Biogeosciences Discuss.,
https://doi.org/10.5194/bg-2018-512-RC1, 2019

Biogeosciences Discussions

Interactive comment on "Light-dependent calcification in Red Sea giant clam *Tridacna maxima*" *by* Susann Rossbach et al.

Anonymous Referee #2

Received and published: 18 April 2019

Rossbach et al. demonstrated depth-dependent abundances of Tridacna maxima in natural reefs and experimentally examined short term net calcification rates of T. maxima in different light conditions. Tridacna is abundant bivalves in coral reefs and has demand as fishery resources and environmental proxies. However, the knowledge about their calcification rates are scarce. While calcification rates of tridacna shells seem to be also strongly related to temperature conditions (Warter et al., 2018), this study provide new insight of the relationship between their calcification and light. I recommend this paper published in "Biogeosciences" after some revisions.

I hope my comments below will be useful to improve the manuscript.

P.3/L7: please check reference style. Probably you can write like "Ip et al., 2006, 2015, 2017".

P.5/L28: . . .following Dickson et al. (2007).

2.1. Clam abundance surveys: How many belt transects were conducted in each depth?

2.2. Clam incubations: How many clams incubate in each condition?

P.2/L32: I think, after the flow-through system turned off, the incubation tanks should be completely closed to measure carbonate chemistry. This description is needed here. And, how did you sample seawater during the experiments?

P.8/L2: Please refer to "Fig.2" here.

P.10/L3 "In the Red Sea, T. maxima shows a significant increase in net calcification rates with increasing incident light." In your results, strong light conditions over 900 μmol photons m-2 s-1 made decreasing net calcification rate. So, net calcification rates were not always increasing with light. Is it right?

4.1. Depth-dependent abundances: I think that local geomorphological feature can also change light availability of benthic habitats. Even at same depth, the angle of incident light and local topography makes different shade conditions for each clam. In connection with the matter, please add the detail description of geomorphology at each site in 2.1 and Figure 1.

4.2./P.11/L19: Not only photosynthetic activity, but also the efficiency of photosynthesis and the density of symbionts might intervene between light availability and calcification. Increased light could be also stressor for zooxanthellae (e.g. Weis, 2018). Additional discussion about the influence of light to algal-tridacna holobiont and its calcification processes could persuade the readers of the results in this study.

Fig.1 (b) and (c): Please zoom up the map and point the area of study sites to see topographical differences among two reefs.

Fig.2 and Fig.3: How many specimens did you use for each condition?

S2.1 and S2.2: Legends for each parameter are needed. I couldn't clealy understand the meaning of this table.

Table S2.2.2: Why are the values in the column of "diff" all zero?

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