

Review of "Marine carbonate system evolution during the EPOCA Arctic pelagic ecosystem experiment in the context of simulated Arctic ocean acidification" by Bellerby, Silyakova, Nondal, Slagstad, Czerny, de Lange, and Ludwig.

This manuscript documents the changes in the carbonate parameters throughout the Arctic Ocean CO₂ perturbation experiment. The authors thoroughly described the evolution of the carbon parameters throughout the experiment. The paper was straightforward and clearly written. I think this part of the paper only may not merit publication. However, this paper is unique in that it puts mesocosm experiments into a regional perspective (Arctic Ocean). In particular, it highlighted the caveats associated with the CO₂ perturbation experiments and also emphasized the needs of more refined experiments that better simulate the acidification conditions in the Arctic Ocean. As far as my memory concerned, the modeling analysis included in this paper is the first attempt that brings the community attention to the needs of new experimental manipulations that better represent the local and seasonal variability in ocean acidification parameters. Since the paper is clearly presented, I believe the paper can be published as it is. I have a few minor comments that the authors consider in preparing any revision.

1. In CO₂ system calculations for mesocosm and modeling works, the authors used the different carbonic acid dissociation constants. For consistency and direct comparison, I would suggest the authors use the same sets of constants.
2. Although there were small alkalinity changes during the experiment (2242 → 2247 → 2242 $\mu\text{mol kg}^{-1}$), the authors should be more quantitative in explaining the changes. For example, Can the 5 $\mu\text{mol kg}^{-1}$ increase be explained by salinity increase? Another issue is the 5 $\mu\text{mol kg}^{-1}$ decrease in the later part of the experiment. The authors attributed this decrease to calibration problem. This should be better explained.