

## ***Interactive comment on “Technical Note: How long can seawater oxygen samples be stored before titration?” by M. Lankhorst et al.***

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Received and published: 23 December 2014

### **Abstract**

This response refers to comment osd-11-C1114-2014 received for the following paper in *Ocean Science Discussions*:  
doi:10.5194/osd-10-1-2014

### **1 Comments from referees/public**

The key point of criticism in this comment is that many of the data points, esp. those collected during the *New Horizon* cruise, were outside a limit that the ODF facility uses

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internally for precision (0.006 ml/l), concluding that the resulting data show “unacceptably different values”. Other points of criticism are that:

- the *New Horizon* batches were not sampled on board, i. e. the “reference” is already affected by some sort of storage,
- the justification for using the less stringent measure of inter-operator bias as a measure of success is not justified,
- storage of samples is not an attractive option on cruises where large numbers of samples are taken (hundreds or thousands),
- shipment of samples from a remote port to an analysis facility is not feasible due to the water seals on the bottles.

### **2 Authors’ response**

Regarding the main point of criticism, that the repeats especially from the *New Horizon* cruise fall outside ODF limits, we maintain that our samples were collected for a particular purpose. That purpose was to calibrate and validate electronic instruments, the target accuracies of which are shown in green shading in figure 1 of the original manuscript. That figure, as well as the data presented in table 3 of the original manuscript, demonstrate that storage of samples did not adversely affect usefulness of the data for the purpose for which they were collected. Therefore, the values are perfectly acceptable to us. In addition, at least the more stable batch (from the *Melville* cruise, also table 3) lets us hope that the storage is in fact acceptable even under more stringent precision demands. The underlying issue here is that we need to define what constitutes “acceptable” versus “unacceptable”, and we propose new wording to make this clearer.

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We acknowledge that even batch 1 from the *New Horizon* cruise is already a week old, and therefore not a true reference. That said, the key differences between batches 1 and 2 are the storage and that they were sampled from separate Niskin bottles in the upper ocean. Therefore, we feel that these data can be used to quantify an upper bound of the effect of storage before titration, i. e. a statement like, “the effect is no worse than the numbers shown in table 3”.

Regarding our use of the less stringent inter-operator bias as a measure of success, we propose new wording that makes it clear that this is not the accuracy target of our study, but rather a value to compare our numbers with.

Regarding the notion that storage is not an option for cruises that take thousands of samples, simply due to the amount of bottles, we agree. The manuscript never makes any claims to suggest otherwise.

Regarding the notion that shipment of samples from a remote location to an analysis facility is not feasible, we agree. This is due to the nature of the water seal around the bottle stopper, which in its present configuration will not withstand shipping conditions.

There is a notion in the comment to suggest that storage of samples and analysis ashore later might be more expensive than taking an analyst and the equipment out to sea. The opposite is true in our cases, but this heavily depends on the duration of the cruise, the number of samples, and if the analyst can work on other tasks during the cruise. Ballpark costs are likely upward of \$10000 to hire a chemical analyst for a cruise, while costs to run individual samples ashore are roughly \$30 per sample. Dividing one by the other, we see that the analyst will be more expensive unless the number of samples exceeds several hundred.

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### **3 Authors' changes in manuscript**

The changes to the manuscript proposed in the response to the first reviewer comment, C1116, address the points of criticism from this comment as well. See our response to C1116 for details.

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