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Title: Multidecadal variability in an eddy-resolving ocean model

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Multidecadal variability in an eddy-resolving ocean model

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Objective

Excite and analyze low-frequency variability of the North Atlantic Ocean circulation in a strongly eddying ocean model.

Background

The North Atlantic climate system displays variability on decadal (10-20 yr) and multi-decadal (60-70 yr) time scales. It has been speculated that internal oscillations of the ocean circulation are responsible for these climate swings. Here we aim to excite and analyze such ocean oscillations in an ocean model that explicitly resolves meso-scale processes (eddies, energetic boundary currents, etc.).

Approach

- Perform simulations with the Parallel Ocean Program in a strongly eddying ('R0.1') configuration;
- Perturb the initial condition with the dominant eigenmode from another model;
- Compare the response of the Atlantic Meridional Overturning Circulation (AMOC) with a control integration.

Conclusion

- The response of the AMOC to the applied initial perturbation is not strong enough to stand out amongst interannual variability. A stronger perturbation needs to be applied to excite a measurable response.

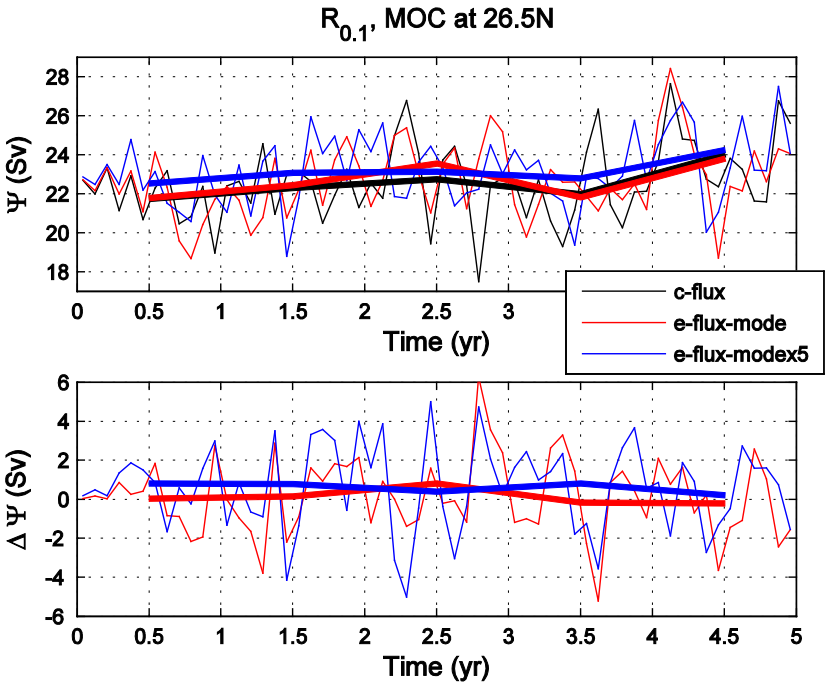

Figure 1: Upper panel: Strength of the Atlantic Meridional Overturning Circulation (in Sv = 10^6 m^3/s) for the control integration (black) and the two perturbation experiments (red: weak perturbation; blue: strong perturbation). Lower panel: anomalies with respect to the control. Thin/thick lines denote monthly/annual averages.