

## AMOC Review / Synthesis Papers

As the Science Team sunsets in 2020, we would like to produce a collection of review / synthesis articles that highlight the advancements in AMOC-related science made during the existence of the US AMOC Science Team as well as the UK RAPID Program.

Joint effort between the US AMOC Science Team and the UK RAPID Program with authors drawn from both communities and their collaborators.

Virtual Special Issue

Feeds into both the UK RAPID Program Review in 2018 – 2019 time frame and the Ocean Obs '19.

## 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 coherency,
10. ....

# Survey of related review and synthesis papers published over the past five years (starting in 2012) and manuscripts in progress ....

2012 (28 -> 15)

Lozier, M. S., 2012: Overturning in the North Atlantic. *Ann. Rev. Mar. Sci.*, **4**, 291-315, doi: [10.1146/annurev-marine-120710-100740](https://doi.org/10.1146/annurev-marine-120710-100740).

Liu, Z., 2012: Dynamics of interdecadal climate variability: A historical perspective. *J. Climate*, **25**, 1963-1995, doi: [10.1175/2011JCLI3980.1](https://doi.org/10.1175/2011JCLI3980.1).

Marshall, J., and K. Speer, 2012: Closure of the meridional overturning circulation through Southern Ocean upwelling. *Nat. Geosci.*, **5**, 171-180, doi: [10.1038/ngeo1391](https://doi.org/10.1038/ngeo1391).

Srokosz, M., M. Baringer, H. Bryden, S. Cunningham, T. Delworth, S. Lozier, J. Marotzke, and R. Sutton, 2012: Past, present, and future changes in the Atlantic Meridional Overturning Circulation. *Bull. Amer. Meteorol. Soc.*, doi: [10.1175/BAMS-D-11-00151.1](https://doi.org/10.1175/BAMS-D-11-00151.1).

2013

Straneo, F., and P. Heimbach, 2013: North Atlantic warming and the retreat of Greenland's outlet glaciers. *Nature*, **504**, 36–43, doi: [10.1038/nature12854](https://doi.org/10.1038/nature12854).

Våge, K., R. S. Pickart, M. A. Spall, G. W. K. Moore, H. Valdimarsson, D. J. Torres, S. Y. Erofeeva, and J. E. O. Nilsen, 2013: Revised circulation scheme north of the Denmark Strait. *Deep-Sea Res. I*, **79**, 20-39, doi: [10.1016/j.dsr.2013.05.007](https://doi.org/10.1016/j.dsr.2013.05.007).

# Survey of related review and synthesis papers published over the past five years (starting in 2012) and manuscripts in progress ....

2015

- Straneo, F. and C. Cenedese, 2015: Dynamics of Greenland's glacial fjords and their role in climate. *Ann. Rev. Mar. Sci.*, **7**, 89-112, doi: [10.1146/annurev-marine-010213-135133](https://doi.org/10.1146/annurev-marine-010213-135133).
- Srokosz, M., and H. Bryden, 2015: Observing the Atlantic Meridional Overturning Circulation yields a decade of inevitable surprises. *Science*, **348**, doi: [10.1126/science.1255575](https://doi.org/10.1126/science.1255575).
- Haine, T. W. N., B. Curry, R. Gerdes, E. Hansend, M. Karcherc, C. Leeb, B. Rudelsf, G. Spreend, L. de Steurd, K. D. Stewarth, and R. Woodgate, 2015: Arctic freshwater export: Status, mechanisms, and prospects. *Glob. Plan. Change*, **125**, 13-35, doi: [10.1016/j.gloplacha.2014.11.013](https://doi.org/10.1016/j.gloplacha.2014.11.013).
- Keenlyside, N. S., J. Ba, J. V. Mecking, N.-O. Omrani, M. Latif, R. Zhang, and R. Msadek, 2015: North Atlantic multi-decadal variability-mechanisms and predictability. Chang, C.-P., Ghil, M., Latif, M. and Wallace, M. (Eds.) *Climate Change: Multidecadal and Beyond*, 141-158, <http://hdl.handle.net/1956/13046>.
- McCarthy, G. D., D. A. Smeed, W. E. Johns, E. Frajka-Williams, B. I. Moat, D. Rayner, M. O. Baringer, C. S. Meinen, J. Collins, and H. L. Bryden, 2015: Measuring the Atlantic Meridional Overturning Circulation at 26°N. *Prog. Oceanogr.* **130**, 91-111, doi: [10.1016/j.pocean.2014.10.006](https://doi.org/10.1016/j.pocean.2014.10.006).
- Perez, R., M. O. Baringer, S. Dong, S. L. Garzoli, M. Goes, G. J. Goni, R. Lumpkin, C. S. Meinen, R. Msadek, and U. Rivero, 2015: Measuring the Atlantic Meridional Overturning Circulation. *Mar. Tech. Sci.*, **49**, 2, 167-177, doi: [10.4031/MTSJ.49.2.14](https://doi.org/10.4031/MTSJ.49.2.14).

