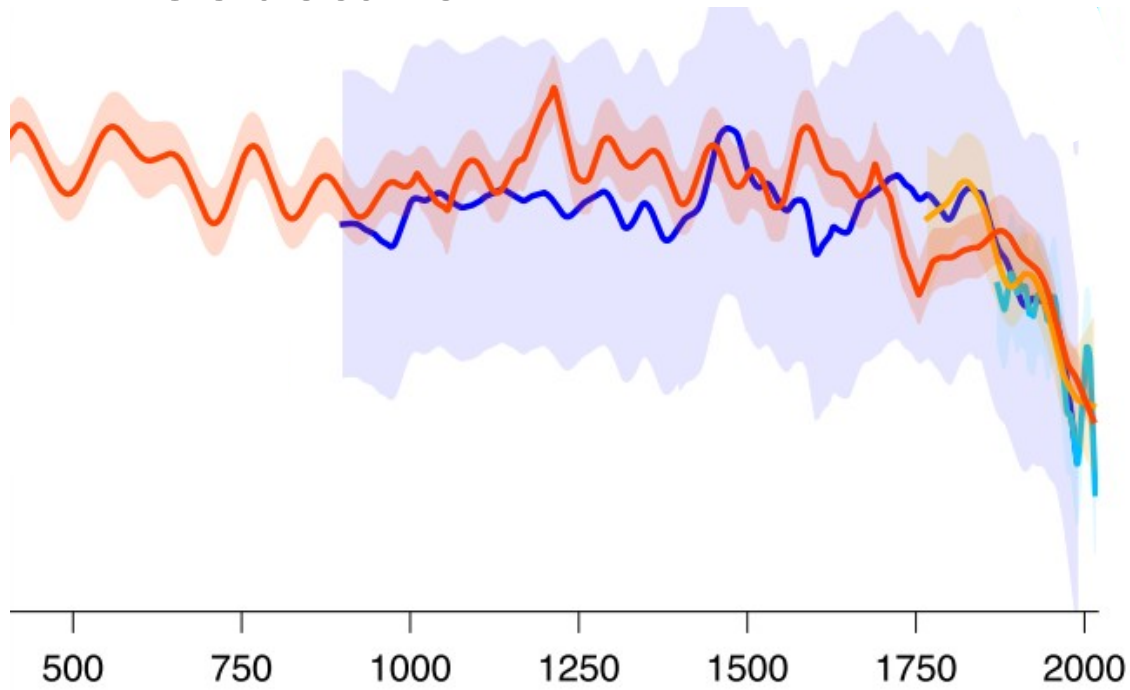


AMOC early warning signals in CMIP6 models?

