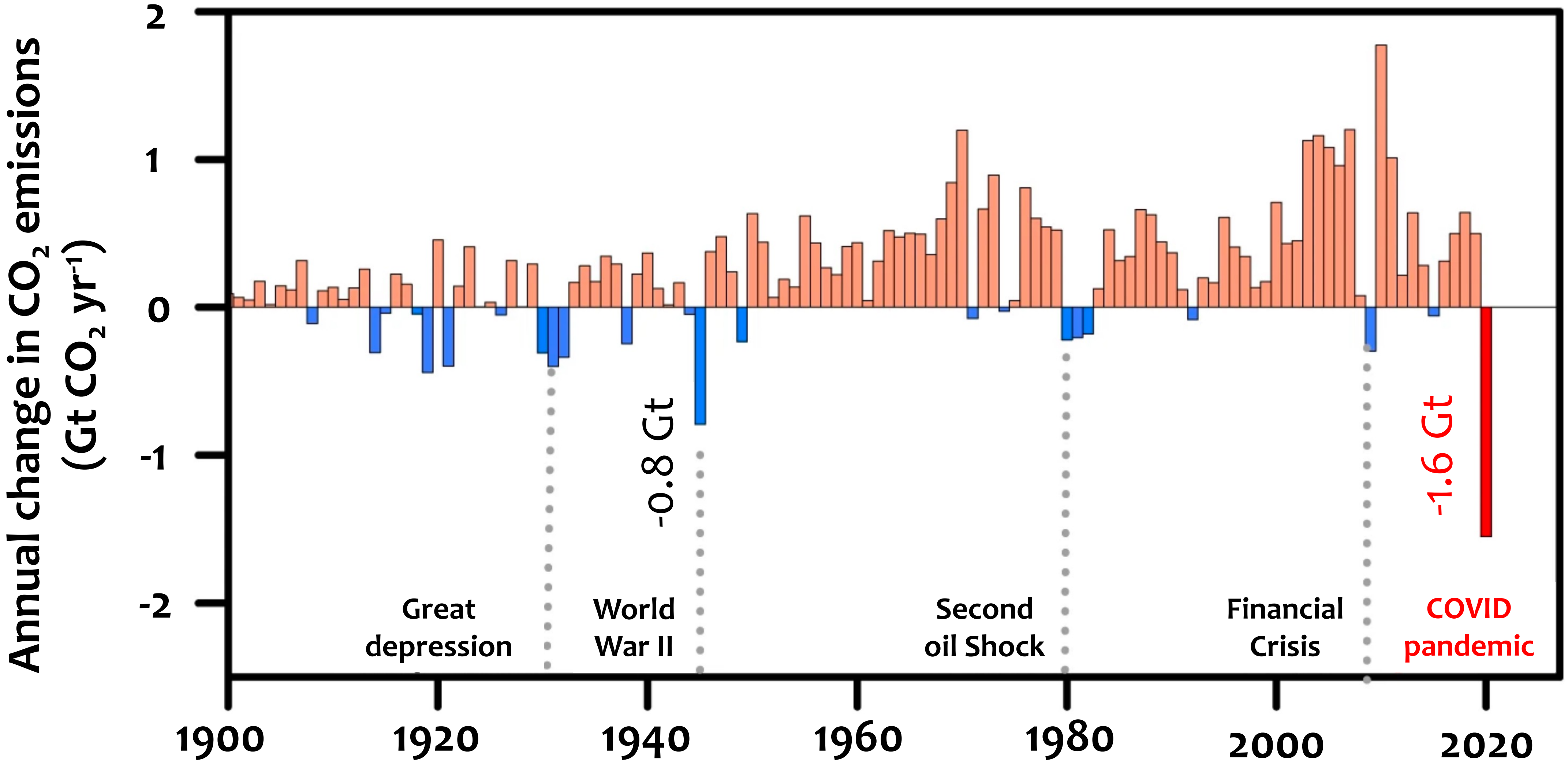
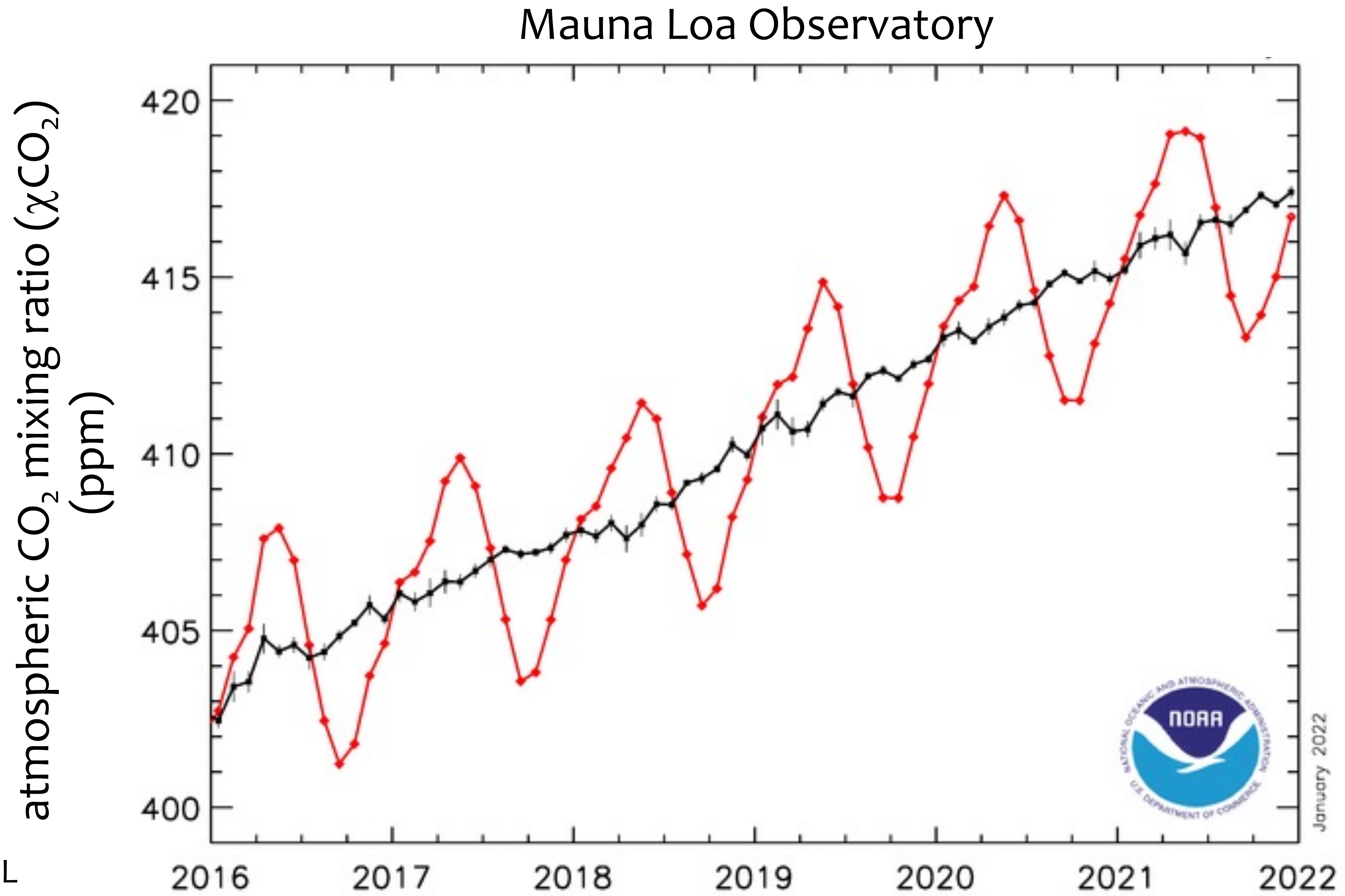
COVID-related CO_2 emissions reductions



