

Impacts of diabatic heating on the seasonality of the Atlantic Niño

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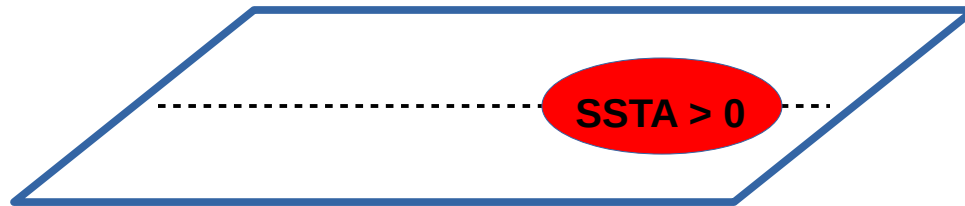
Mojib Latif, Noel Keenlyside, Joakim Kjellsson, Ingo Richter

HELMHOLTZ
RESEARCH FOR GRAND CHALLENGES

GEOMAR 

Bjerknes loop

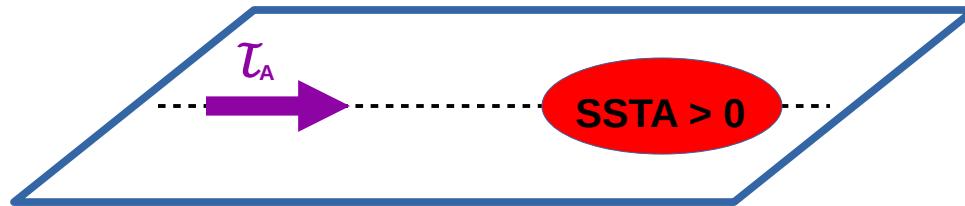
Surface-Ocean



$$dSST/dx$$

Bjerknes loop

