

## ***Interactive comment on “Observed decline of the Atlantic Meridional Overturning Circulation 2004 to 2012” by D. A. Smeed et al.***

**Anonymous Referee #2**

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In the present manuscript, the authors analyze the currently available RAPID time series with respect to changes in the magnitude and structure of the Atlantic meridional overturning circulation (AMOC). They find a reduction in magnitude over the last four years of observations, which can be mostly attributed to a strengthening of the upper mid-ocean transport, and is balanced by a decrease in the Lower North Atlantic Deep Water, while the Upper North Atlantic Deep Water remains almost unchanged.

The manuscript presents novel and interesting findings. It is overall easy to read and very understandable. I recommend the manuscript for publication after a few minor changes.

1) Section 3.1: Has a t-test also been performed for the the period including 2009? Also, would it be possible to indicate significant changes in Table 2 (maybe in italics)?

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2) Page1624, line 22: Maybe state that the reasoning behind choosing 35 degrees of freedom is explained in the next paragraph?

3) Page 1624, lines 24-26: Not clear what “those results” refers to.

4) Section 3.2: Values for the period excluding 2009 are listed in Table 3, but not mentioned in the text?

5) Figure 6b appears in the text before Figure 6a does. Maybe change the order of the figures?

6) Page1627, lines 11-18: If a longer time series is needed to identify reductions due to anthropogenic forcing, then agreement with the results from Thomas et al. cannot be expected?

7) Page 1627, line 20: There is an 's' missing at the end of 'year'.

8) Page 1628, lines 9-22: For me, Figure 7 and this paragraph do not seem to contribute to the manuscript, as the only conclusion seems to be that available data are not adequate for a comparison with climate indices and longer observations are needed.

9) Page 1628, line 28: I think it would be worth citing the Atkinson et al. (2012) paper again, for the values adjusted for seasonal variability.

10) Generally, I am not sure how valid the comparison with the Bryden et al. paper is. For the hydrographic section data, the weakening of the LNADW cannot be a manifestation of a reduction of the AMOC, as there is no significant reduction of the AMOC after the values are adjusted for seasonality. Also, the timescale is very different, and you say yourself that the reduction seen the RAPID data is probably part of a “cyclical change” and not necessarily a long-term trend.

11) Figure 7: I would prefer positive values on the depth axis.