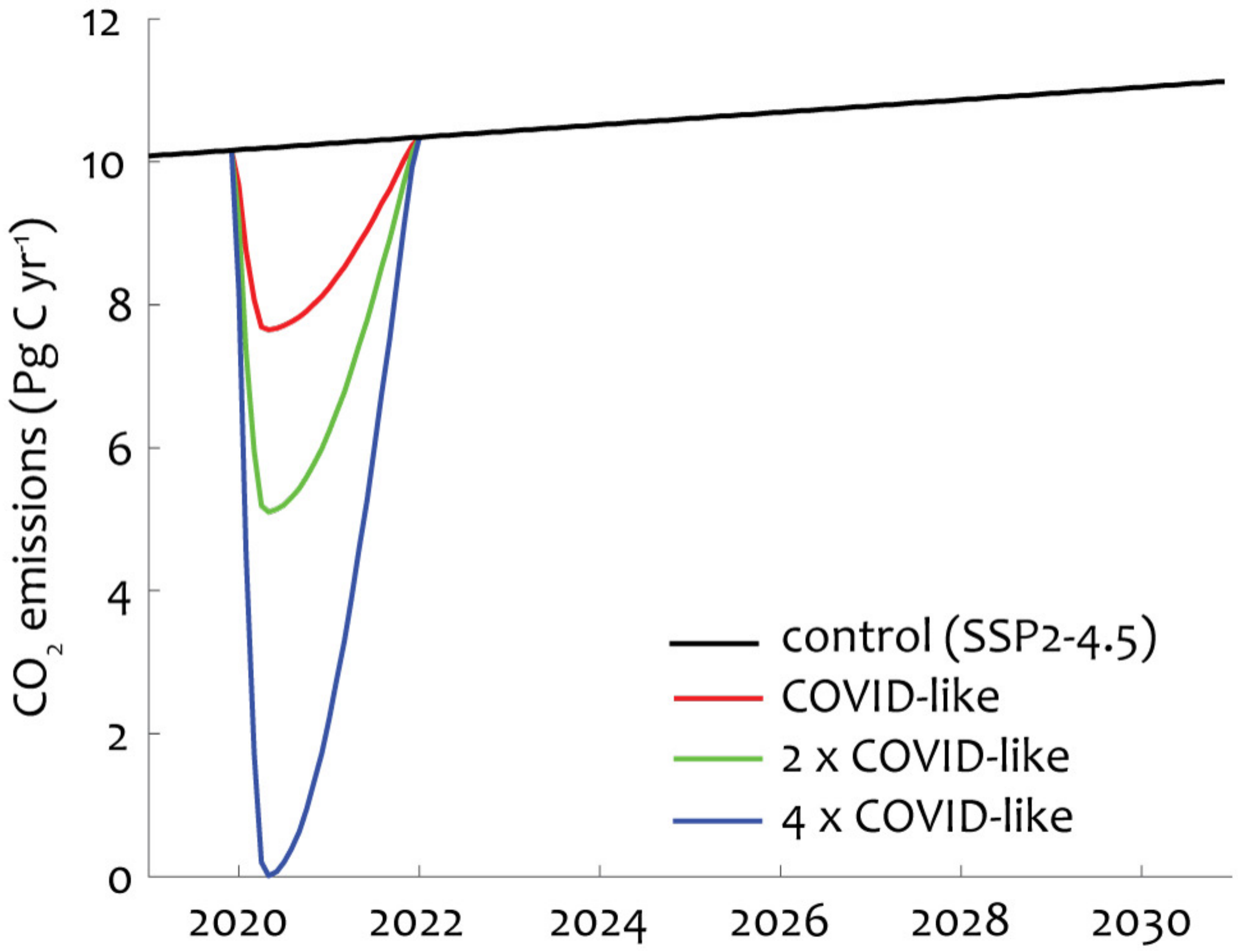
Liu et al. (2020)