Lana Blaschke, Maya Ben-Yami, Niklas Boers, Da Nian

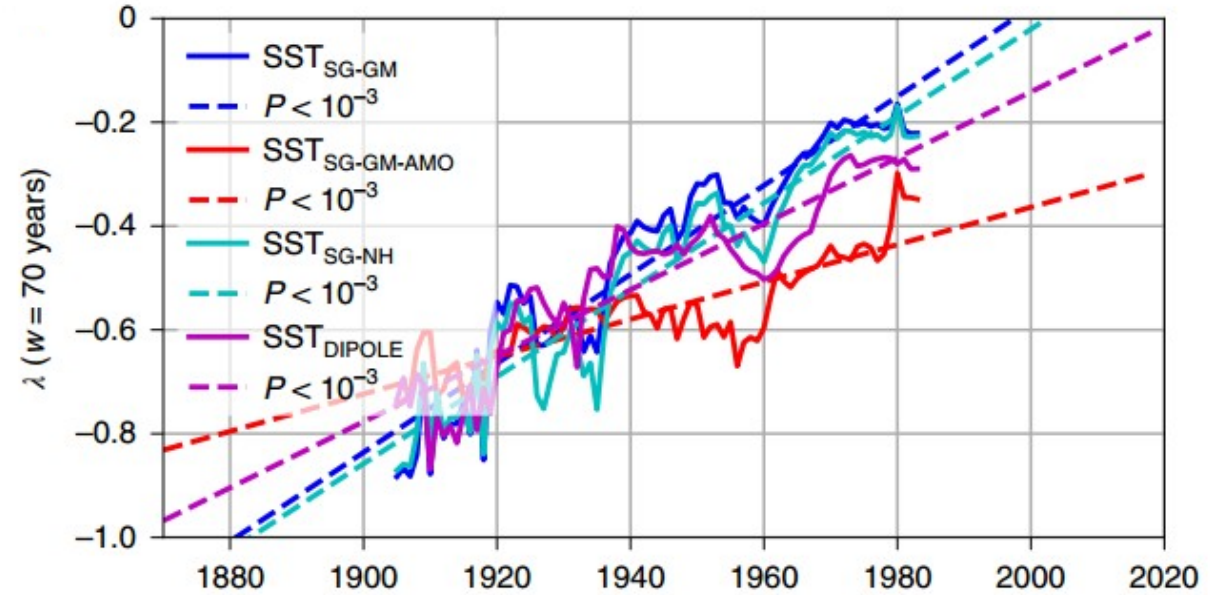
AMOC decline



Caesar et al. 2021

Year

Early warning signals

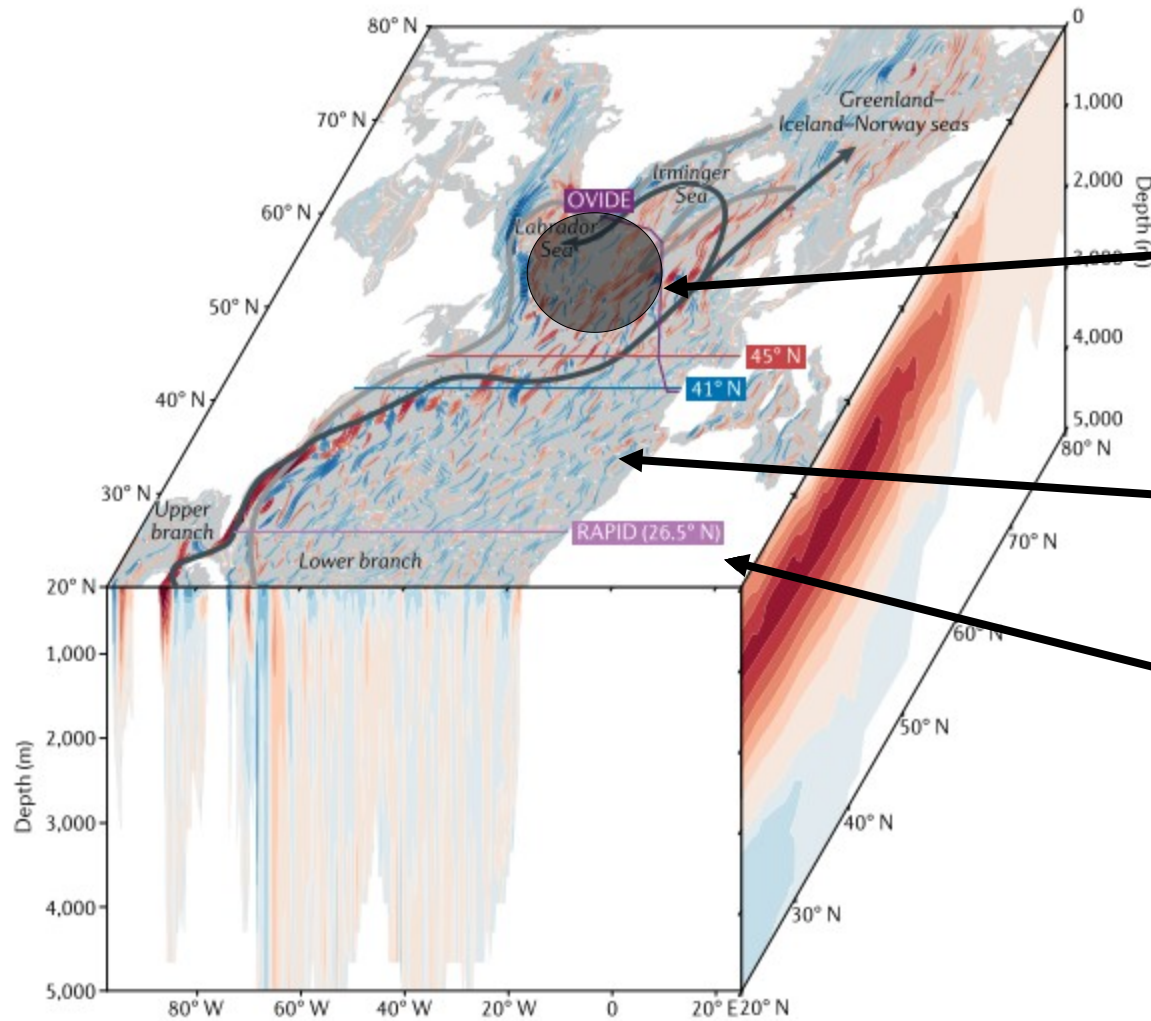


Boers 2021

BUT the decline is still controversial!