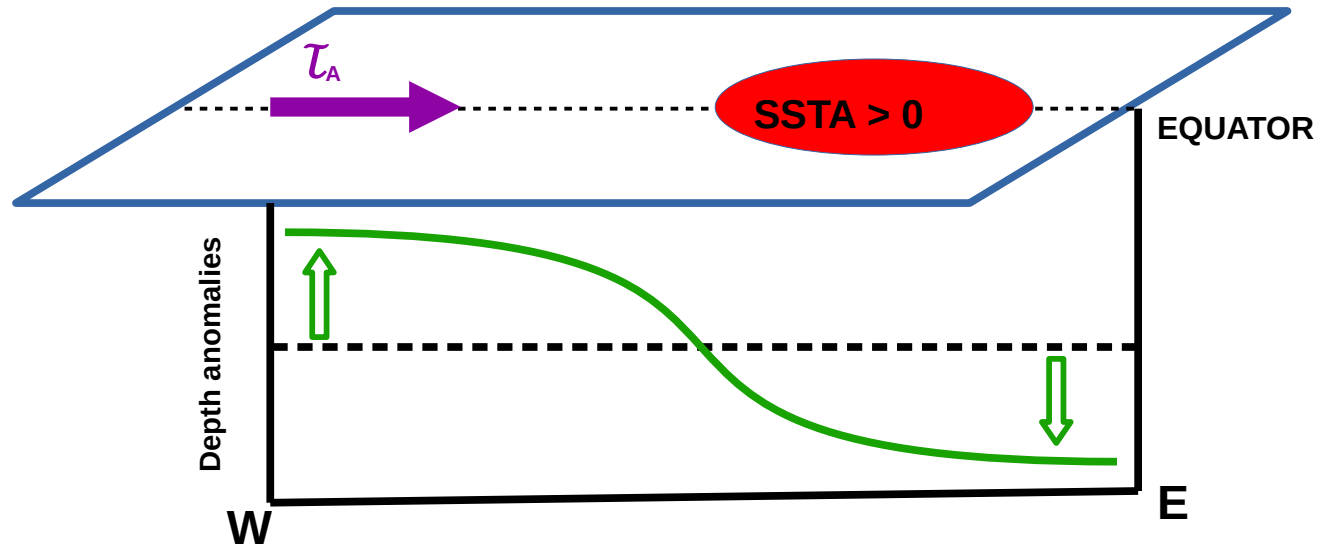
Surface-Ocean



$$dSST/dx \rightarrow \tau_x$$

Bjerknes loop

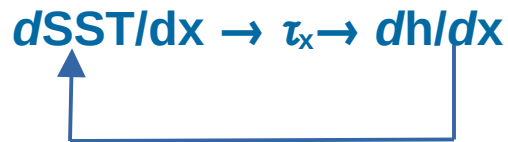
Surface-Ocean

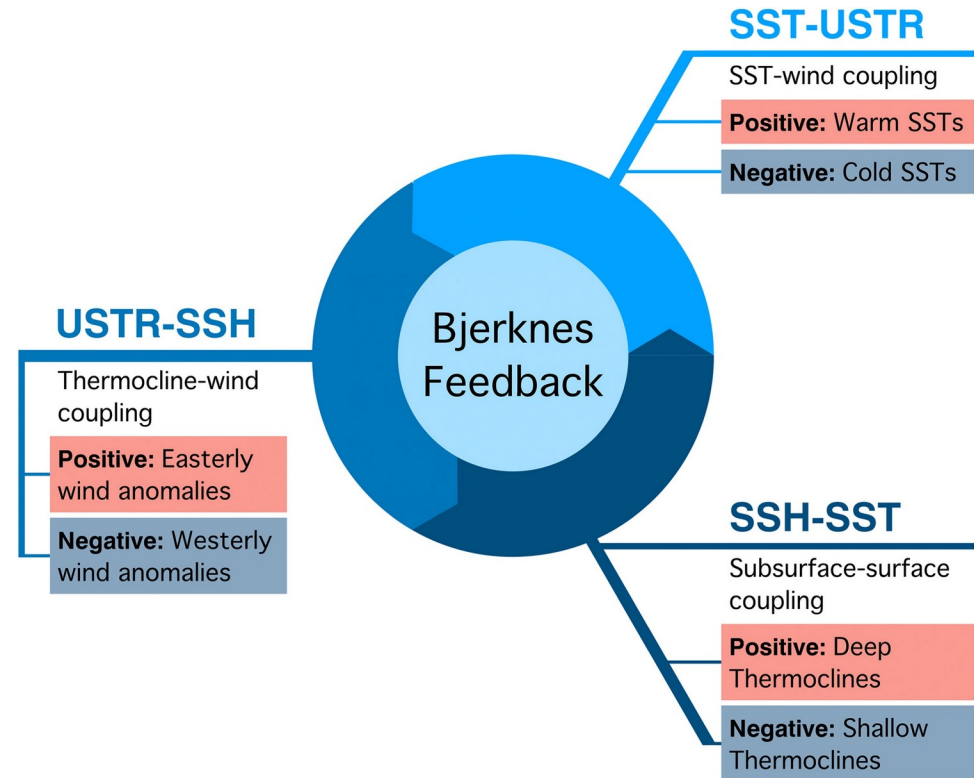


$$dSST/dx \rightarrow \tau_x \rightarrow dh/dx$$

Bjerknes loop

Surface-Ocean

$$dSST/dx \rightarrow \tau_x \rightarrow dh/dx$$




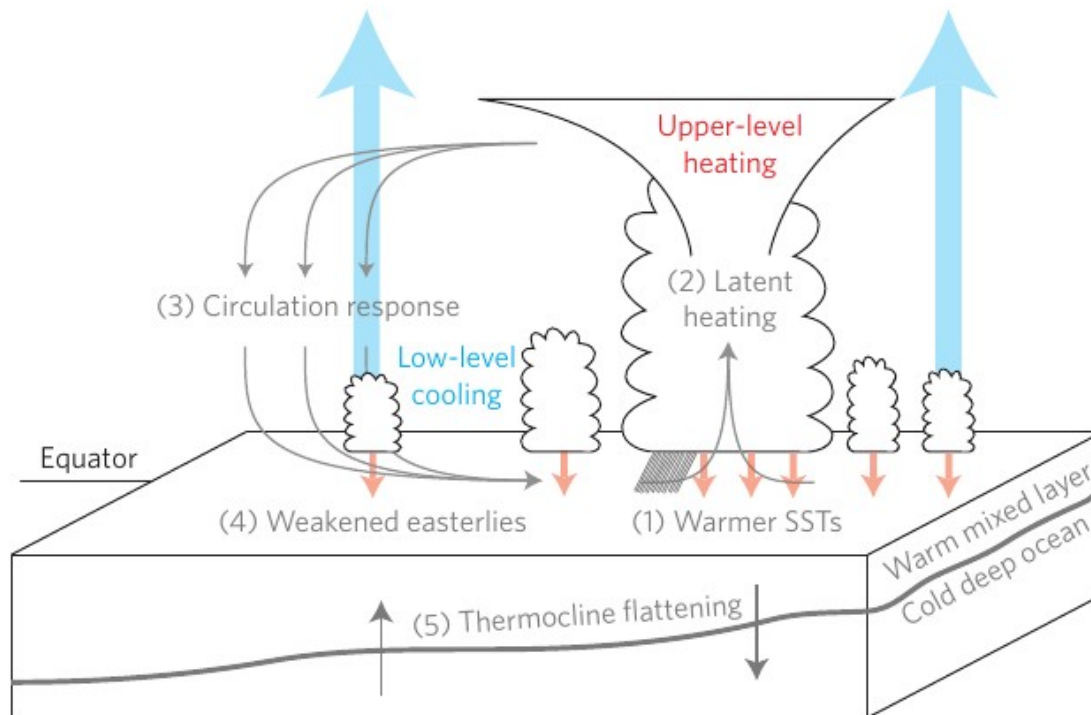
Dippe et al., 2019, JGR-Oceans.

