

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

Anonymous Referee #2

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Ocean acidification potentially influences marine organisms and hence ecosystems. The effects could be manifold and in particular are driven by direct CO₂ enrichment and/or the subsequent reduction in pH, e.g. affecting calcium carbonate saturation state etc. Mostofa et al discussed mechanistic insights into a variety of OA-dependent processes and pH changes, and focused especially on processes taking place at different time scales with potentially detrimental effects on marine organisms as well as ecosystems and their services. Indeed the topic is attractive, timely, and can raise important issues

However, in my opinion the authors could have done a better job in summarizing and

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conceptualizing recent findings. The manuscript lacks some important literature and in particular I miss some good graphics representing linkages of different environmental drivers, processes and cycles related to ocean acidification and on potential OA effects on aquatic ecosystems in the future ocean.

For me, the structure of the review is not clear, e.g. there is no clear distinction between natural and anthropogenic OA and related processes. . .

Specific comments:

P4, L6 “anthropic activities” I guess you mean “anthropogenic activities”, however, studying Greek philosophy is never disadvantageous!

P4, L13ff Furthermore, while the global oceans are net sinks of atmospheric CO₂, particular locations such as the sub-Antarctic zone during winter and the equatorial oceans are actually net CO₂ sources to the atmosphere (Takahashi et al., 2002, 2009; Cai et al., 2010; Zhai et al., 2014).

I would be more careful with this statement since we are far away from understanding the C sink/source function of the ocean. . . None of the cited studies can calculate a full budget throughout a year or even several decades, in particular when including the deep sea.

Introduction in general: I miss a statement on the possibility that Ocean Acidification could be also increase in primary productivity, but this could be strongly related to temperature changes (see Holding et al. 2015, Nature Climate Change). There are many more references stating that increasing CO₂ concentrations can also increase primary production in the long-term run (greenhouse effect), at least at CO₂ levels expected in the near future.

P6, L4: “This review will provide an insight into the mechanisms of the ocean acidification. . .” Sentence sounds a bit strange.

Chapter 2.3: reference from Holding et al. 2015 is missing in addition to others. . .

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Chapter 3: Here, I would expect an overview of different ocean sites which respond differently. Depending on the respective buffer capacity, the system reacts more or less pronounced.

P13, L21ff: The matter of upwelling of CO₂ rich deep water is a different story and should be discussed with care in an own chapter.

P16, L1, Pt.1 needs some references, otherwise it remains quite speculative.

P16, L8, Pt.2: I don't necessarily agree with this statement since coastal water in general has a higher buffer capacity related to its higher trophy. Be more specific.

P18, L3ff: I miss an evaluation of acidification effects on heterotrophic microorganisms (e.g. Grossart et al. 2006; Piontek et al. 2010) and potential feedback mechanisms.

P19 Chapter 5.2: I suggest to cutting down a bit to have the review more concise. The matter of ROS has been already addressed above.

P22, Chapter 5.4. Please add that there is a potential interaction between OA and toxic phytoplankton blooms. For example, there are studies in the Baltic Sea which demonstrate that OA has a clear impact on growth and toxicity of diazotrophic cyanobacteria such as *Nodularia* and *Aphanizomenon* (e.g. Wannicke et al. 2013).

P41, Fig 1: I suggest to link processes of OA with the different chapters given in the text. Currently this is not really clear.

I miss a summarizing figure of potential effects of OA. In general, I miss a thorough evaluation of potential ecological and biogeochemical consequences of future OA.

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