Is the Atlantic Meridional Overturning Circulation Chaotic?

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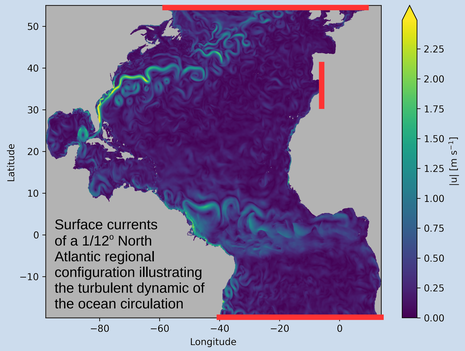
OBJECTIVE

Categorize the **North Atlantic** low frequency variability as **forced** or **intrinsic**



Evidence: Significant contribution of intrinsic dynamics for the North Atlantic ocean low frequency (> 1 year) variability [Penduff et al. (2011) ; Sérazin et al. (2015, 2017)]

METHOD

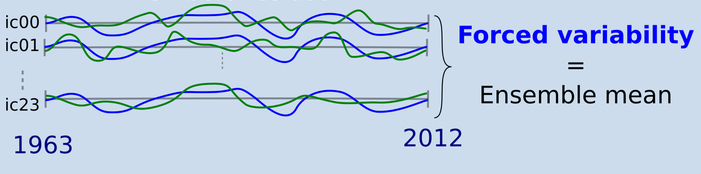
1/ North Atlantic regional modeling

- 1/12° oceanic configuration of the MITgcm
- CheapAML (Atmospheric boundary layer)
- Atmospheric forcing: Drakkar Forcing Set v4.4
- Boundary conditions: ORCA12.L46-MJM88 global run
- 50-year long simulations

2/ Ensemble strategy

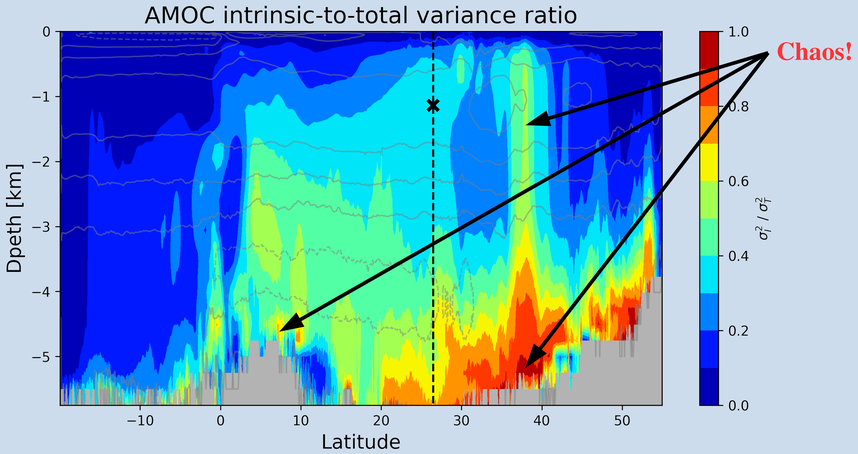
- 24 members with identical forcing and model formulation
- 24 perturbed initial conditions

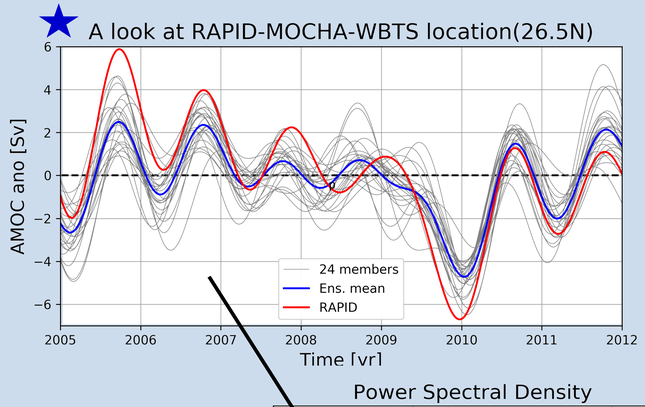
Intrinsic variability
=
Members residual

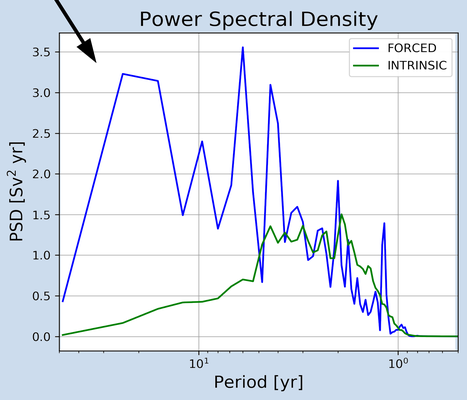


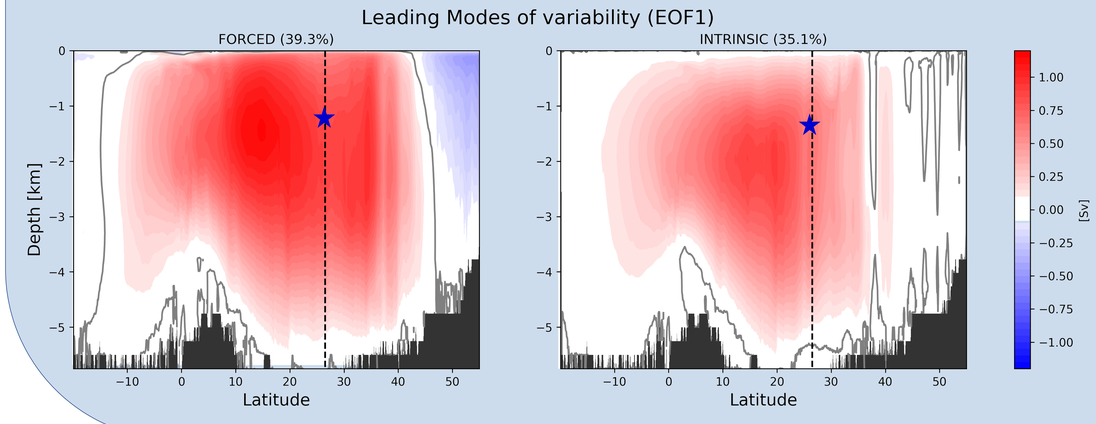
Forced variability
=
Ensemble mean

RESULTS









SUMMARY

- The Atlantic Overturning is chaotic !
- The leading mode of intrinsic variability is large scale ; Share similarities with the forced signal
- RAPID-MOCHA-WBTS location (26.5N)
  - **40-50%** (~1 Sv) at **interannual** time scales (2-5 years)
  - **20-25%** (~0.3 Sv) at **decadal** time scales (10-20 years)