Missing...

The atmosphere: vertical profile?

Bjerknes loop

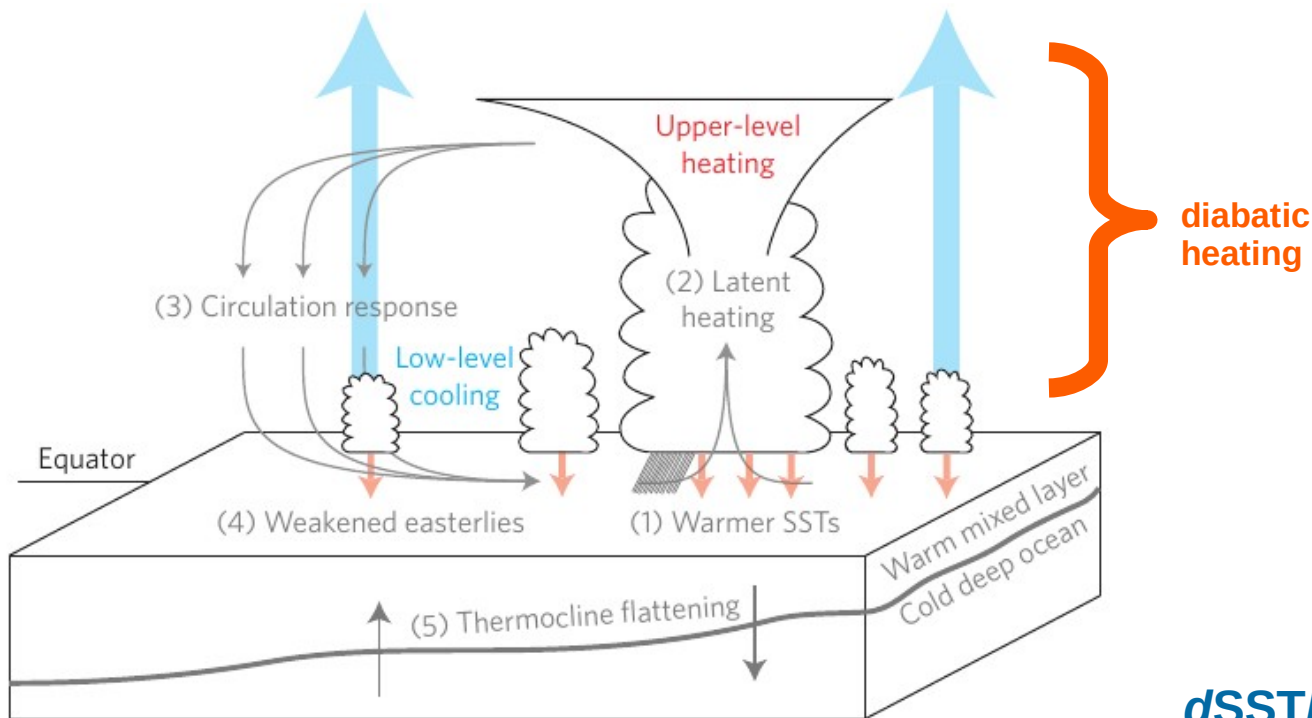
Atmosphere-Surface-Ocean



Rädel et al., 2016, Nature Geoscience

Bjerknes loop

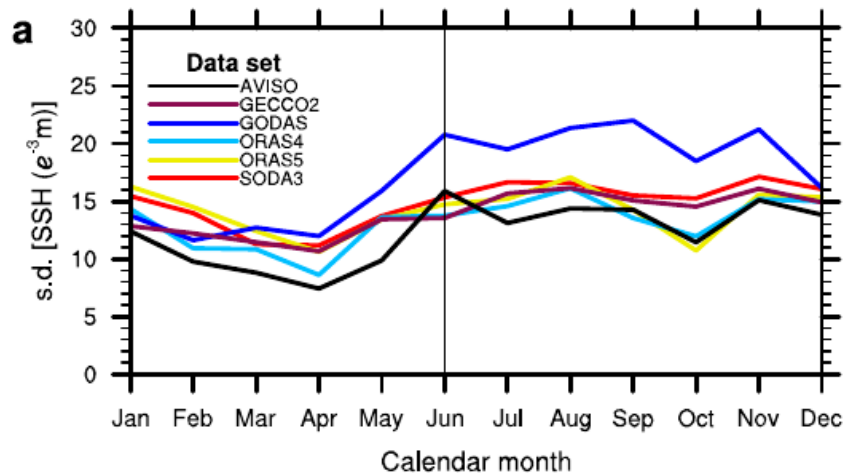
Atmosphere-Surface-Ocean



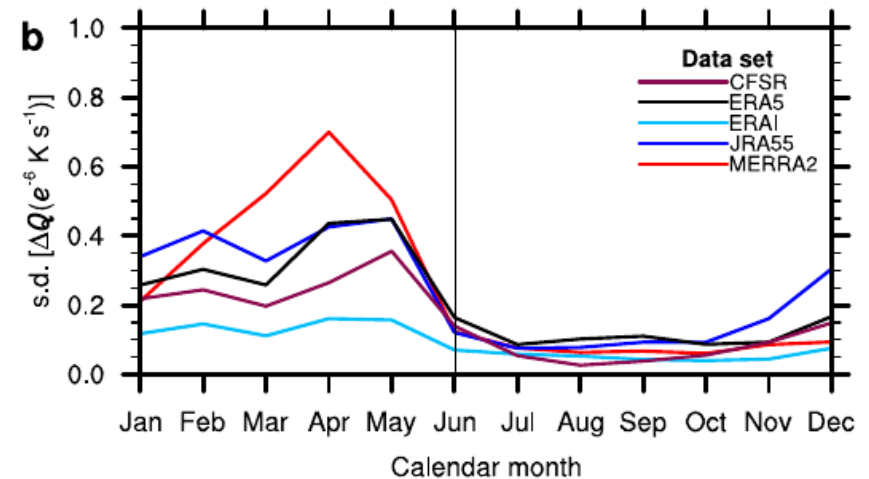
$$dSST/dx \rightarrow \Delta Q \rightarrow \tau_x \rightarrow dh/dx$$