Latif et al. 2022

Kilbourne et al. 2022




SST Index

Subpolar gyre SSTs
- global mean SSTs

Strength at 35° N

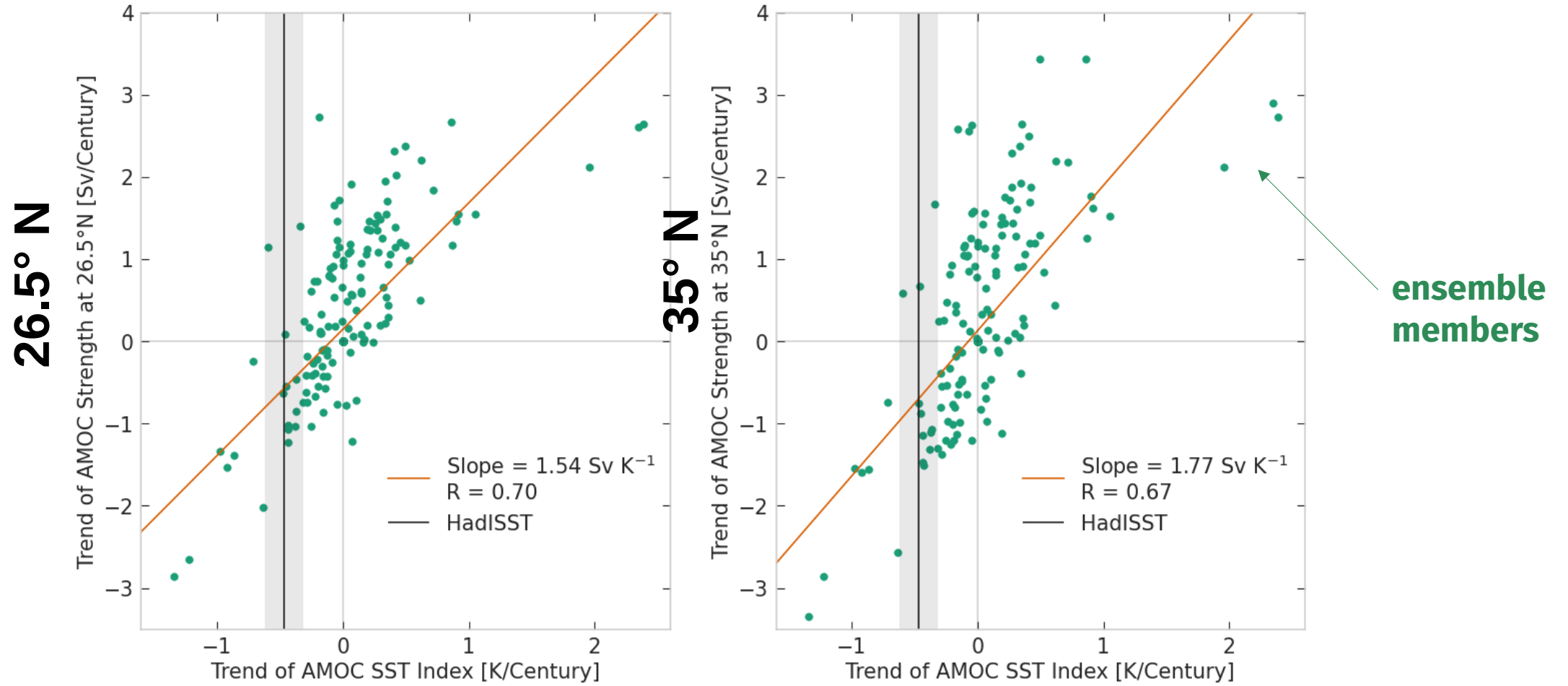
Strength at 26.5° N

Early warning signals (EWS)

