Ocean Anthropogenic Carbon Uptake **Under High Emission Mitigation**

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INTRO:

- The ocean has absorded ~40% of emissions from cement production and fossil fuel combustion
- Nearly every nation pledged to limit global warming to 1.5°C
- The reductions in warming can enhance ocean carbon uptake, but how will reduction to the growth rate of atmospheric CO₂ affect ocean uptake?

METHODS

Model:

We use ocean biogeochemistry output from the CESM-LE, CESM-ME, and a low-warming CESM ensemble

Flux Efficiency:

 $\eta = (F_{anth}/F_{exp}) \times 100$

- Assumes continued growth at historical rates, consistent with transient steady state
- Ratio of anthropogenic flux (F_{anth}) and expected flux (F_{exp}).

RESULTS

 Increasing emission mitigation decreases efficiency



Emissions mitigation reduces ocean carbon uptake efficiency.

Meeting the **1.5°C** warming target reduces ocean carbon uptake efficiency to <10% by 2080.

$$F_{exp} = \alpha(t)F_{ref}$$
$$F_{ref} = F_{anth}(1990)$$
$$\alpha(t) = \frac{xCO_2(t) - xCO_{2,PI}}{xCO_{2,PI}}$$

 $xCO_{2,PI} = 278ppm$ Mikaloff-Fletcher et al. 2006





Rogelj et al. 2019

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