Rädel et al., 2016, Nature Geoscience

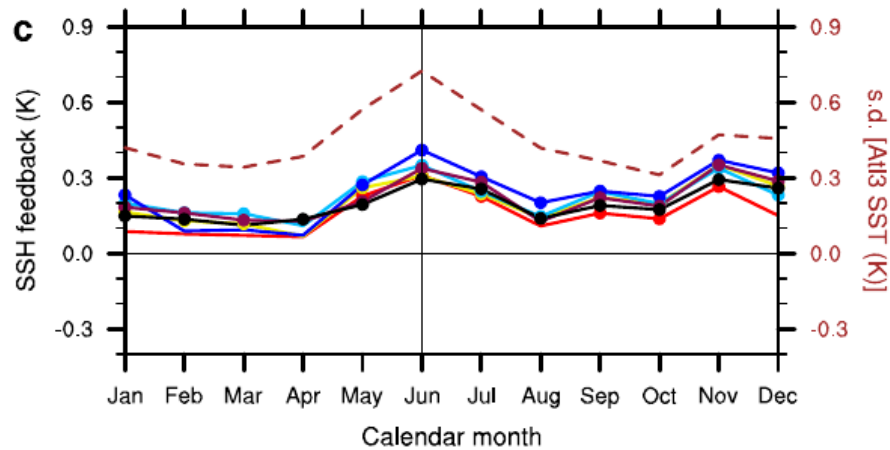
SSH



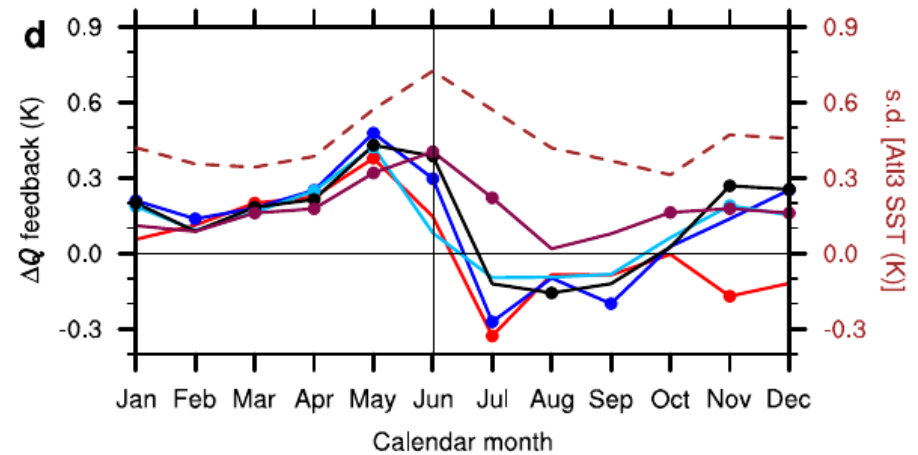
