Ocean Science
Discussions

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Interactive comment on "A 30-year reconstruction of the Atlantic meridional overturning circulation shows no decline" *by* Emma L. Worthington et al.

Anonymous Referee #2

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This study presents a new linear regression model to estimate the AMOC strength at 26degN and its two subcomponents, i.e. the upper mid-ocean transport and the Lower North Atlantic Deep Water transport, back to 1981 based on the density anomalies in the western boundary. In particular, the new approach allows the temporal resolution of the time series to be nearly annual, thus sufficiently resolving interannual variability on timescale of ∼4 years. The main conclusion is that this new AMOC time series does not exhibit any significant weakening trend throughout the record. This is an excellent study with a clever method and clear presentation. I only have some minor comments as listed below.

1. L108-110, Figure 2: The rather nontrivial difference between the calculation in this

paper and that by Longworth et al. (2011) may suggest a nonstationary relationship between the ∼400 db temperature and the thermocline transport. Such aspect may have an implication for the reconstruction method employed by the authors, as the multiple regression is trained for the RAPID period and applied to a much longer period. Therefore, the cross-validation approach for training the multiple regression would allow a quantification of uncertainty due to potential nonstationarity. The training period can be broken into ∼3 segments and the regression coefficients for each segment can be measured by fitting the model to the rest of the time series. Then, the end results such as the Fig. 3 can be constructed by stitching the regressions from all the segments together. The authors tried a cross-checking by testing the model on the latest 21 month RAPID data that were not used in the model training (L163-166). However, a systematic cross-validation would allow a more robust estimate of the uncertainty.

2. L146: What is the interpretation for the autocorrelation being significant for a lag of one month?

3. L200: "(Figure 5e), For" <- The comma should be a period.

4. L231: "during Longworth et al." -> "by Longworth et al."

5. L466: Please correct some of the broken symbols.

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