

Drivers and consequences of a stronger mid-Pliocene AMOC

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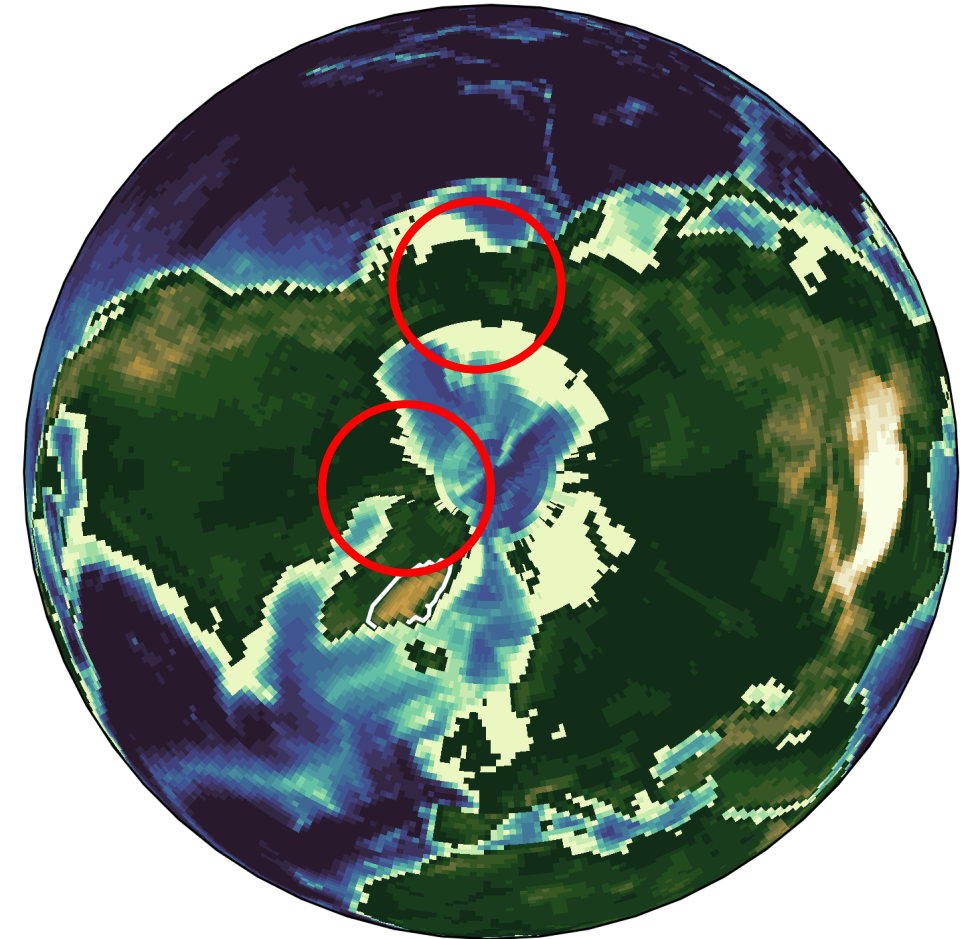
Link to abstract

Mid-Pliocene AMOC: a non-analog feature for a future warm climate?

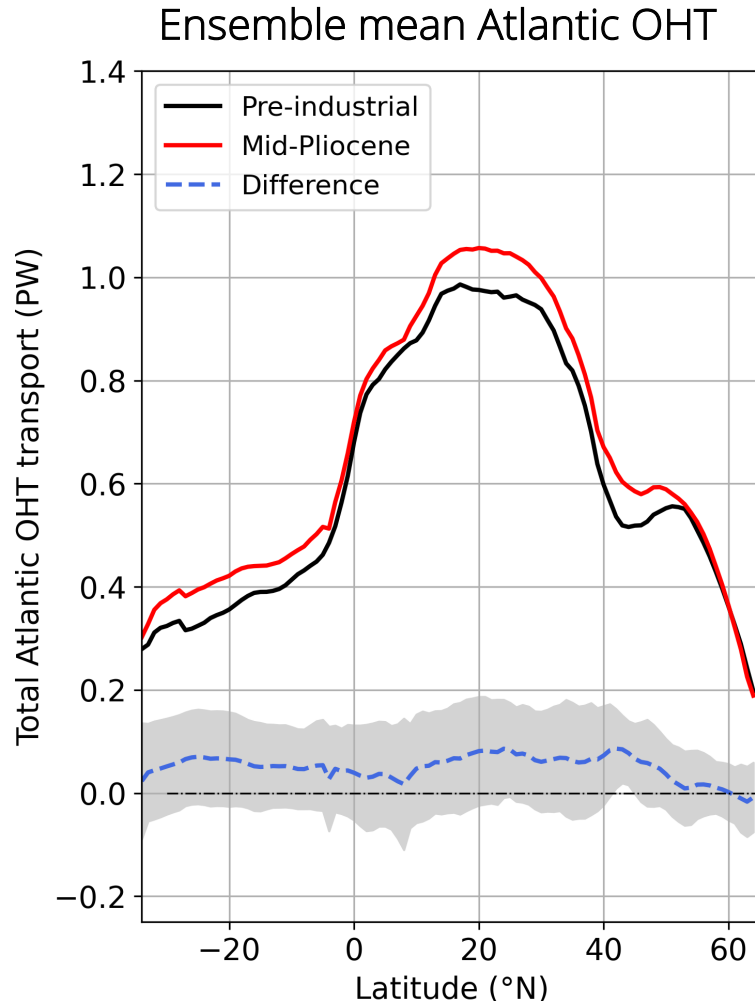
PlioMIP2: ensemble of 17 Earth system models simulating the mid-Pliocene and pre-industrial.

