



EGUsphere, referee comment RC1
<https://doi.org/10.5194/egusphere-2022-682-RC1>, 2022
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Comment on egusphere-2022-682

Anonymous Referee #1

Referee comment on "Depth-related patterns in microbial community responses to complex organic matter in the western North Atlantic Ocean" by Sarah A. Brown et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-682-RC1>, 2022

Brown and co-authors collected seawater samples from different depths of North Atlantic Ocean and investigated the response of microbial communities to the addition of diatom derived organic matter. I think this is an important study to understand the metabolic capabilities and activities of heterotrophic microorganisms in meso- and bathypelagic oceanic zones and illuminate the dynamics of carbon cycling in "dark" ocean. The experimental set up and the quality of the data shown in this study is very good; however, some aspects need to be considered before publication.

In the current flow of the manuscript, it is difficult understand the context of presented data when discussion points are provided in another section. If possible, I would suggest writing a combined Results & Discussion section to improve the readability of the manuscript. Another alternative would be to add some "bridge" sentences in Results section to guide readers to the points that will be discussed in the next section. This would yield a smoother read of the manuscript and better presentation of provided data. Moreover, I would suggest adding some extra information and modify some paragraphs in introduction. It is essential to mention the importance of proteins and polysaccharides in marine carbon cycling as they mostly focus on polysaccharide hydrolase and peptidases activities in the manuscript. It is also needed to innovative aspects of their work. They did not explicitly point out how the data presented in this study differs from Balmonte et al. 2019. Lastly, it would be useful to discuss the results with an ecological context. I suggested some reference studies below.

L25: The first sentence is of the abstract is too long. Diving into two sentences would help.

L26-27: Please define the depth of mesopelagic and bathypelagic zones in the abstract.

L35-39: Please be more specific and add some points to discuss the provided results.

L74: Please mention the importance of polysaccharides and proteins in marine carbon cycling. This paper would also help to add some ecological context (<https://www.biorxiv.org/content/10.1101/2022.08.04.502823v1>)

L97: Please provide more information for "the nature of that enzymatic response differed in some key respects". That will also help to define the motivation of the study.

L102: What does "moderate quantities" mean? Please be more specific.

L231-236: Is there any particular reason to get samples from these stations? Adding some oceanographic key data would help.

L247: Please clearly define "endopeptidases". There are some substrates listed in the supplementary figure and it is not clear which ones are endopeptidases.

Figure 1: Please provide the full names of substrates in the figure or in the legend. Also, using a different scale for amended and unamended could be misleading. Maybe using broken axis or another solution would help?

L266: Please define alpha and beta-glucosidase activities. What do they use for? What is the difference between them?

L278: For this section, please introduce the polysaccharides used in this study. Short biogeochemical and ecological information would help. What are the sources of these polysaccharides? Why they are important? Why did you select these substrates?

L316: Please explain why you measure bacterial protein production rates.

Figure 3: Please explain how you classify ambiguous taxa in the legend. Also add the information in the methods section.

Figure 4: Too much information is embedded in MNDS plot. Is it possible to divide this

figure into different panels to show the differences between treatments, depth, and time.

L475-490: I really like the discussion provided in this paragraph! It would be a very good example for the rest of discussion.

Figure 5: Very nice summary! Yet, it is difficult to read the next and see the colours within dark background. Please make the background lighter.

L530: There is an elevated chondroitin hydrolase activity in bathypelagic. Why don't you discuss it here?

L569: For to discuss fucoidan, please also refer this paper:
<https://www.nature.com/articles/s41467-021-21009-6>

L584: Please provide a more relevant sentence to finalize the manuscript. I cannot see any direct link between your data and the "changing ocean conditions".

Supplementary information: Please provide the full names of used substrates in Supp Fig. 3, 4 and 5