

Advective controls on the North Atlantic anthropogenic carbon sink

Ridge, S. M., & McKinley, G. A. (2020). *Global Biogeochemical Cycles* doi: 10.1029/2019GB006457



Science Question

The ocean is an important sink of anthropogenic CO₂ emissions. Why is the subpolar North Atlantic one of the most intense regions of anthropogenic CO₂ uptake?

Analysis

We used observations from the GO-SHIP program, ECCO v4 as an estimate of the physical state, and a hindcast model from NCAR

Results

- Old waters, low in anthropogenic CO₂, are found in the nutrient stream of the Western North Atlantic
- These low anthropogenic CO₂ waters are on isopycnals that outcrop in the subpolar North Atlantic
- Subpolar anthropogenic carbon uptake is sustained by these low anthropogenic CO₂ waters supplied by the overturning circulation

Significance

We've come up with a mechanistic explanation for why the subpolar North Atlantic is an intense sink for anthropogenic CO₂. This helps us understand what could happen to CO₂ uptake in this region in the future as mixing and overturning change

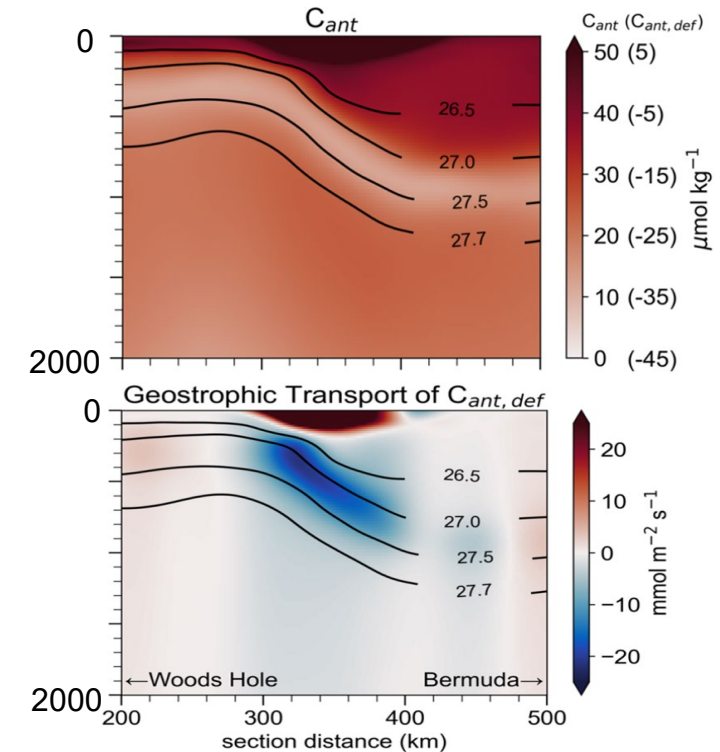
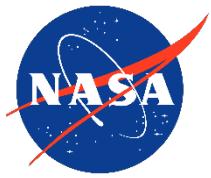


Figure Caption

(Top) Anthropogenic carbon below the Gulf Stream (0-2000m). Measurements from a research cruise between Woods Hole, MA, to Bermuda. Note the low anthropogenic carbon waters sandwiched between higher waters. (Bottom) The Gulf Stream transports these low anthropogenic CO₂ waters that have a high capacity for CO₂ absorption (blue values)



Notes



Full citation:

Advective Controls on the North Atlantic Anthropogenic Carbon Sink.
Global Biogeochemical Cycles. 34(7). doi: 10.1029/2019GB006457

Award information:

Funded by the NASA IDS program grant number NNX17AK19G
North American Carbon Program