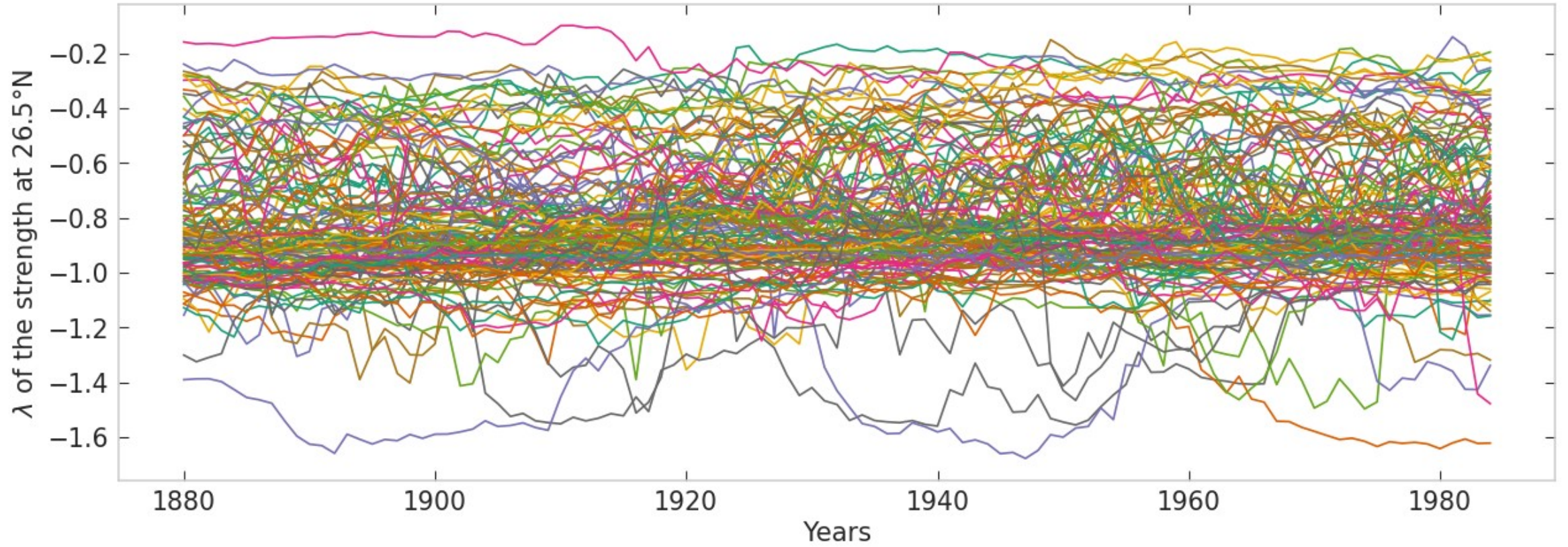

$$\frac{d\Delta x}{dt} \approx \lambda \Delta x + \eta(t)$$

1) Trends

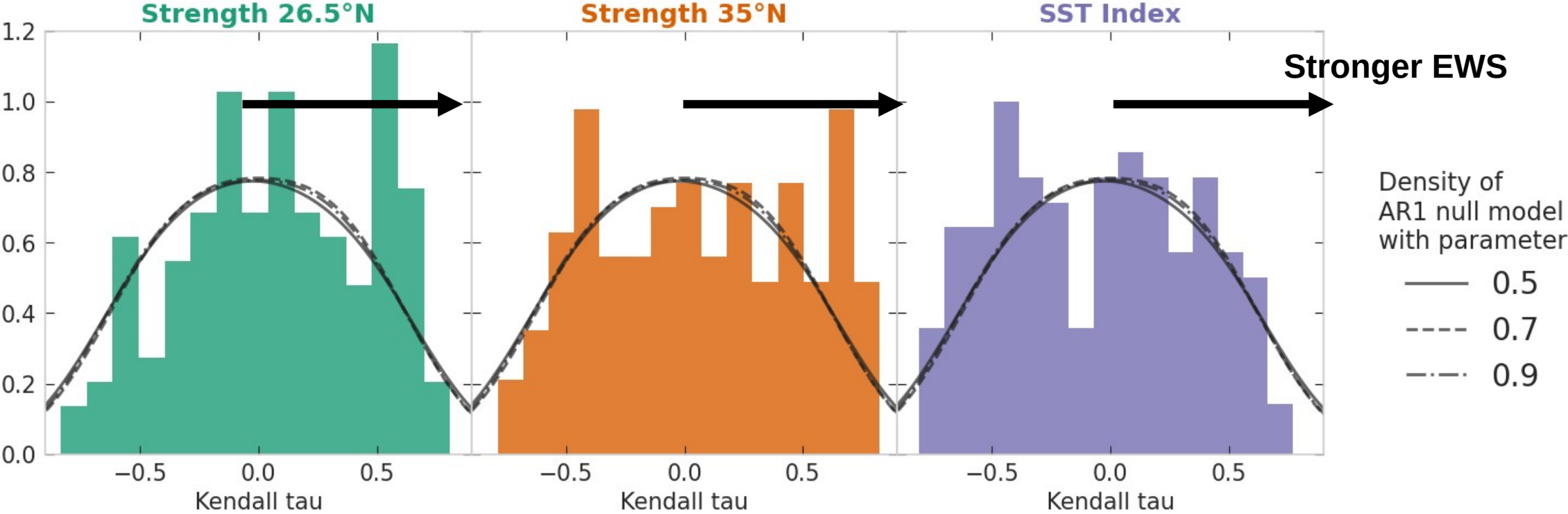
- good correlation
- many models outside observational range



