



How gateways shape the world

An ocean perspective on the Eocene-Oligocene-Transition

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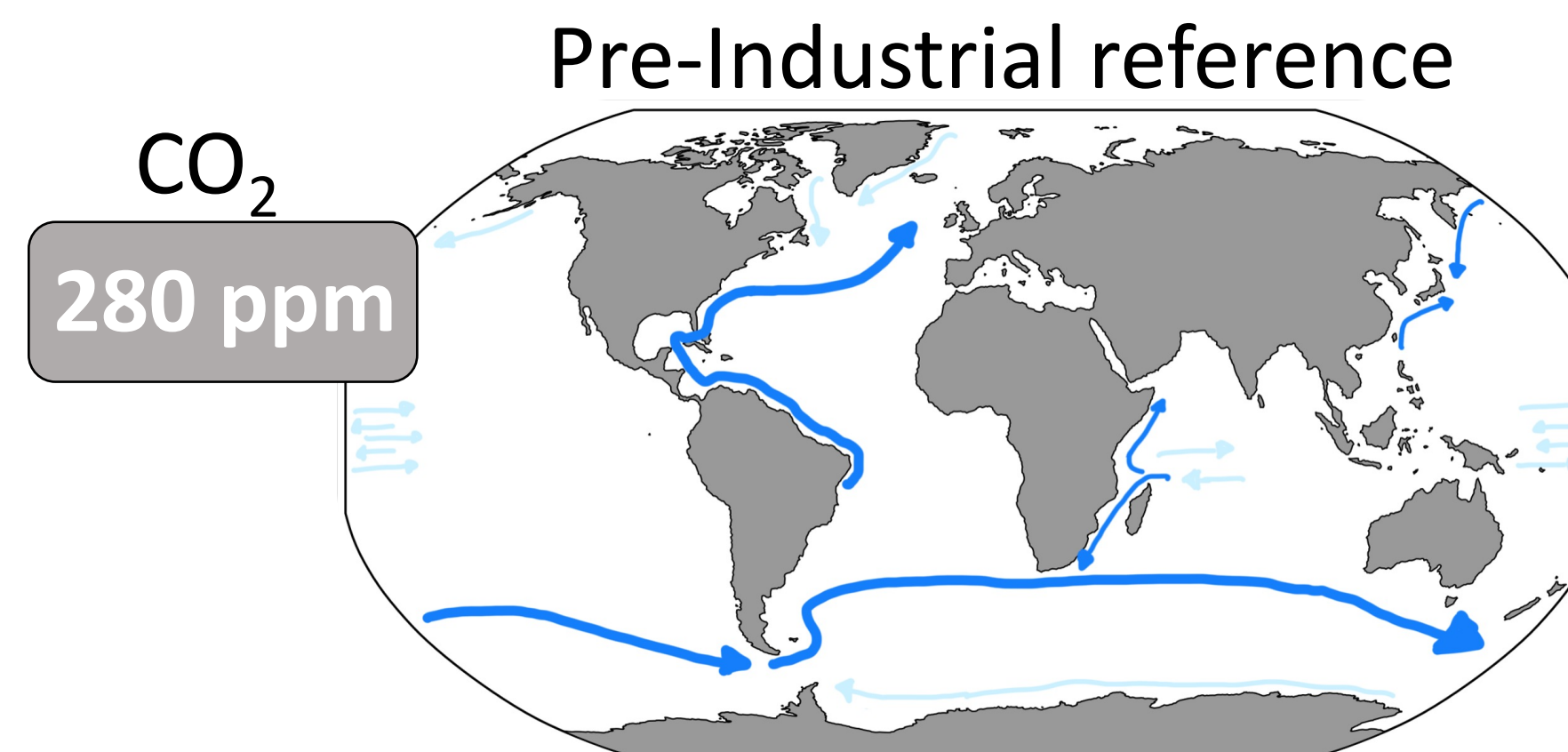


