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Biogeosciences
Discussions

Interactive comment on "Controlled experimental aquarium system for multi-stressor investigation: carbonate chemistry, oxygen saturation, and temperature" *by* E. E. Bockmon et al.

Anonymous Referee #3

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This manuscript presents a novel set up to equilibrate flow-through aquaria systems used in ocean acidification research with variable CO2 and O2 concentrations by means of Liqui-Cel membrane contactors. The approach is interesting, well described and timely and is certainly of a broader interest for the ocean acidification research community. Nonetheless, while the introduction is nice and clear, the remaining manuscript would profit from a few edits to improve its clarity, the detail of information presented and some shortening in places where it is overly speculative. Moreover, while the authors claim that their system creates very stable experimental conditions, the fail to present those and instead keep explaining the fluctuations observed in the experimental data, which to my impression appear rather preliminary. The manuscript

would have been much more impressive if data had been presented to prove the concept. While it is true that systems that are based on header tank equilibration may have their limitations, I do not understand why direct ‚in-tank' equilibration should be advantagous over the header tank concept, provided water parameters are measured in the animal tanks in both cases (l. 193). Some more arguments are needed here to convince the reader. Another aspect is the suitability of such a system for recirculating incubation systems, the authors state that for stable alkalinity, seawater needs to be replenished at a constant rate (l. 136). Bad news for those who have no access to a constant supply of seawater?

Specific comments:

l. 177: can you present data for a closed system set up, what would a suitable volume/biomass ratio be?

l. 193: this also infers that per replicate, an individual membrane contactor is needed. Given the price of these cartridges, a multi-replicate set up would render quite costly?

l. 197: do the 1500μatm refer to the system described here or is this a general comment?

ll. 201-211: shorten paragraph, this is not particularly relevant here.

l. 230: please correct spelling: M. galloprovincalis

l. 237: please provide more information: how many larvae per bucket, how many buckets (replicates?)?

l. 243: if a respiration signal is seen in the pH of the water, doesn't this indicate too little oxygenation/water turnover? Should a system like the one described here not aim to exclude exactly this?

ll. 244-257: since your system does not seem to include such a feedback system to control water parameters, this paragraph is rather speculative and cannot be backed

up with respective data. I would suggest to shorten or delete it.

l. 270: As you have mentioned the issue of pseudoreplication, please provide some more information here: what does ‚discrete samples' really mean? How many discrete samples, what kind of replication does this include, how many tanks and membrane contactors were involved in the experiment?

l. 275-303: this is a discussion of why the system is not as stable as it was initially described. This is a bit unfortunate, as even room temperature seemed to influence the systems' stability. The data presented here leave the impression of preliminary trial or troubleshooting experiments and does not go down well to support the concept of this set up.

ll. 306-315: this is pretty speculative as it's not backed up by data, I would recommend to shorten this parapgraph.

ll. 316-329: I would suggest to shorten this paragraph as well, as it is in part redundant (cf. introduction).

ll. 330-337: please cite the references for the experiments you refer to in this paragraph.

l. 456: please explain the n=8 stated here. How was the setup of 4 membrane contactors (2 replicates per treatment?) used to create an n=8? Did you use a total of 16 contactors to avoid pseudoreplication (cf. l. 190)?

Interactive comment on Biogeosciences Discuss., 10, 3431, 2013.