# Survey of related review and synthesis papers published over the past five years (starting in 2012) and manuscripts in progress ....

## 2016

Buckley, M. W., and J. Marshall, 2016: Observations, inferences and mechanisms of the Atlantic Meridional Overturning Circulation: A review. *Rev. Geophysics*, **54**, doi: [10.1002/2015RG000493](https://doi.org/10.1002/2015RG000493).

Carmack, C. E., M. Yamamoto-Kawai, T. W. N. Haine, S. Bacon, B. A. Bluhm, C. Lique, H. Melling, I. V. Polyakov, F. Straneo, M.-L. Timmermans, and W. J. Williams, 2016: Freshwater and its role in the Arctic Marine System: Sources, disposition, storage, export, and physical and biogeochemical consequences in the Arctic and global oceans. *J. Geophys. Res.*, **121**, 675-717, doi: [10.1002/2015JG003140](https://doi.org/10.1002/2015JG003140).

## 2017

Yeager. S., and J. Robson, 2017: Recent progress in understanding and predicting Atlantic decadal climate variability. *Current Climate Change Reports*, in press, doi: [10.1007/s40641-017-0064-z](https://doi.org/10.1007/s40641-017-0064-z).

# Survey of related review and synthesis papers published over the past five years (starting in 2012) and manuscripts in progress ....

## IN PROGRESS (4 -> 2)

Rudels, B., and 16 Co-authors, 2017: Exchanges of volume, heat and freshwater between the Arctic Mediterranean and the North Atlantic in relation to the main physical processes: Insights from the EU-NACLIM observations. *Prog. Oceanogr.* submitted. **(Preliminary #1)**

Toole, J. M., M. Andres, I. A. Le Bras, T. M. Joyce, and M. S. McCartney, 2017: Moored observations of the Deep Western Boundary Current in the NW Atlantic: 2004-2014, *J. Geophys. Res. Oceans.*, submitted.

## IN PREPARATION / THOUGHT

Eleanor Frajka-Williams, Matthias Lankhorst, Jannes Koelling, and Uwe Send: Coherent changes of the circulation in the deep North Atlantic from moored transport arrays. Manuscript in preparation.

Young-Oh Kwon and Rowan Sutton (+ Zhang, Yeager, Danabasoglu, ...) to start drafting a review paper on the AMV. **(Keenlyside et al. 2015)**

Renellys Perez and Chris Meinen considering drafting a review paper on the South Atlantic AMOC with a March 2018 due date.

Peter Gent, AMOC Stability **(Preliminary #8)**

## 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:  
Lozier et al. (2012); Marshall & Speer (2012); Vage et al. (2013); Straneo & Cenedese (2015); Haine et al. (2015); Perez et al. (2015); Buckley & Marshall (2016); Carmack et al. (2016); Rudels et al. (2018)
2. Characterizing the annual fluctuations of AMOC and the importance of winds vs. buoyancy forcing: OVERLAP
3. Inter-annual, decadal, centennial, etc. variations of AMOC and the mechanisms that drive them (including trends):  
Liu (2012); Srokosz et al. (2012); Srokosz & Bryden (2015); McCarthy et al. (2015); Buckley & Marshall (2016)
4. Impacts of AMOC on SST (e.g., AMV), SSH, sea-ice, weather, climate, ecosystems, ... (including paleo-climate linkages): Keenlyside et al. (2015); Kwon et al. (2018)

Review paper, gray zone, new

## Preliminary list of potential paper themes which can be combined and/or expanded:

5. AMOC fingerprints and proxies (somewhat related to #4):  
[Straneo & Heimbach \(2013\)](#)
6. Impacts of eddies/mesoscale variability on AMOC characteristics,
7. AMOC and climate prediction on various time scales:  
[Yeager & Robson \(2017\)](#)
8. AMOC (stability) thresholds: [Gent \(2018\)](#)
9. AMOC coherency,
10. ....

[Review paper](#), [gray zone](#), [new](#)

## 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.

**Lead Authorships:** Volunteers and reached out

**Journals:** AGU; Current Climate Change Reports (a review journal); ....

## Tentative timeline:

June 2017: Draft list of topics and lead authors in collaboration with UK RAPID Program

July 2017: Confirm / finalize topics and authorships

January - February 2018: Submission deadline