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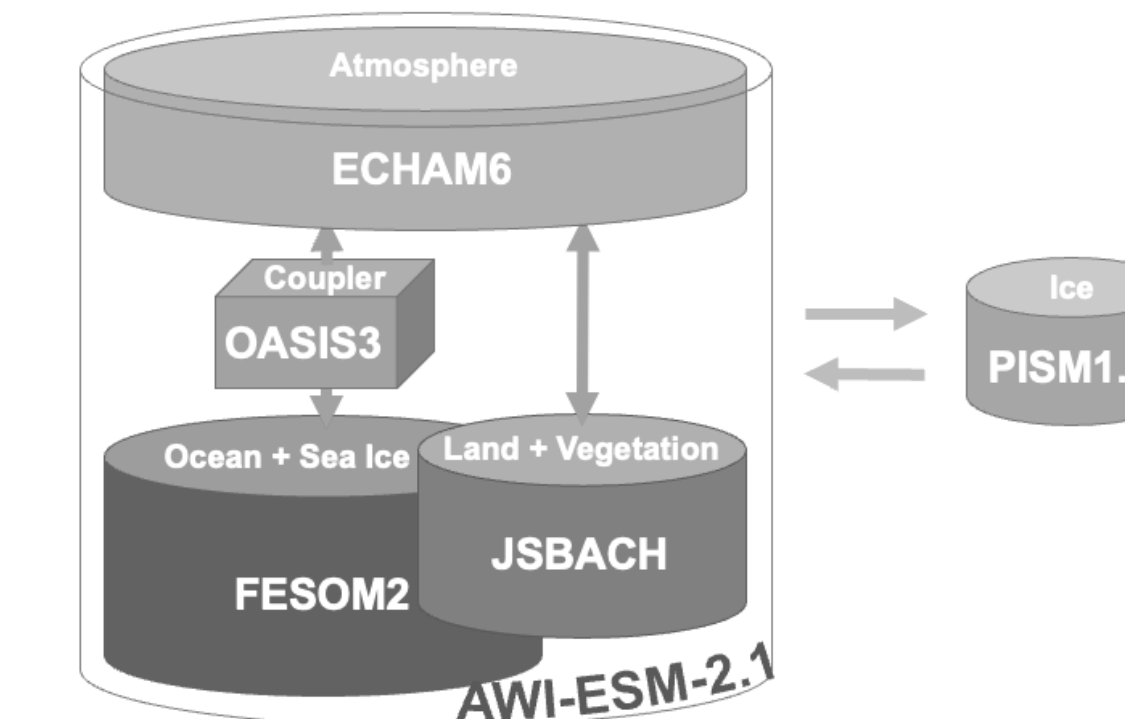
The Eocene-Oligocene-Transition

34 Ma was a time of **fundamental changes**:

- Climate change: greenhouse → icehouse
- Inception of the Antarctic Ice Sheet
- Opening of the Southern Gateways
→ onset of the circumpolar current?



