Ocean Sci. Discuss.,
doi:10.5194/os-2016-75-RC2, 2016

Ocean Science Discussions

Interactive comment on "Technical Note: Oxygen Optodes on Profiling Platforms: Update on Response Times, In-Air Measurements, and In-Situ Drift" *by* Henry C. Bittig and Arne Körtzinger

Anonymous Referee #2

Received and published: 27 October 2016

Summary:

In "Oxygen Optodes on Profiling Platforms: Update on Response Times, In-Air Measurements, and In-Situ Drift, the authors provide new insight into the factors governing optode response time and correction and add to the growing body of air oxygen calibration interpretations. Both of these contributions are timely as the number of biogeochemical floats increases and with it the need for consensus on interpretation and use of these data. Most of my comments are relatively minor, mainly concerning the overall interpretation of their results and a few details regarding their methods of interpreting optode data. Overall, this manuscript is very readable, concise, and a useful extension of their previous work.

Comments:

Page 1, Line 1-2: "are or eventually run out of calibration" – a bit awkward – maybe just say that the sensors experience significant drift?

P1, L12: Time frame over which that drift occurred would be helpful since there is still uncertainty about whether in situ drift rates are constant or variable.

P2, L27: I think this paragraph continue to refer to Bittig et al. 2014, but that is unclear until several sentences into the paragraph.

P4, Paragraph1: Any thoughts on the breakpoint in the boundary layer thickness vs. float vertical velocity relationship? Presumable this is due to a sensor design choice, like foil recess. Is it worth speculating on changes that could be made to make this function more linear? Presumable that would help with the time response corrections you are making.

Figure 1: Wrong title

Question about the time stamp: Since most Argo data (that I know of) does not include the time stamp for each measurement, would it be at all useful to estimate a time response correction based on typical ascent speed and the pressure of each sample? I recognize that due to changes water density the ascent speed will not remain constant (as pointed out in the text and figure 3b), but perhaps that can be estimated as well, given knowledge about the float's volume and mass. My point is, you have convincingly demonstrated the need to adjust optode oxygen to account for response times, but is there a way to correct data that does not have a measurement-specific time stamp and what would be the increase in uncertainty? This might be of great value to other researchers if it is possible.

Figure 3b/c – What causes the wavelike fluctuations in ascent speed and response time of the Aanderaa optode between 100 and 1500 db?

Figure 3f: What causes the discrepancy between Aanderaa and SBE optodes in deep

water?

Variable carry over slope? I think from equations 7 and 9, mt=0 is constant, and based on the carry over slope determined from the entire deployment. The carry over slope must vary seasonally and potentially interannually, if the float moves far enough. Is it possible to split the deployment into periods of time with different carry over slopes or fit the carry over slope to some type of function of season or time?

P10, lines 3-4: While they authors may have found a significant drift, I believe they also had fewer measurements and the floats were not raised out of the water as high.

P10, L9: Could the differences between Aanderaa and SBE optodes be due to differences in calibration? Do you have a way of differentiating uncertainties in the temperature dependency from uncertainty in the pressure dependency? Surface data at the same temperature as deep data would work.

P10, last paragraph. This is an interesting and important point. Are the environmental conditions significantly different between the two floats? If environmental factors control the in situ drift rate, then one would expect all 4 optodes on both floats (which seem to be deployed in the same location) to drift similarly. Instead one float has two optodes drifting twice as fast as the other float. But different manufacturer's optodes drift at similar rates on the same floats. And one optode is housed, the other is not. I'm not sure you can necessarily answer many questions here, but it might be worth expanding on this point for a few sentences, because this comparison gets at some of the central questions surrounding in situ drift in oxygen optodes.

Interactive comment on Ocean Sci. Discuss., doi:10.5194/os-2016-75, 2016.