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Interactive comment on "Decadal oxygen change in the eastern tropical North Atlantic" *by* Johannes Hahn et al.

Anonymous Referee #2

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The manuscript updates the observed decadal trend of Dissolved Oxygen (DO) of Eastern Tropical North Atlantic (ETNA) using both shipboard and moored measurements, as well as satellite Sea Surface Height (SSH) and Argo float profiles. The authors found that the most recent decadal trend is characterized by a di-pole structure with decreasing DO in the 100-400m depth range and increasing trend below between 400m and 800m. This is in contrast to the previously identified multidecadal trend declining more uniformly from 100m to 800m. Results suggest that low frequency DO changes are more complicated than previously thought. Authors attribute the DO trend in the most recent decade to a southward shift of wind driven circulation in the upper layer and strengthening of Latitudinally Alternating Zonal Jets (LAZJ) in the deeper part. The study presents an interesting analysis of in situ measurements in the ETNA Oxygen Minimum Zone (OMZ) and should be publishable after addressing the following con-

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cerns. A minor revision is recommended.

Major Concern: The presentation is not easy to follow mainly because evidence shown in several of the figures are not robust and noisy. Some of the following specific comments may help to improve the manuscript.

Specifics:

1) Line 108: “q-S” typo here?

2) Line 230, residual term in eq.1, “[5] ... composite of mean advection, zonal eddy diffusion as well as submesoscale processes”: Mean advection shall be separately estimated by using the shipboard and mooring data.

3) Much of the significant changes, DO or salinity (S), are identified on density surfaces 26.8 and 27.2, but presented in difference-maps of two time periods (e.g., Fig.9). These two density surfaces happen to be the upper and lower bound of OMZ (Fig. 2). Even though isopycnal heaving has been ruled out as the main reason for observed variations, time series of moored DO and S, together with data points from shipboard measurements, shall be presented in the data section or 3.2 on these two density surfaces and 27.0 (corresponding to the center of OMZ).

4) Line 300, “OMZ core ... was estimated ...by ... center of 1%..”: How many data points, corresponding to the 1%, are used for estimating the position of OMZ core? Will using 5% of the data change the conclusion?

5) Fig.7: How the moored timeseries data are represented by data points, every 90 days? The colored dots in the slope line can be confused with the data points. Consider using thin straight lines to show the linear fit?

6) Fig.9b and Fig8b: Most of the S changes in Fig.9b are insignificant. There is also the large inconsistency between Fig.8b and Fig.9b at 5N. Why is so? Add another subfigure based on Argo data? Fig.9a and b are noisy, not easy to identify the significant changes. Will smoothing help?

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7) Fig.10: What is the purpose to show the insignificant correlations in Fig.10. There are too many subpanels. Only show significant ones?

8) Fig.11a-c and e-f: too noisy to show the propagation signals. Would Hovmoller diagrams, either along 23W or zonal average, do better job?

9) Fig.13 vs. Fig.14: The most striking changes of zonal currents are between 12N and 14N in the shipboard ADCP data (Fig.14), while the most significant changes in geostrophic currents are between 4N and 8N in Fig.13. Why is this difference?

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