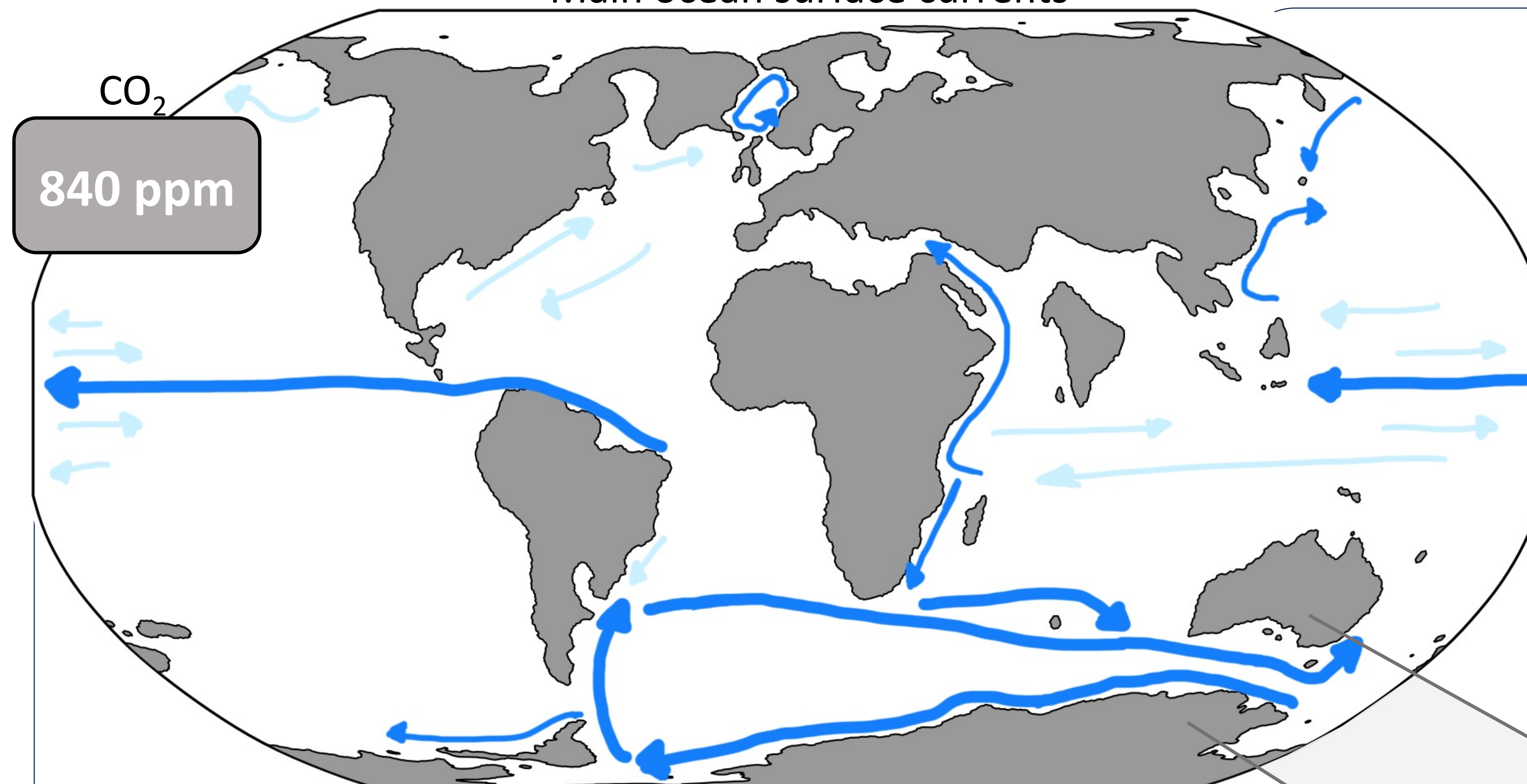
Climate Model



