Attenuated carbon sequestration by Weddell Sea dense waters over the 21st century – an assessment with FESOM-REcoM

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Motivation

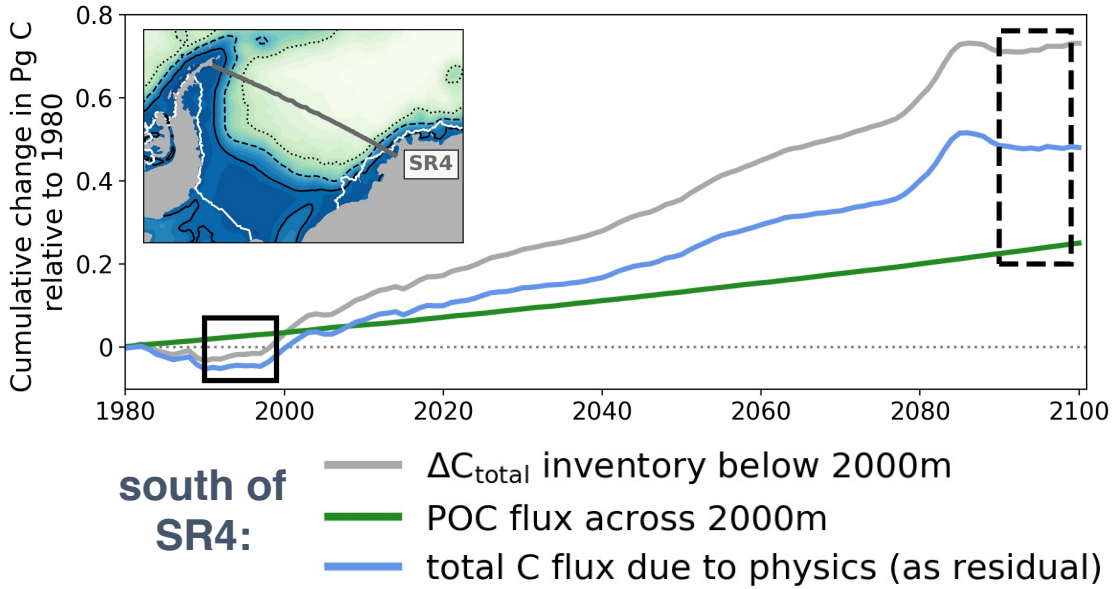
Dense water formation regions are important vectors of carbon transfer to depth.

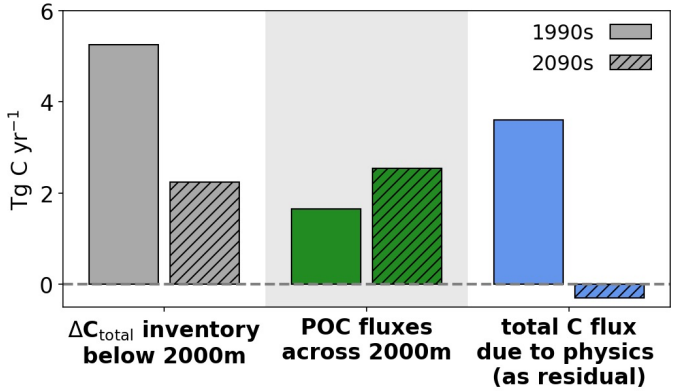
Limitations of previous models:

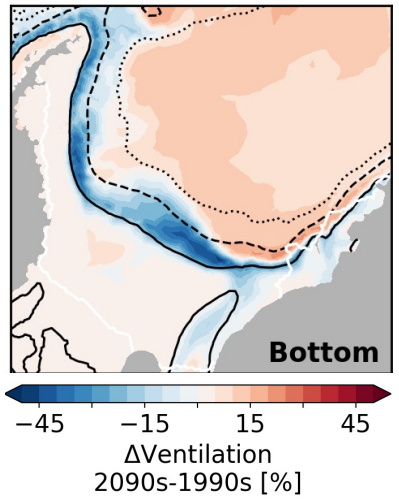
- either a crude representation of ice shelf-ocean interactions
- or no carbon cycling

Tool

- FESOM1.4-REcoM2 with ice shelf cavities
- grid resolution <10km on shelf
- simulations from 1950-2100
- forced with output from the AWI Climate Model (historical + ssp585 scenario)







White isoline in map: cavity edge
Black isolines in map: solid = 700m, dashed = 2000m, dotted = 3500m

based on an age tracer, blue=waters are less ventilated in 2090s

Results

The deep ocean C inventory in the southern Weddell Sea increases over much of the 21st century in FESOM-REcoM.

After ~2085, C accumulation at depth is reduced (despite an increase in biological sinking fluxes).

Attributed to…

- changes in the density distribution, sea ice formation, and basal melt throughout the Weddell Sea
- changes in dense water formation on the southern Weddell Sea shelf
- reduced ventilation of bottom waters along slope

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 820989 (project COMFORT, Our common future ocean in the Earth system – quantifying coupled cycles of carbon, oxygen, and nutrients for determining and achieving safe operating spaces with respect to tipping points). The work reflects only the author's/authors' view; the European Commission and their executive agency are not responsible for any use that may be made of the information the work contains.

vEGU 2021, SESSION OS 1.6, EGU21-6248