

## AMOC state, variability, and change

**A charge for the Breakout / Task Team groups:**

Discuss review / synthesis paper topics (new topics?), taking into account what has been already published and in progress.

Suggest one to two topics that you think would address a gap with possible volunteers to lead the effort.

Synthesis papers: preliminary list of potential paper themes which can be combined and/or expanded:

- 1. Characterizing the mean state of AMOC, and heat and salt transport by AMOC, over the whole Atlantic basin,**
- 2. Characterizing the annual fluctuations of AMOC and the importance of winds vs. buoyancy forcing,**
- 3. Inter-annual, decadal, centennial, etc. variations of AMOC and the mechanisms that drive them (including trends),**
4. Impacts of AMOC on SST (e.g., AMV), SSH, sea-ice, weather, climate, ecosystems, ... (including paleo-climate linkages),
5. AMOC fingerprints and proxies (somewhat related to #4),
6. Impacts of eddies/mesoscale variability on AMOC characteristics,
7. AMOC and climate prediction on various time scales,
8. AMOC (stability) thresholds,
9. AMOC coherence, **spatial & temporal, compare N and S Atlantic, gyre-specificity of signals and mechanisms**
10. ....

## Breakout Session 2017-05-25, Task Team 2: AMOC state, variability, and change

- **Which AMOC signals have been consistently identified in both observations and simulations, and which have not?**
  - Seasonal overturning in Labrador Sea (float-based obs., hi-res models)
  - Wind-driven influence at 26N, some internal flow components at 26N (both ocean-only and coupled climate models)
  - Some evidence of meridional coherence within gyres in both obs. (GRACE) and models, but less so across gyres
  - Some work done with seasonal cycles showed consistency
  - Inconsistency in depth extent of AMOC (models have problems with deep limb)
  - Inconsistency in variability (small in models) and trends
  - Inconsistency in regions and extent of convection
- **What AMOC fingerprints show up coherently across multiple observing systems?**
  - Some coherent changes in density and hydrographic properties
  - Altimeter-derived SSH patterns, perhaps SST
  - Tracers (CFC, O<sub>2</sub>) have been used to outline pathways
- **What ideas drive us to consensus in data-assimilating models on current and past states of AMOC?**
  - Metrics that can be consistently assessed in multiple products and observations
  - Continued efforts to quantify uncertainties

## **Priorities**

Use new and existing observations in combination with modeling experiments to refine our understanding of the present and historical circulation (and related transports of heat and freshwater as well as flow pathways) in the North and South Atlantic.

Observational studies should focus on mechanisms and pathways that identify and explain coherent and incoherent signals between different study sites, thereby reaching consensus on which signals represent the large-scale AMOC versus more localized circulation patterns.

Synthesize modeling and observational evidence to build scientific consensus on the variability and change of the AMOC over the last 50 years, using observable proxies as appropriate.

Efforts within the data assimilation community should focus on reaching an accurate consensus (consistent with other lines of observational evidence) on the evolution of the AMOC over the last 50 years.