

## ***Interactive comment on “Reviews and Syntheses: Ocean acidification and its potential impacts on marine ecosystems” by K. M. G. Mostofa et al.***

**K. M. G. Mostofa et al.**

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Interactive comment on “Reviews and Syntheses: Ocean acidification and its potential impacts on marine ecosystems”

Authors: K. M. G. Mostofa et al.

Anonymous Referee #1

Ocean acidification, the other CO<sub>2</sub> problem, could significantly influence marine ecosystems. One well-known effect is the lowering of the calcium carbonate saturation state, and ocean acidification alters phytoplankton abundance and carbon fixation rates

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in some photosynthetic organisms. Mostofa et al discussed mechanistic insights into the aforementioned processes and pH changes, and focused especially on processes taking place with different time scales and potential detrimental effects to marine organisms, and of ecosystem processes and services. Indeed the topic is attractive, timely, and can raise important issues. The work described in the manuscript appears to be competently performed and the results are interesting and useful. The manuscript is reasonably well written and easy to follow; however, there are a number of aspects, which, to my opinion, need improvement prior to a publication in Biogeosciences.

Ans: Thank you for your true evaluation of our paper.

General comments:

1. The major impacts of ocean acidification are decreased pH and increased inorganic carbon availability. Many of the referenced studies only analyzed the impacts of reduced pH - this should be considered.

Ans: For your kind information, since 2008, the IPCC working group on ocean acidification has generated a guide for ocean acidification studies. This Guide became available on website for free download (<http://ocean-acidification.net/2014/04/07/ipcc-working-group-ii-on-climate-change-and-ocean-acidification/>). As shown in this guide, carbonate system changes with increased dissolution of CO<sub>2</sub> from air, resulting in increased pCO<sub>2</sub>, HCO<sub>3</sub><sup>-</sup> and decreased CO<sub>3</sub><sup>2-</sup> and drop of pH. Therefore, ocean acidification reflects an integrative change in the carbonate chemistry, not only pH or CO<sub>2</sub>. Most of the papers published in recent years followed the guide. Our authors are agreed in that regards. So, our reply in that regards is that pH and other carbonate parameters could not be separated.

2. I am concerned about the confusing use of direct and indirect evidence to support relationships proposed in the review. Specifically, I think that section “Stress caused by algal or red-tide toxins and pathogens” lacks direct evidence.

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Ans: Yes, we are entirely agreed with this thoughtful comment. Still now there is no study in that issue that causes lack of direct evidence. But our aim was to include this issue in this review that marine Scientists may think about it for their future research. According to your comments, we have deleted this section "Stress caused by algal or red-tide toxins and pathogens" from this review.

Specific comments, following the order of the manuscript, are listed below.

1. P10942 line 1, CO<sub>2</sub> seeps, for example, from sub-seabed storage and volcanic vents in shallow submarine should be considered.

Ans: According to this thoughtful comment, we have revised the sentence by the addition of "CO<sub>2</sub> seeps from sub-seabed storage (Taylor et al., 2014) and volcanic vents (Lidbury et al., 2012; Hall-Spencer et al., 2008) in shallow submarine," in line 2 page10942 after "...primary producers (PP) (Cai et al., 2011; Mostofa et al., 2013a),"

2. P10946 line 3, "atmospheric CO<sub>2</sub> and Sand Jensen, 1997", something missed or add a "(" between "and" and "Sand".

Ans: Yes, there is a typical mistake during typesetting of this manuscript. It is needed to add "(Hein" after '..... atmospheric CO<sub>2</sub>' in P10946 line 3.

3. P10946 line 27, Is "increase" correct? suggest changing "increase" to "decrease".

Ans: As suggested, we have revised the sentence by the addition of "increase" instead of "decrease" in P10946 line 27.

4. P10961 line 10, "Elevated PCO<sub>2</sub> causes bacterial community shifts" is incorrect. The influence of higher CO<sub>2</sub> and lower pH on ocean microbial community has not been completely verified in terms of significance. For example, some studies observed there is little effect of pCO<sub>2</sub> treatments (380, 540, 750, 1,120, and 3,000 \_atm) on microbial diversity (Joint et al., 2011; Tait et al., 2013).

Ans: According to general comment provided by the distinguished referee, we have

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deleted this section.

Lidbury I, Johnson V, Hall-Spencer J, Munn C, Cunliffe M (2012). Community-level response of coastal microbial biofilms to ocean acidification in a natural carbon dioxide vent ecosystem. Marine Pollution Bulletin 64: 1063-1066.

Taylor JD, Ellis R, Milazzo M, Hall-Spencer JM, Cunliffe M (2014). Intertidal epilithic bacteria diversity changes along a naturally occurring carbon dioxide and pH gradient. FEMS Microbiology Ecology 89: 670-678

Ans: We have mentioned these two references in the aforementioned revisions.

5. References need to follow journal requirement.

Ans: As suggested, we shall revise the references according to journal requirement.

6. Figures 2 and 4, Fig. a, b and c should have uniform size.

Ans: According to this suggestion, we have revised the Figures with uniform size. They are: Figure 2 (please see the Figure in the next page) and Figure 4 (please also see the Figure 4 in the subsequent next page):

Figure 2

Figure 4

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Interactive comment on Biogeosciences Discuss., 12, 10939, 2015.

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**Fig. 1.**

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