2) Early warning signals



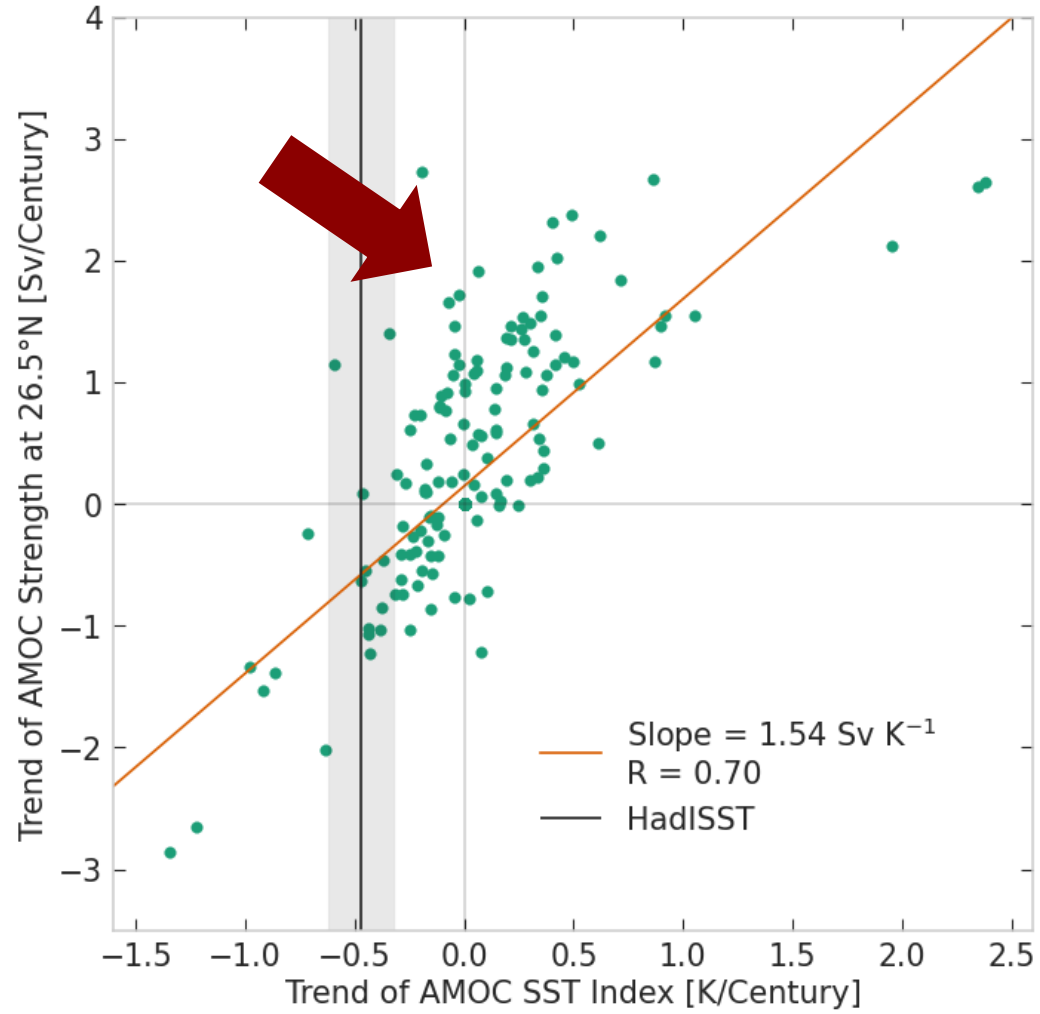
2) Early warning signals



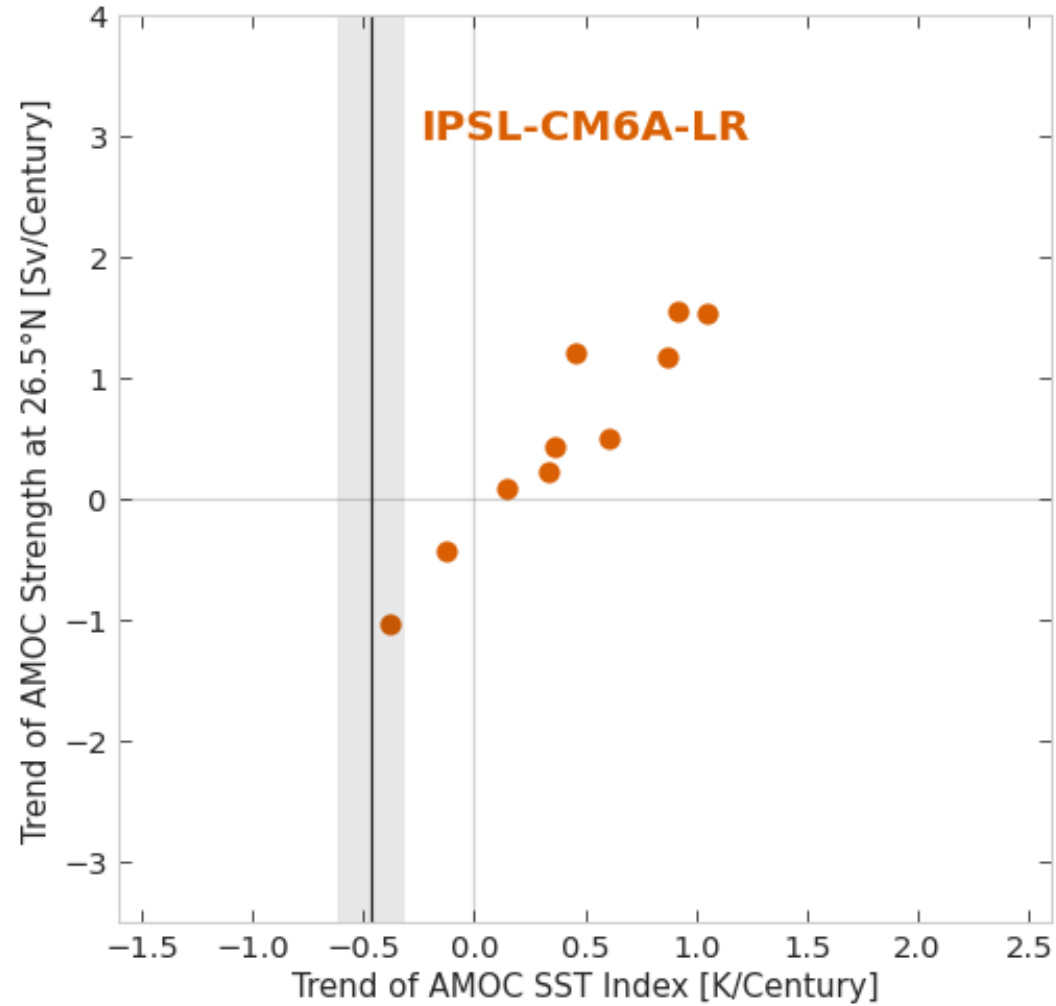
- 1) AMOC trend does not match observations for most models
- 2) No coherence for early warning signals

Why?