Zhang et al. (2021) show a stronger mid-Pliocene AMOC in PlioMIP2.

Linked to closure of Bering Strait and Canadian Archipelago in the mid-Pliocene.



Response of Atlantic OHT to stronger mid-Pliocene AMOC



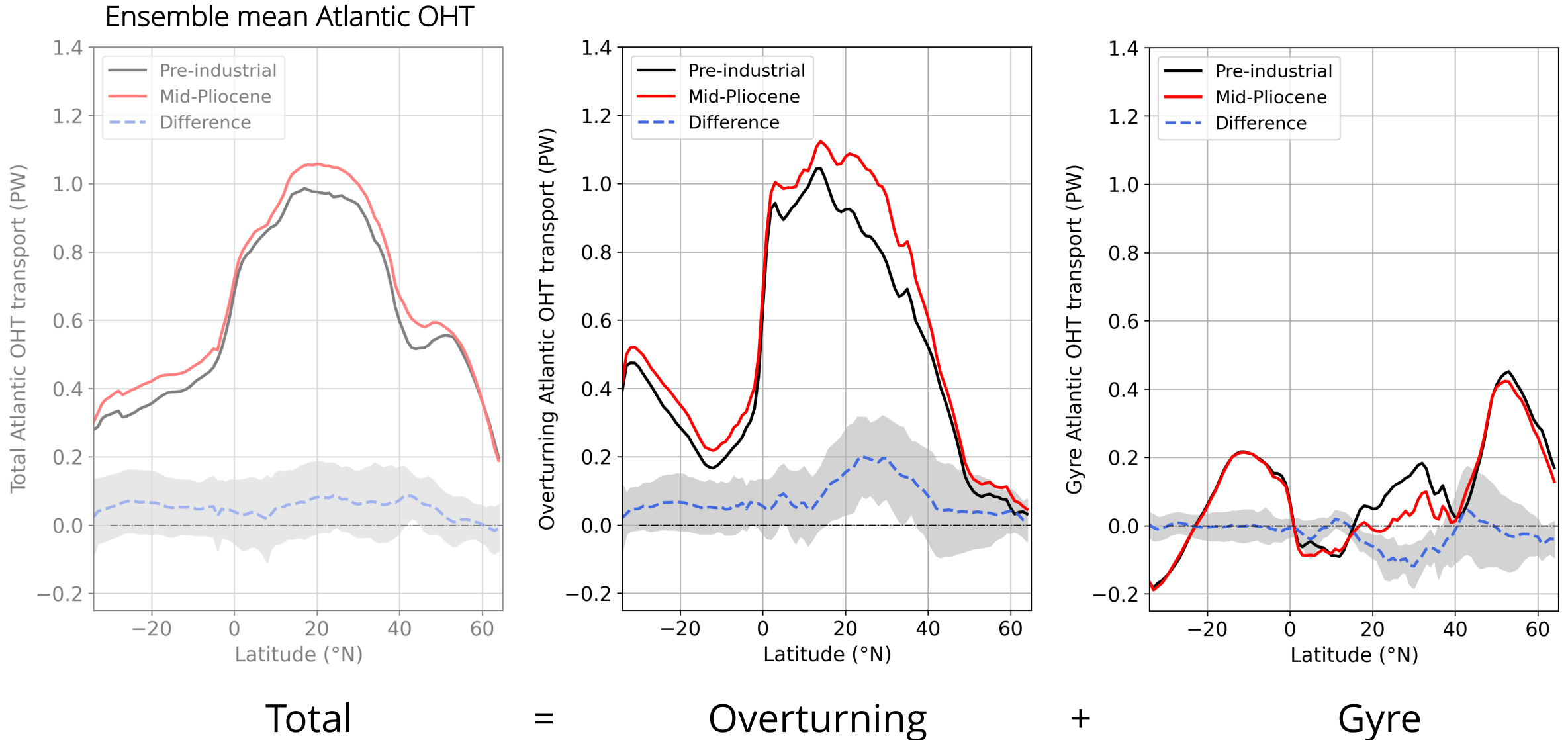
A stronger AMOC may explain reconstructed warm SSTs in North Atlantic.

