



EGUsphere, referee comment RC2  
<https://doi.org/10.5194/egusphere-2022-682-RC2>, 2022  
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## **Comment on egusphere-2022-682**

Anonymous Referee #2

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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-RC2>, 2022

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Brown et al. present microbial enzymatic activities and community compositions in response to the addition of diatom-derived organic matter to water collected from the surface, mesopelagic, and bathypelagic depths in the North Atlantic. The manuscript is well written, and it is easy to follow the experimental setup and results comparing amended and unamended controls. I would recommend that this is published with only a few minor revisions to aid in the context of the study and its results. The study is very similar to the one in Balmonte et al., 2019, so some distinguishing characteristics should be included and/or more discussion about how the two studies compare and contrast. I believe more information is needed about the enzymes and their substrates — why were these enzymes chosen? What are the differences in these specific polysaccharides? What are their distributions in the marine environment? Do these particular hydrolases have any physiological significance for the microbes, e.g., are some more energetically expensive to produce than others? Just some things to consider...

Some more oceanographic context about the stations selected would be welcomed as there is not much beyond just stating where the water was collected. Are DOC concentrations available for the in situ water?

Please include full names of abbreviated enzymes in Figure 1 caption (line 273) as was done in Figure 2 caption. Full names are also needed in the supplemental figures 3, 4, and 5.

Bacterial protein production is generally absent from the discussion: why was this measured? could these data be used to normalize the response in enzymatic activities in some way?

The last sentence (line 584) about changing ocean conditions does not really tie into the prior discussion — if kept as is, please indicate earlier the analogs of the experimental setup to changing ocean conditions.