Can you find the COVID signal?



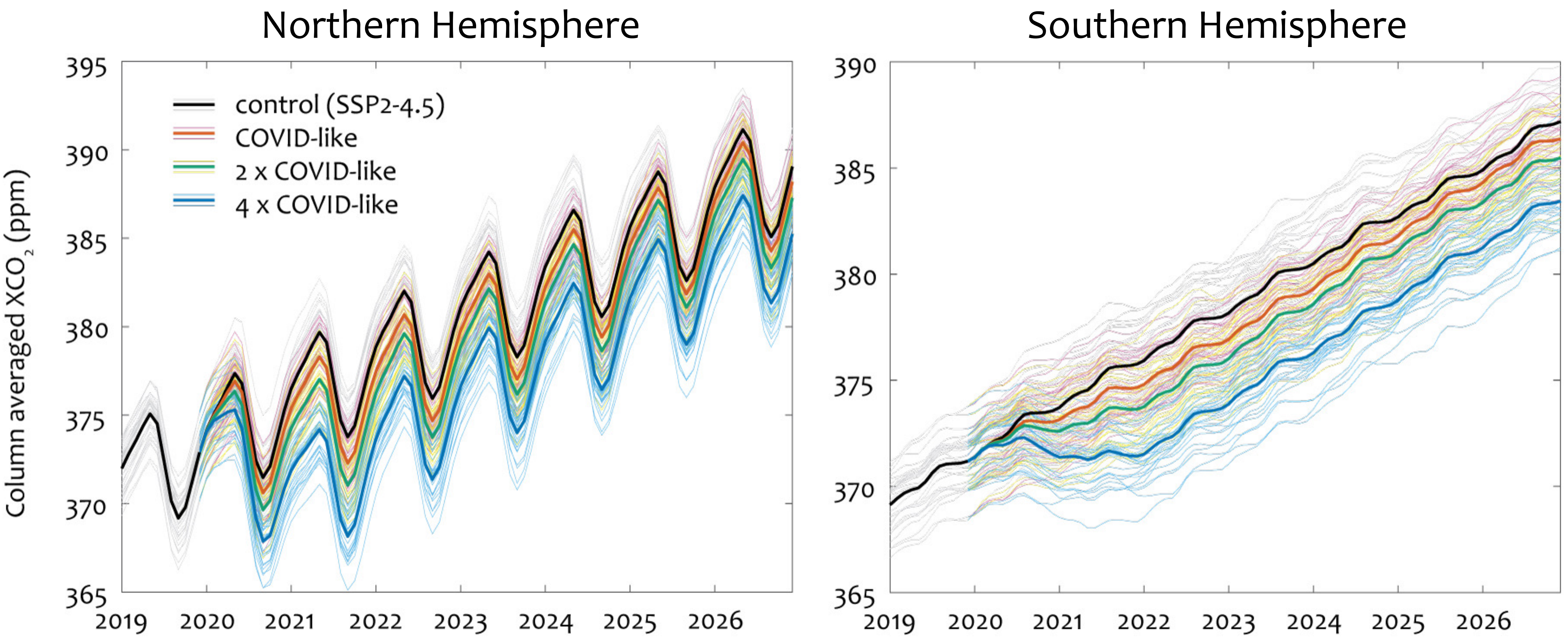
NOAA GML