ΔQ



SSH



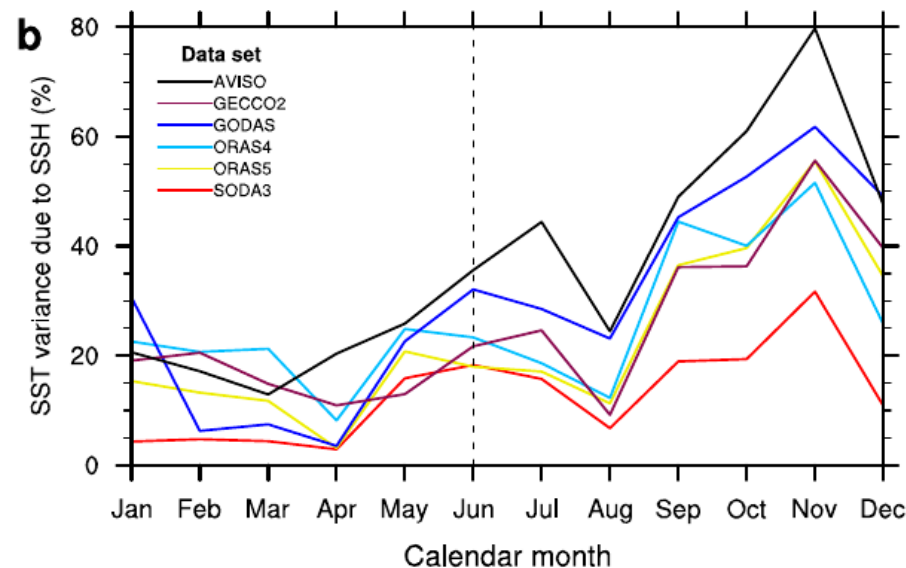
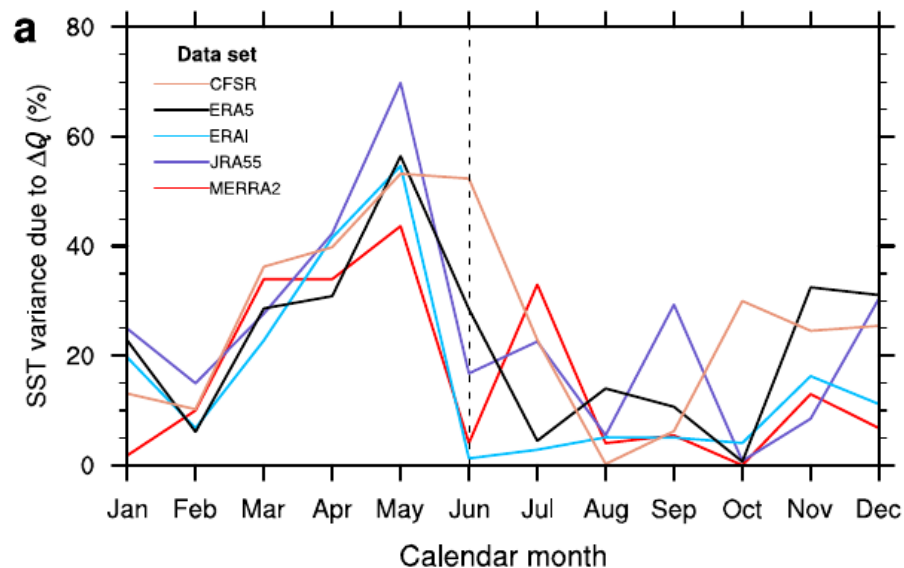
ΔQ



