

## ***Interactive comment on “Seagrass beds as ocean acidification refuges for mussels? High resolution measurements of $p\text{CO}_2$ and $\text{O}_2$ in a *Zostera marina* and *Mytilus edulis* mosaic habitat” by V. Saderne et al.***

**Anonymous Referee #2**

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I am very ambiguous about this paper, on one hand it is a very nice technical demonstration on a new sensor setup that could prove extremely useful in future studies (if lessons are learned) but on the other hand it is speculative and presents a discussion that reaches far from what is warranted from the results obtained. The manuscript also lack clear aims and foci.

The first part of the title poses a question, a question that the authors do not manage to answer. The second part of the title is descriptive and, at the moment, it is the only part that accurately describes the content of the manuscript.

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All through the text there is reflections of an over-belief in the accuracy of the new equipment, like “The sensors were recently purchased and their specs are supposed to meet the manufacturer’s data” (11428, line 12). The authors then report that the measurements are quite inconsistent, and show large discrepancies between measured and calculated (from DIC and TA)  $p\text{CO}_2$ . The authors then reasons that: “The observed discrepancy at elevated  $p\text{CO}_2$ ’s (Fig. 8) would correspond to an unrealistic measurement uncertainty of above 50 %. This is extremely unlikely since the sensor successfully passed calibration” and: “We therefore attribute the observed discrepancies between measured and calculated  $p\text{CO}_2$  to strong  $p\text{CO}_2$  gradients on small spatial scale near the mussel bed” While it might be true that there are real differences in water chemistry that could explain the reported discrepancies, it is a mere speculation from the author’s side, and should be tested properly with additional measurements.

The discussion is quite heavy on methodology, and lack structure. Furthermore, the attempts to answer the question posed in the first part of the title are weak. In the end of the introduction, it would be helpful to have a clear description on the general aim of the work, what question is posed. Then this should be followed up in the discussion.

I cannot recommend this manuscript for publication in its present form, but it definitely contains publishable data and could eventually prove very useful. Either the authors could shorten the paper, and remove the “Seagrass beds as ocean acidification refuges for mussels?” part which is weak at the moment, or they could strengthen the paper. I would then suggest the authors to redo the measurements one more time, see to that proper comparison and intercalibrations between the different methods are made, and then resubmit as a new submission.

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