CanESM5-COVID ensembles



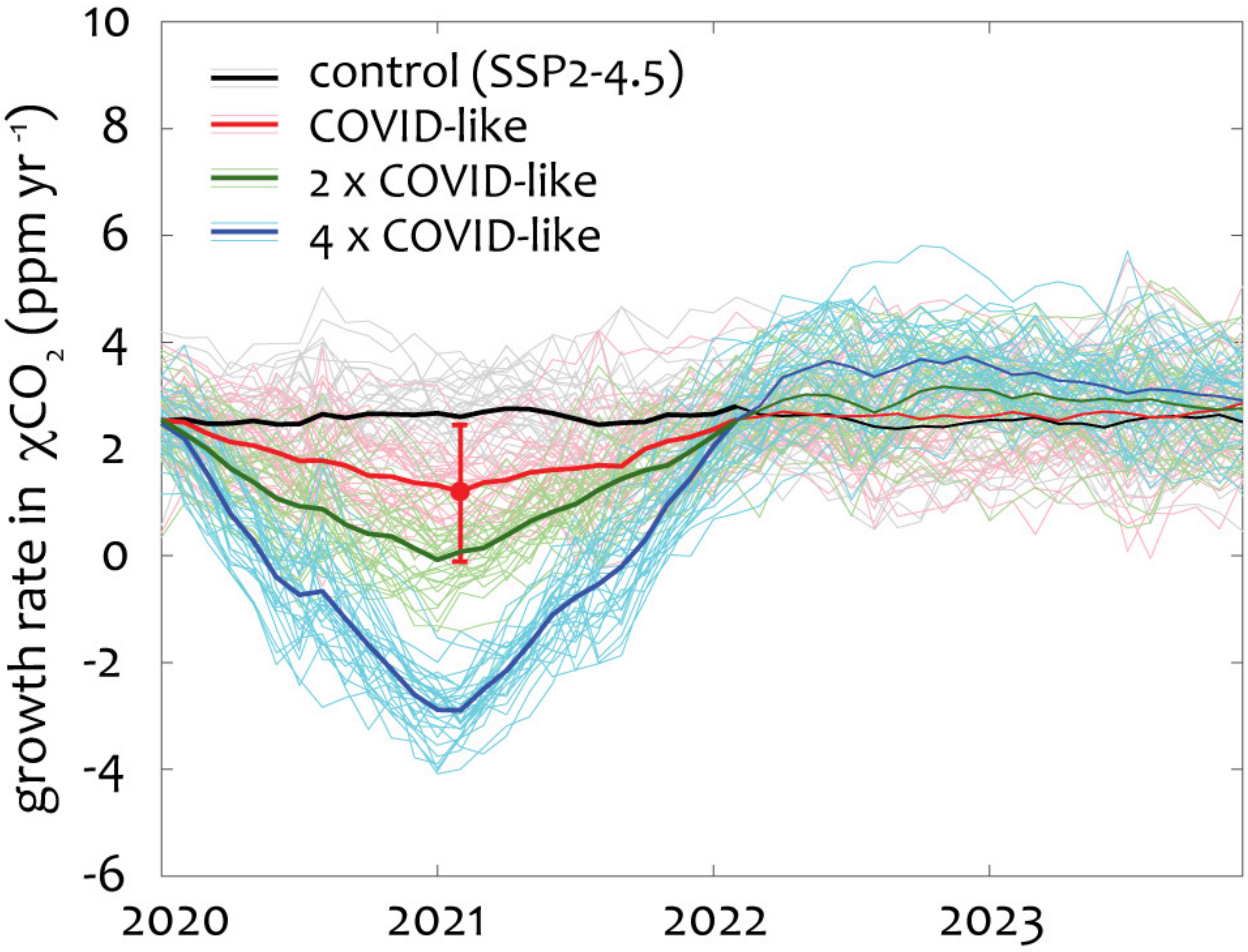
Fyfe et al. (2021)

CO_2 from "space"