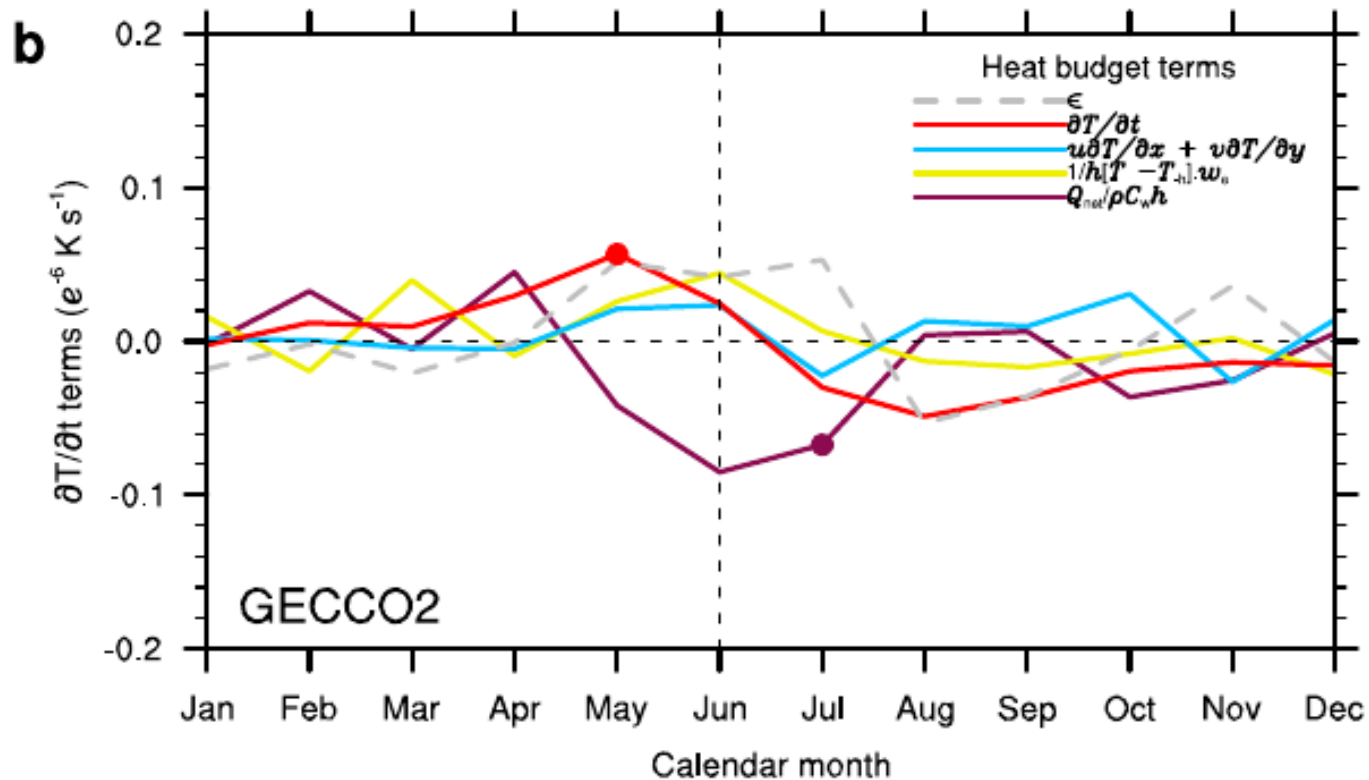
Explained variances

ΔQ

SSH



Transition: heat flux to thermocline



Impacts of diabatic heating

- Atlantic Niño peaks in June
- Diabatic heat in May leads the SST anomalies
- Maximum variance of SSH [as a thermocline proxy occurs in November]
- The summer Atlantic Niño anomalies are shortlived
- Linked to the ITCZ crossing the equator
- Precipitation leads SST anomalies
- SST anomalies to keep ITCZ at the equator as in the Pacific?
- A zonal component of the Atlantic Niño?

Nnamchi, H.C., Latif, M., Keenlyside, N.S., Kjellsson, J., Richter, I., 2021. Diabatic heating governs the seasonality of the Atlantic Niño. *Nature Communications*. 12, 376. <https://doi.org/10.1038/s41467-020-20452-1>