1) AMOC trend does not match observations for many models

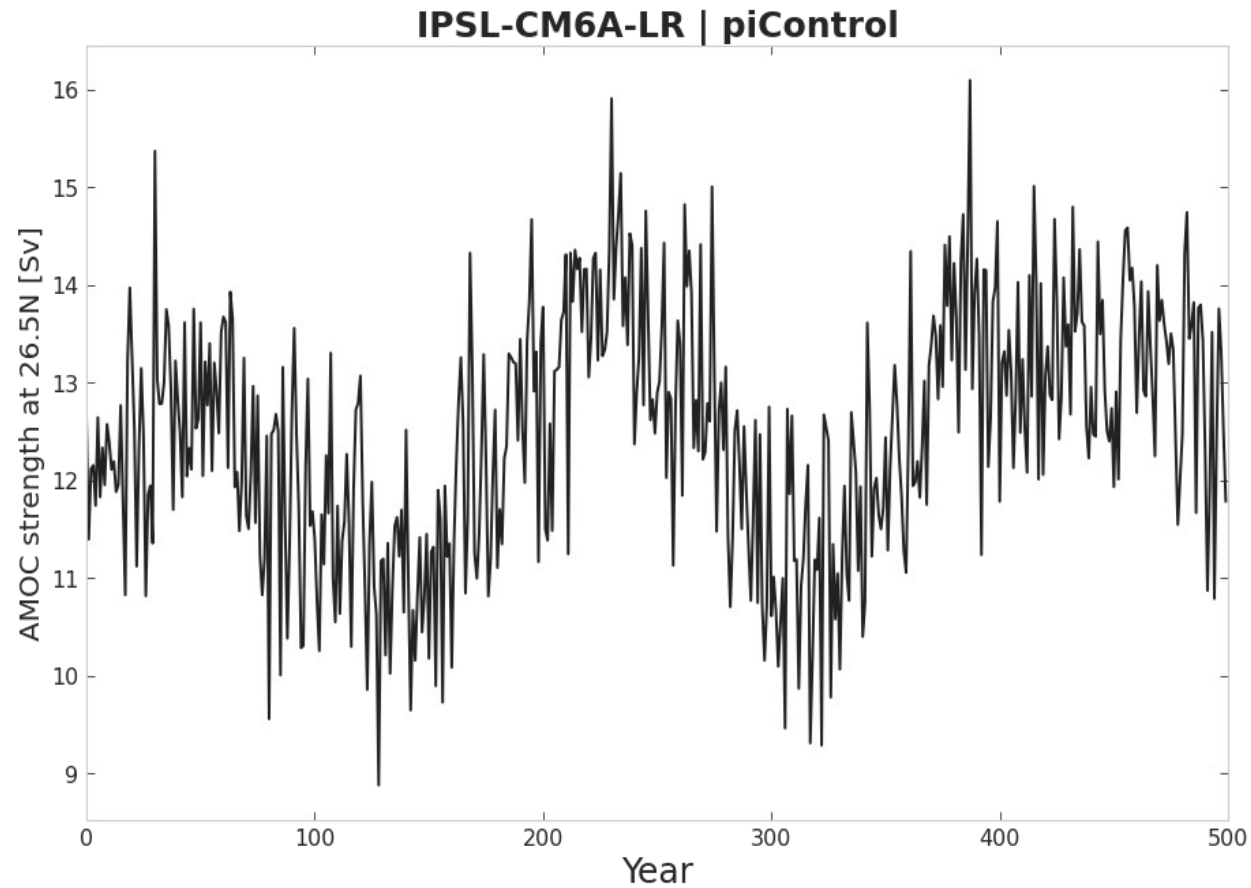


1) AMOC trend does not match observations for many models



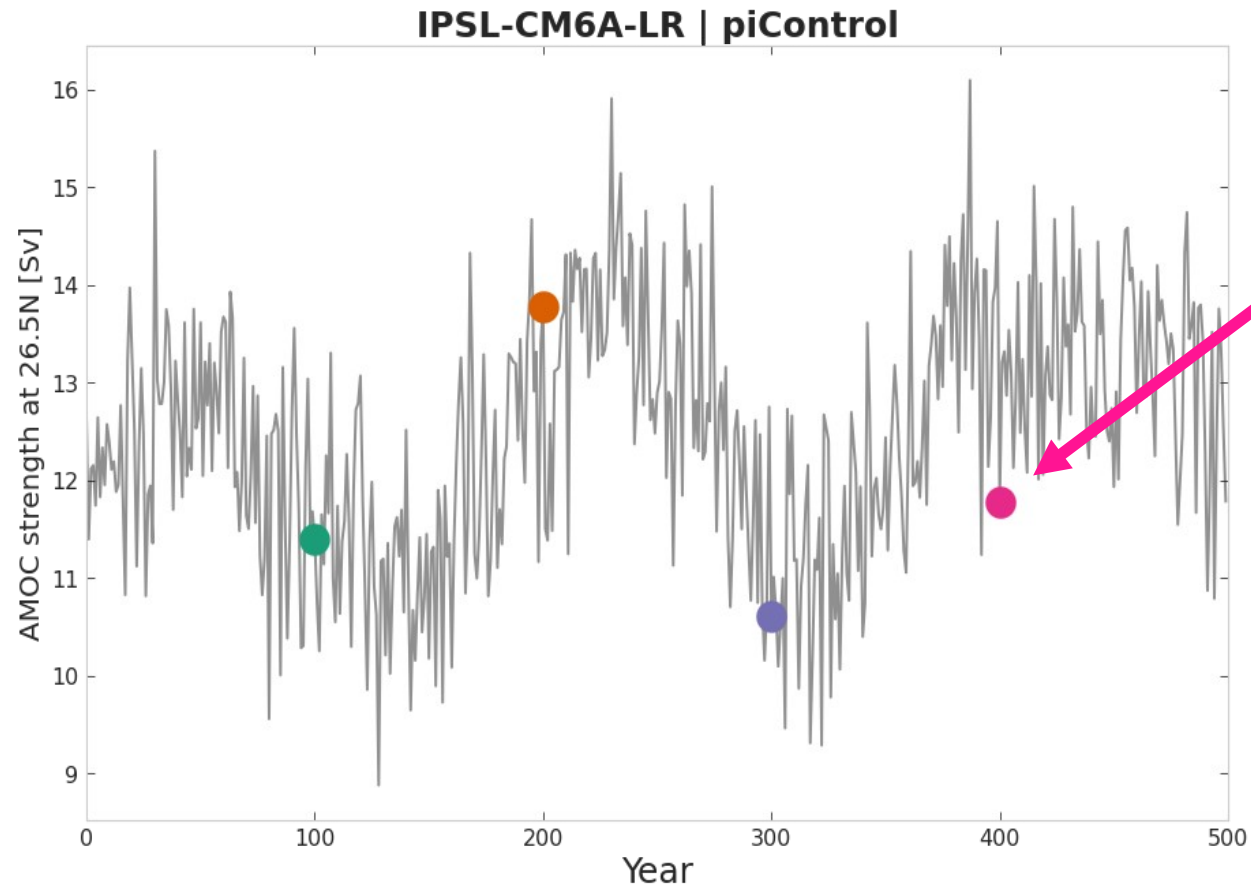
1) AMOC trend does not match observations for many models

—> centennial oscillations of the AMOC?



