Responses to reviewer's comments

Friedrich, J., Janssen, F., et al. (bg-2013-353) Investigating hypoxia in aquatic environments: diverse approaches to addressing a complex phenomenon

Anonymous Referee #1

Dear Anonymous Referee #1,

Thanks a lot for your interest in the manuscript for your valuable comments. We appreciate that you consider our work "well-written", an "authoritative review of state-of-the-art techniques for monitoring oxygen and other biogeochemical properties" and your recommendation for publication with minor revisions. Also, thanks a lot for your detailed suggestions for these revisions. We have no objections and will follow your suggestions and provide corrections and additional information were requested – please find some details below.

Best regards on behalf of all authors,

Jana Friedrich and Felix Janssen

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Detailed statements (in italic) concerning the individual "Specific comments"

1. p12667, line13; give this transport estimate (310 $km^3 yr^{-1}$) in the standard oceanographic volume transport unit of Sverdrup ($10^6 m^3 s^{-1}$).
o.k., will be changed

2. P19672, line 23; (j on panel I of Fig. 1)
o.k., will be changed

3. P12675, line 21; what is the ascent speed of the instrumentation platform?
The ascent speed is about 0.37 m s^{-1}. Information will be included.

4. P12675, line 23; what oxygen sensor (manufacturer and model number) was used?
The oxygen sensor is a "Rinko III" from JFE Advantech Co., Ltd. (Japan). Information will be included

5. P12675, line 26; mention that this sampling interval of 8 hours works well because of the absence of tides in the Baltic Sea. In other marine systems with semi-diurnal tides, a shorter sampling interval (6 hours or less) would be necessary to avoid tidal aliasing of the low-frequency signals.
That's certainly true. There has to be a tradeoff between sampling interval and deployment duration as the energy in the batteries limits the number of profiles that can be carried out.

6. P12676, line 5; delete "breaking". Internal waves do not need to break in order to cause high temporal variability.
o.k., will be changed

7. P12676, line 17; lateral transport processes and vertical oscillations rather than
o.k., will be changed

8. P12678, line 28; 20 nmol L^{-1} instead of 20 µmol L^{-1}?
Correct, will be changed

9. P12681, line 27; replace "global" with "remote" or "larger-scale", as the NAO is not a global process.
o.k., will be changed

10. P12682, line 17; NEMO float 144 (WMOID 7900465) appears on the Argo Information Centre, but not float 145. Why?
Data for both floats now appear on Coriolis:
http://www.ifremer.fr/co-argoFloats/float?detail=false&ptfCode=7900465&active=false&ocean=A&lang=en
http://www.ifremer.fr/co-argoFloats/float?detail=false&ptfCode=7900466&active=false&ocean=A&lang=en
Some minor issues (correct institute affiliations, outliers in the trajectories) are currently addressed.

11. P12683, lines 18-20; this text gives the false impression that oxygen fluxes are predominantly controlled by diffusive fluxes, with convective fluxes playing only a secondary role or no role at all. This statements needs to be qualified. Oxygen's piston velocity does indeed prevent the mixed layer from becoming fully saturated during short-lived convective events. But this does not mean that convection does not play a role in injecting oxygen from the surface layer into the CIL.
Indeed, convection plays a role for oxygenation. However, our measurements strongly suggest that (eddy-) diffusion plays an important role for changes in upper layer oxygenation, too. We will explain that more thoroughly in the revised version.

12. P12691, line 2; substantially increased? Do the confidence intervals of both slopes overlap? Are the slopes statistically different?
The confidence intervals of the linear regressions do not overlap within the observed range of data, as it can be seen from an updated Fig. 14, which we will insert into the revised version of the manuscript. Yet, the difference in the slopes of two liner regressions is statistically insignificant ($p=0.0837$) at 95% confidence level ($p<0.05$), but can be considered statistically significant at, for example, 90% confidence level ($p<0.10$).

13. P12704, lines 19 and 26; define what are "K-strategists" and "r-strategists".
We will include definition into the text:
"R-strategists reproduce and grow fast and are therefore better adapted to unstable environments (e.g., rapidly changing oxygen concentrations) than k-strategists, who produce a lower number of offspring with lower growth rates."

14. P12719, lines 1-14; mention that the Black Sea Argo-O2 float data can be downloaded from the two Argo GDACs (www.argo.net). If this is not the case yet, then the data from these two floats should be uploaded to the Argo GDACs where all other Argo data reside.
We will include the information.

15. P12747; do the numbers 237 and 931 represent optode serial numbers? Right panel: were both oxygen sensors 0.3 m above the seafloor? Or was one at 0.3 m and the other at 1.0 m as for the left panel?
The numbers represent optode serial numbers. They were mounted at different heights on the lander (0.3 m and 1.0 m) but serve only as replicate measurements and not to resolve possible gradients in the Benthic Boundary Layer or to infer benthic fluxes. We will correct the figure caption accordingly.

16. P12771; Fig. 27; the color schemes for oxygen sensor data and oxygen SMHI reference data should be made more consistent with each other. When possible, always match the same depths (sensor or SMHI) with the same color.
We agree that the figure is quite crowded and not easy to read. We will try to improve it but in former versions of the figure with the same colors for similar depths it was hard to discern symbols for discrete samples and continuous recordings.

Minor corrections

1 p12661, line 23; the term “hypoxia”
2 p12662, line17; EU instead of EC?
3 P12663, line 3; delete “water”
4 P12682, line 22; of the two floats
5 P12690, line 15; replace “agree to” with “are consistent with”

o.k., will be changed.