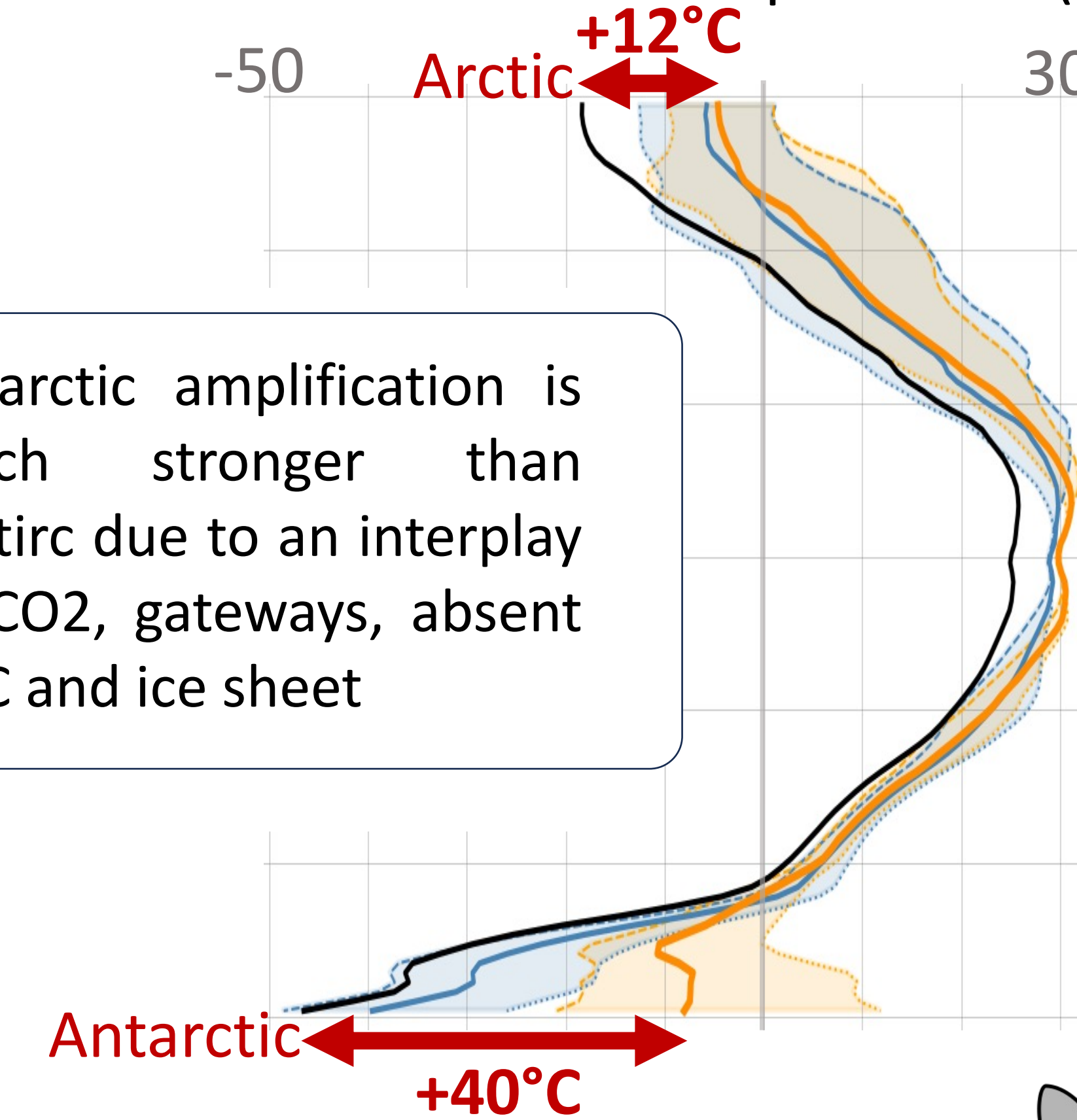
Abstract



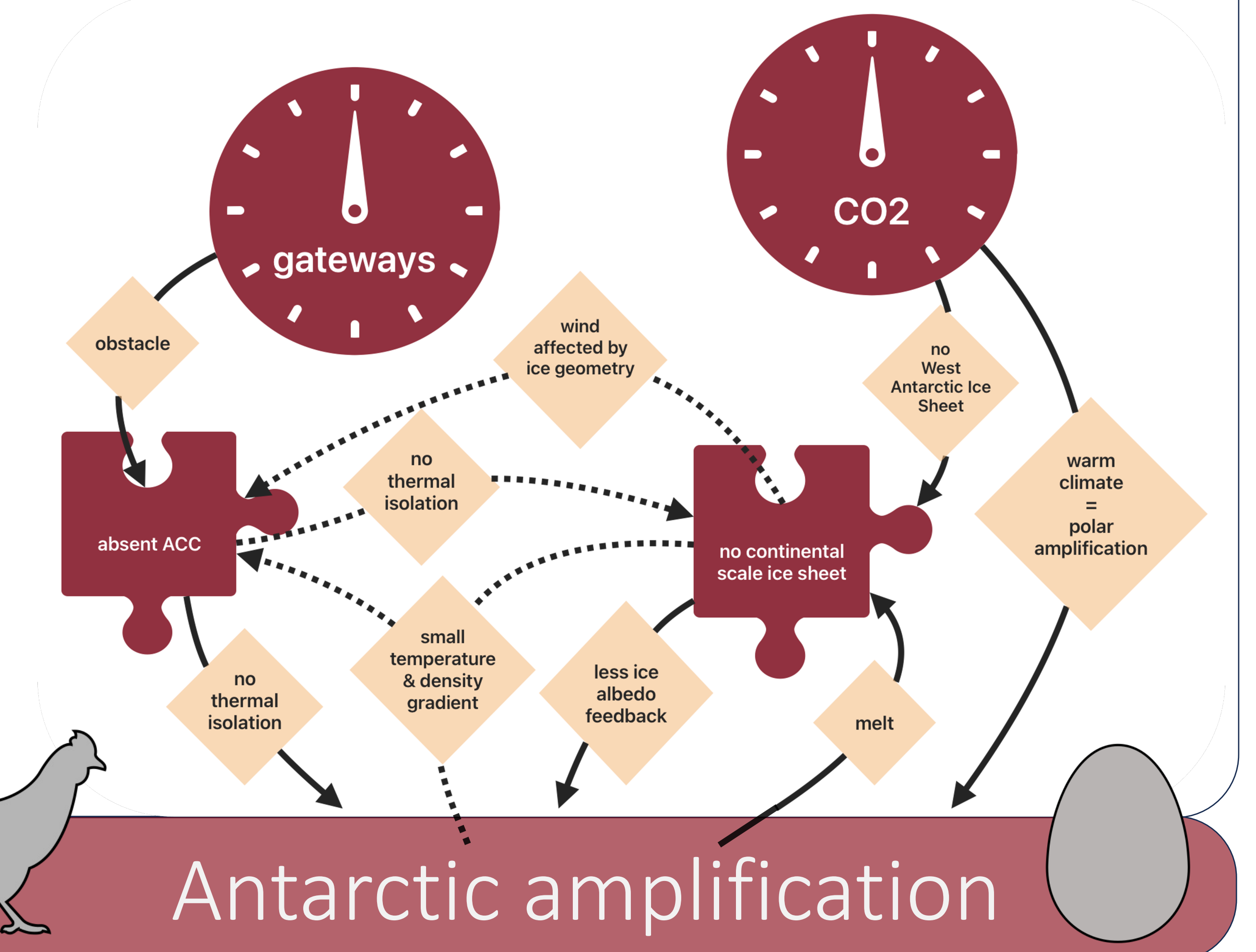
Main ocean surface currents



Zonal mean air temperatures (°C)