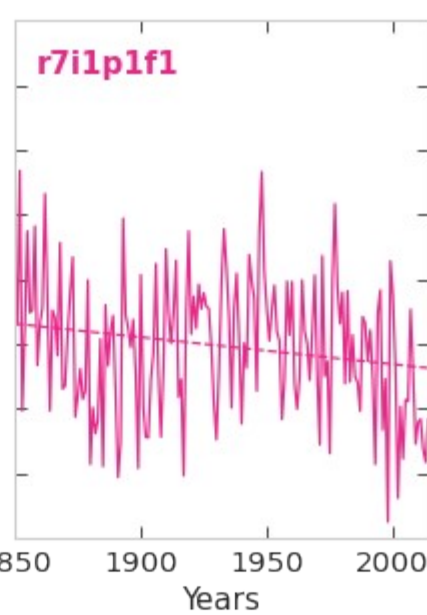
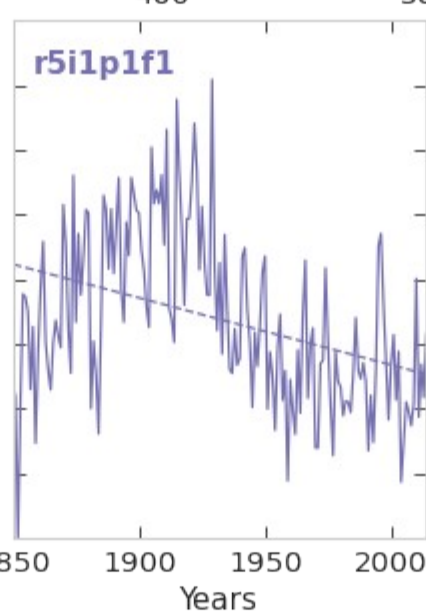
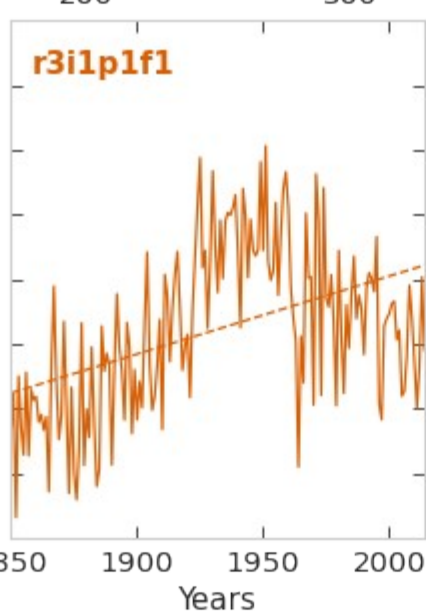
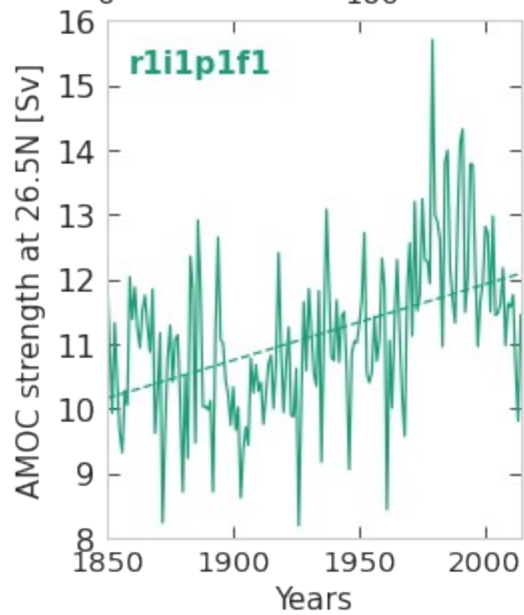
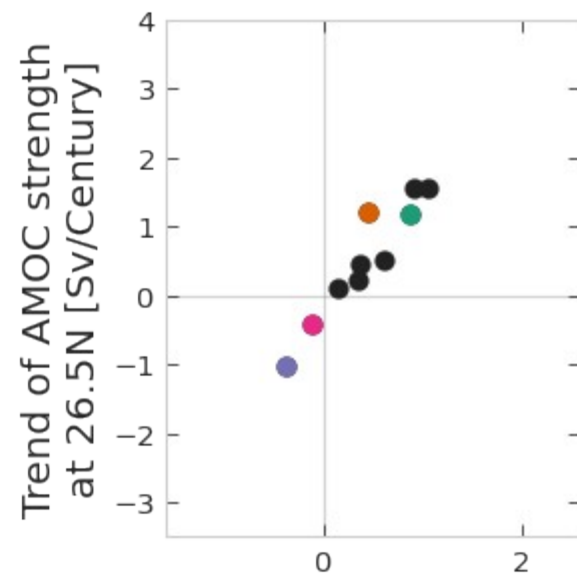
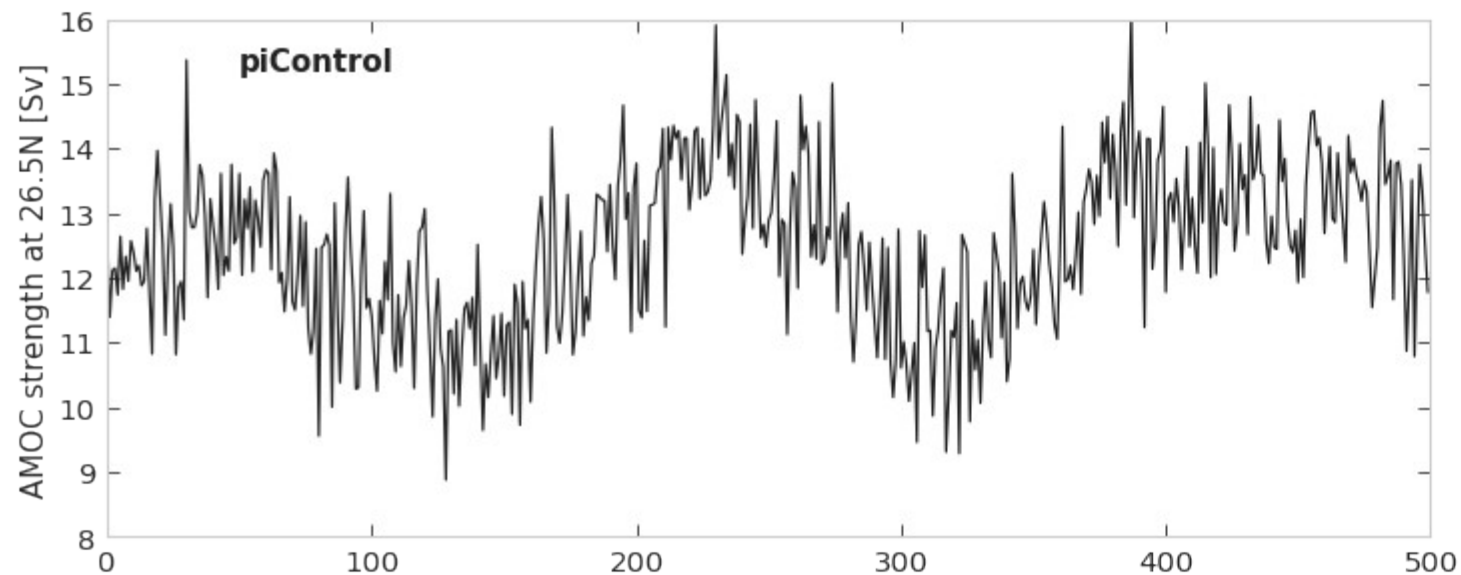
1) AMOC trend does not match observations for many models

—> centennial oscillations of the AMOC?



initialization years
(illustrative examples)

IPSL-CM6A-LR



What about the early warning signals?

Not more than null model, no coherence in indices or ensemble members

- Model **representation** of the AMOC?
- AMOC subsystems **destabilize separately**?
- Decline part of an **oscillation** and not a destabilization?
- EWS analysis **problematic for a 1D fingerprint** of an extended system?

Questions?