

CGD Seminar Series

Application of a Newton-Krylov Solver to Spin-up Ocean Tracers

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NCAR

Date: Tuesday, 5 October 2021

Time: 11am – 12pm

For Zoom information, please contact

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For live stream information, visit the

CGD Seminar Webpage

ABSTRACT

A challenge for ocean biogeochemical modeling is spinning up the tracers to be in balance with the model's circulation, to eliminate, or significantly reduce, drift. Motivations for spinning up the tracers include: clean comparison of the modeled solution to observations, such as nutrient distributions; initializing transient experiments (e.g., simulating anthropogenic carbon uptake or bomb radiocarbon) and having a steady control experiment to compare to; and coupling the ocean to other Earth system model components and avoiding the impact of drift in one component on the other components. Two aspects of the challenge for ocean tracer spinup are the long-time scales of ocean ventilation and the short time scales of processes in the upper ocean.

We describe a Newton-Krylov based framework for directly solving for the equilibrated tracer distributions. We show results from the application of the solver to a variety of tracer packages, including ideal age, natural radiocarbon, and some other biogeochemical tracers. We discuss ongoing development of the solver and present the results of some recent developments.

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