

Atlantic Meridional Overturning Circulation

Outline

1. Phenomenology of the AMOC and connection to broader climate system.
2. Biases in the representation of the AMOC in coupled models.
3. Factors influencing the presence and strength of the AMOC
4. Understanding the AMOC as part of the coupled system

Concepts & Terminology

- Buoyancy versus wind-driven circulations
- Thermohaline circulation
- Western Boundary Currents
- Ocean Equation of State

Reading

This is a vast topic, but two review papers are quite helpful. Buckley and Marshall (2016) is more phenomenological. A nice overview of the status of theoretical thinking is given by Johnson et al. (2019). My second lecture was largely based on the paper by Gnanadesikan and Anderson (2009), which is also introduced by Johnson et al. This employs basic concepts from e.g., Stommel and Arons (1959).

Exercises

TBD

References

- Buckley, M. W., and J. Marshall, 2016: Observations, inferences, and mechanisms of the Atlantic Meridional Overturning Circulation: A review. *Rev. Geophys.*, **54** (1), 5–63.
- Gnanadesikan, A., and W. G. Anderson, 2009: Ocean Water Clarity and the Ocean General Circulation in a Coupled Climate Model. *J. Phys. Oceanogr.*, **39** (2), 314–332.
- Johnson, H. L., P. Cessi, D. P. Marshall, F. Schloesser, and M. A. Spall, 2019: Recent Contributions of Theory to Our Understanding of the Atlantic Meridional Overturning Circulation. *Journal of Geophysical Research: Oceans*, **124** (8), 5376–5399.
- Stommel, H., and A. B. Arons, 1959: On the abyssal circulation of the world ocean-I. Stationary planetary flow patterns on a sphere. *Deep Sea Research (1953)*, **6** (C), 140–154.