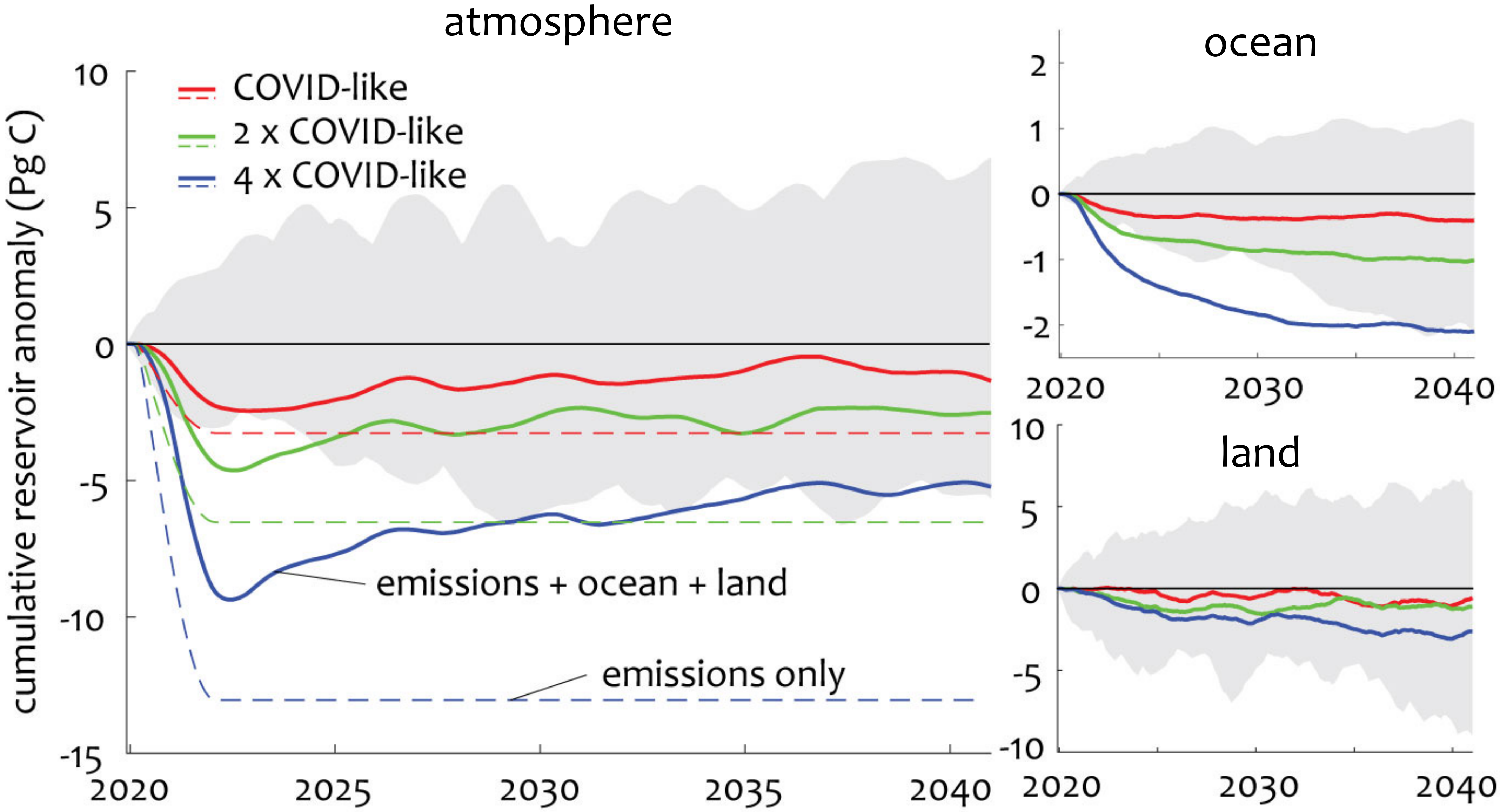
Lovenduski et al. (2021)

Fingerprint of COVID from “flask network”



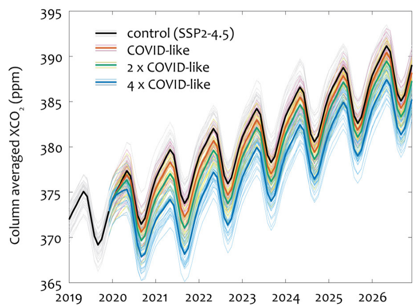
Lovenduski et al. (2021)

Complicating carbon-concentration feedbacks

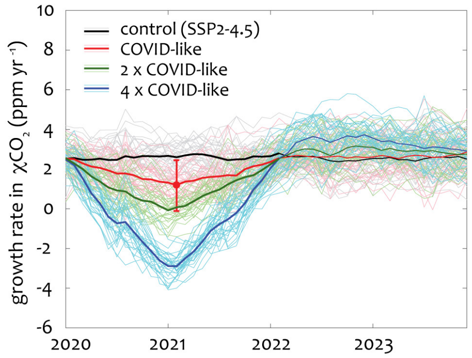


Lovenduski et al. (2021)

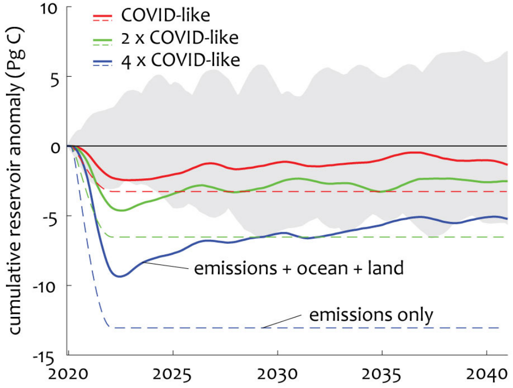
Conclusions



Internal variability hampers our ability to “see” the global COVID emissions decline from satellite observations