However: no consistent increase in total Atlantic ocean heat transport (OHT).

Approach: separate total OHT into two components

1. Overturning circulation component
2. Wind-driven gyre component

Compensation between OHT components in the subtropical gyre region



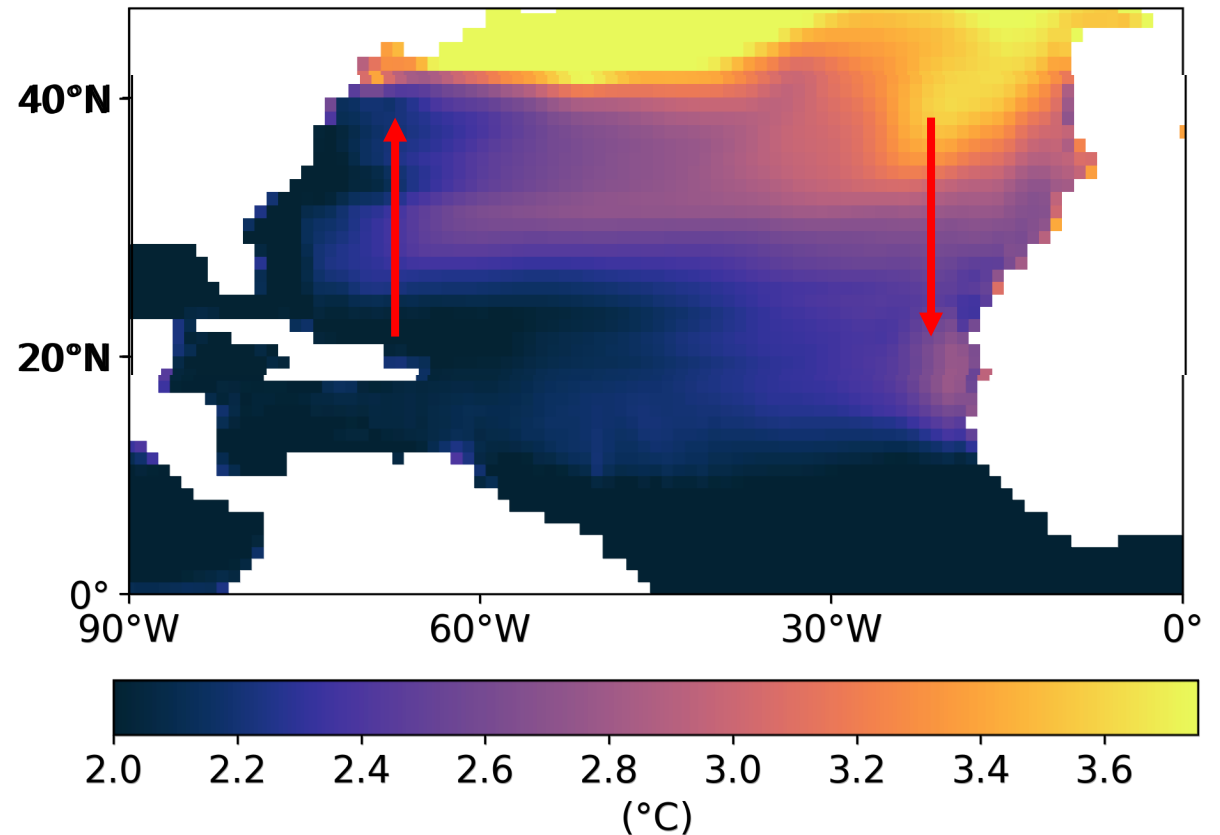
Decrease in OHT by the North Atlantic subtropical gyre

Changes in OHT by the gyre are not driven by changes in gyre circulation itself.

Zonal asymmetry in warming of Atlantic northern subtropical gyre.

Relatively more ocean heat transport southwards by gyre in mid-Pliocene.

Difference in SST between mid-Pliocene and pre-industrial



Conclusions

While the total Atlantic OHT does not respond consistently to a stronger AMOC in the PlioMIP2 ensemble, the OHT by overturning does.

The increase in northward Atlantic OHT associated with overturning is partly compensated by decrease in OHT by the gyre.

What does this mean for the mid-Pliocene AMOC as a non-analog feature for a future climate? Read it in our preprint!