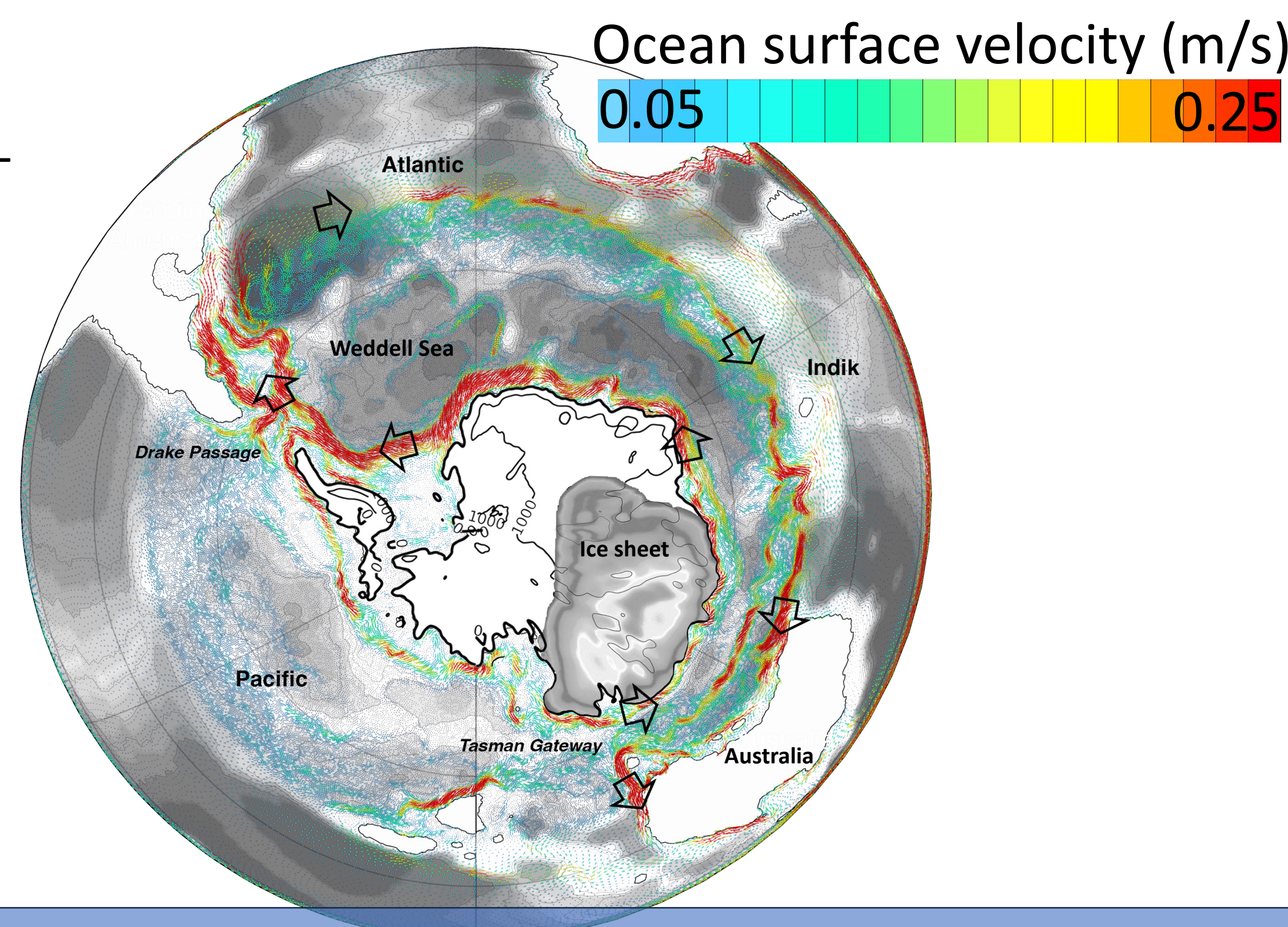
Antarctic amplification is much stronger than Arctic due to an interplay of CO₂, gateways, absent ACC and ice sheet