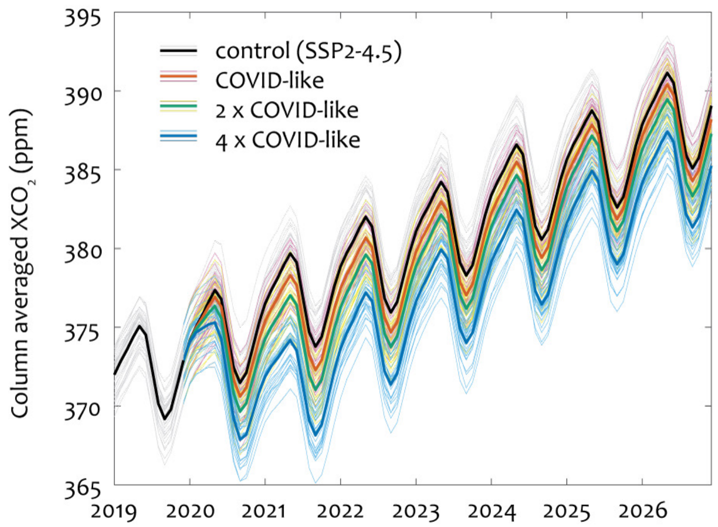


There is a unique fingerprint of COVID emissions reductions in the CO2 growth rate from flask observations; this fingerprint is only formally detectable for unrealistically large emissions reductions

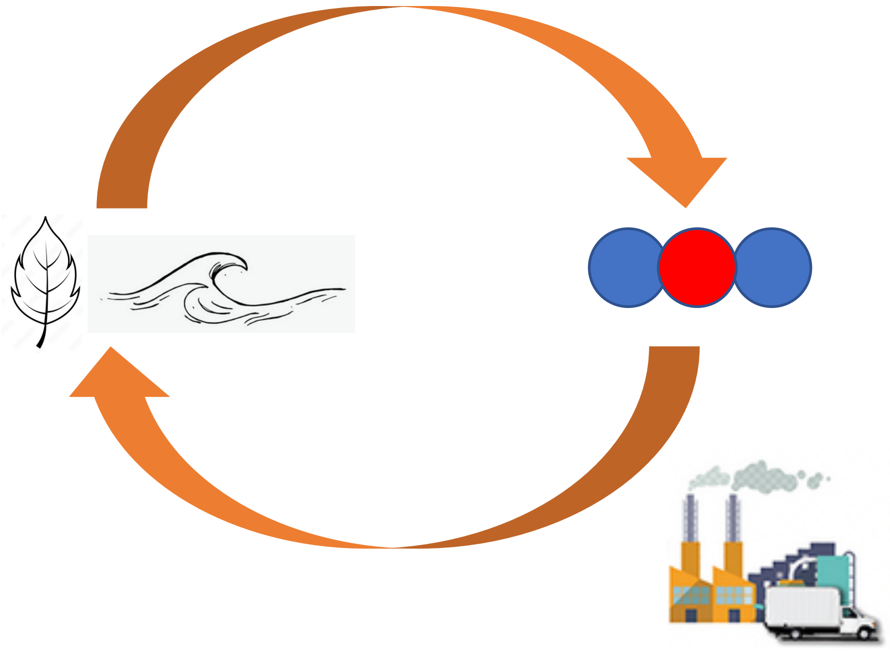


Signal detection is challenging due to internal climate variability and carbon-concentration feedbacks

Knowledge gaps and priorities for next steps



Internal variability challenges our ability to identify emissions reductions on a global scale. It is critical that we have observation systems in place that can quantify internally-driven CO_2 flux variations from land and ocean in near-real time.



Carbon-concentration feedbacks can occur on relatively short timescales and confound our ability to "see" emissions reductions with space-based CO_2 observations. Modelers and observationalists need to work together to better quantify these feedbacks on near-term timescales.

Want to learn more?

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RESEARCH LETTER

10.1029/2021GL095396

Special Section:
Understanding carbon-climate feedbacks

Key Points:

- Climate model simulations suggest a lagged response in the global growth rate of atmospheric CO_2 due to COVID-19 emissions reductions
- Detection of this reduction in

On the Detection of COVID-Driven Changes in Atmospheric Carbon Dioxide

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