

Biogeosciences Discuss., referee comment RC1
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Comment on bg-2022-223

Anonymous Referee #1

Referee comment on "Observed and projected impacts of coastal warming, acidification, and deoxygenation on Pacific oyster (*Crassostrea gigas*) farming: A case study in the Hinase Area, Okayama Prefecture and Shizugawa Bay, Miyagi Prefecture, Japan" by Masahiko Fujii et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2022-223-RC1>, 2022

General comments

This manuscript by Fujii et al. submitted to *Biogeoscience* deals with current and future habitat for Pacific oyster (*Crassostrea gigas*) in two coastal sites in Japan. Recent reports that acidification has already negatively impacted on oyster growth along the West Coast of the United States are widely known among researchers. Also in Japan, the economic impact should be very large since oysters are a representative marine product. As such, the suggestion that the reduction of anthropogenic CO₂ can largely alter future habitat for oyster will be impressive for not only scientific community, but also for the general public.

Another commendable point of this paper is a successful long-term monitoring in coastal sites with several sensors. The figures presented in the manuscript suggest that the quality of data obtained by the sensors was good. As far as I know, there are not so much cases of such successful long-term monitoring in coastal sites. These observations should be maintained in the future.

My largest concern about this manuscript is the absence of long-term warming under RCP8.5 at Hinase. It is too unrealistic that future warming at Hinase is almost negligible (Figure 13a). There was no mention about future physical environment in the Seto Inland Sea in Nishikawa et al. [2021], which cited in the text. So, I could not verify whether negligible warming in this region is true or not. However, air temperature will likely increase over the long term under RCP8.5. It is difficult to believe that rising in air temperature will not affect water temperatures in the shallow Seto Inland Sea. I strongly urge the authors to check water temperature projections in the Seto Inland Sea.

Negligible warming in Hinase has resulted in much of the discussion being focused on whether or not there is an increase in water temperature. The differences in expected

spawning period between Hinase and Shizuagawa appear to be due to the presence or absence of long-term warming. As this manuscript covered two sites, I want the authors to discuss the relationship between regional characteristics and expected changes in habitat for oysters. For example, Hinase is more enclosed area than Shizukawa. Do these differences in characteristics have any effect on acidification in the future? Unfortunately, there is little discussion about the impact of factors other than water temperature on environmental change at current manuscript.

Also, I think long-term oligotrophication in the Seto Inland Sea is a hot topic. I recommend that the authors mention regarding oligotrophication. If it is impossible, the author should mention as limitation of the projection in the text.

I agree with the posted comment (by Dr. Ishizu) that discussion is too little in the current manuscript. The authors have competent observational data and computational methods. Further discussions utilizing these resources are needed for the acceptance.

Specific comments

(Line 164) The reference about oligotrophication (*i.e.*, an overcome of eutrophication) is needed. I think that Abo and Yamamoto [2019], which was already cited in the text is suitable.

(Line 207) Information about the calibration of DO sensor is needed. I suppose that it was done by two-point calibration at 0% and 100%.

(Line 237) "The maximum error \sim is about $10 \mu\text{mol kg}^{-1}$ " Is this true? In Figure 2, some TA data appear to be deviated by more than $10 \mu\text{mol kg}^{-1}$ from possible regression line.

(Line 305) "Although no significant differences were observed among the sites in Hinase, salinity was generally higher at H-4 than at the other three sites throughout the year." What do these sentences mean? Was the difference in salinity statistically insignificant? The author should clarify whether this difference is important in this study or not.

(Line 313) Does the upper limit of optimal DO range ($269 \mu\text{mol kg}^{-1}$) have any biological meaning? Most of observed DO exceeded this value (Fig. 4).

(Line 341) "In Shizugawa, the Ω_{arag} value was below the threshold \sim . However, no morphological abnormalities were observed \sim ." Then, what does the threshold mean?

(Line 438) "Extreme events such as severe storms are anticipated to occur more frequently and intensely in the future." References are essential.