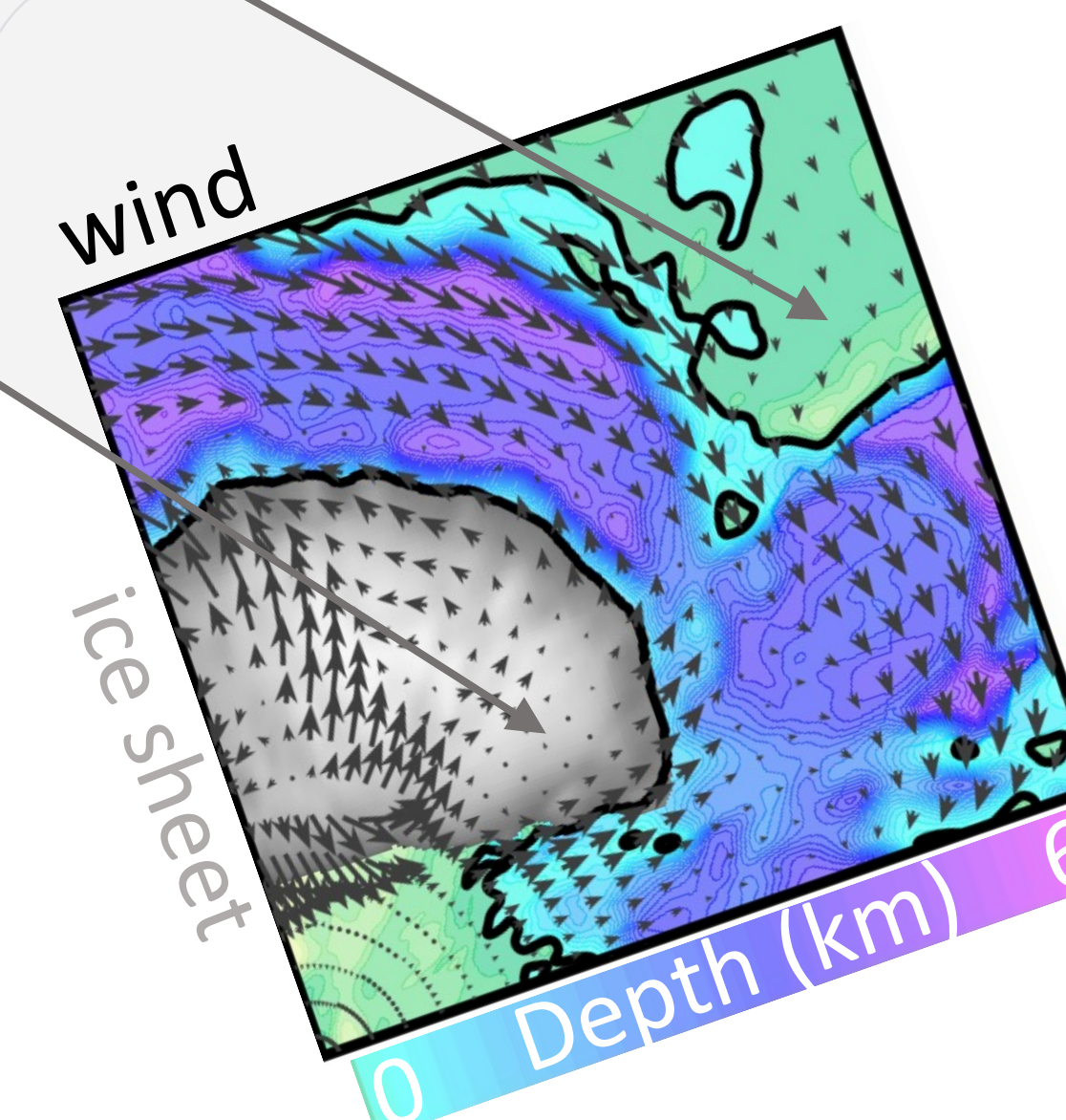
Extended Weddel-Australian gyre

Strong Antarctic coastal current

Weak Pacific west current



Absent Antarctic Circumpolar Current



Tasman Gateway

- Shallow: max. 2000m deep (today max. 5000m)
- Narrow: ~11° (today ~32°)
- Deepest section is not aligned with west wind
- Catabatic winds from the early ice sheet push the eastward coastal current

- West current is deflected North
- Strong east coastal current = large gyre
- No full circumpolar current

No west wind through Tasman gateway

