We thank the reviewer for their positive feedback of this draft manuscript. The comments were insightful and provide an avenue for further clarification and improvement to the final version of this article.

We have highlighted several of your comments below for further discussion, but note we will address each of the comments in full in the revised manuscript along with feedback from any additional reviewers.

Below we briefly address your comments (bold italicised font) in hopes that it might stimulate deeper discussion within this forum.

General Comments:

I found this to be a well-structured analysis of a complicated system with clear results to support the authors' hypotheses. The authors describe the system and all of the potential drivers and contributors of observed low oxygen in detail and leverage a unique, long-term dataset to do so. The figures were of high quality and supported the statements made by the authors well and it was clear that they are well-acquainted with the relevant literature for this system. I found their conclusions relating changes in rainfall to deep hypoxia and deep water renewal event frequency to be very convincing, though I do wonder what role eutrophication from the increased DOM resulting from large rain events might have – potential positive feedbacks?

Our analysis shows that with increased rainfall, DOC and DON loading increases as a result of both increased river flow as well as increased concentrations of DOC and DON present in the water.

The majority of the additional OM entering the system is primarily dissolved and likely retained in the surface lens where dissolved oxygen concentrations are at their highest. It is important to note that Macquarie Harbour is a "black water system" with relatively low chlorophyll-a concentrations at the surface and undetectable levels below the halocline (in this case 12m depth). The contribution of phytoplankton production to eutrophication would be limited by poor light availability.

Undoubtably some river-derived OM will reach the dark sub-halocline layers and depending on its lability will contribute to the removal of dissolved oxygen from the water column through respiratory processes. However, in a previous study (Maxey et al. 2020) the effect of increased riverine OM loading on the rate of water column oxygen demand was not significant.

In regard to establishing positive feedback loops (we assume you mean anoxia promoting the generation of CH_4 and N_2O in the system and further exacerbating climate driven river loading) we feel that this remains a key knowledge gap in the literature (especially for southern hemisphere systems) and that more fjords and fjord-like systems should be investigated to better quantify the significance of this on global scales.

Aside from some more specific comments (see next section), my only note is regarding the connection drawn between the increased hypoxia and outgassing of greenhouse gases. While the authors provide evidence from the literature to support this hypothesis, I think their claims would be better supported with quantitative measurements to show that in this particular system, this outgassing already occurs and might increase.

These measurements are ongoing as part of a body of PhD research and will be submitted as a separate publication.

Overall, this paper appears to fill a notable gap in knowledge for this system and sets up the potential for future analyses on additional questions raised.

Specific Comments:

We thank the reviewer for these specific comments and will address this once we receive feedback from the second reviewer. We have highlighted a few comments for further discussion.

- Citation for the statement on lines 95-96?

- Figure 1: In inset map of Tasmania, put box around area that is zoomed in on in larger figure? Also in right map, it is hard to tell where the river is – can you draw a line or something to highlight its path rather than the two arrows?
- Line 155**:** I am not clear on how distinct functional groups support that external climatic drivers influence harbour processes.

The combination of harbour morphology and external climate drivers (i.e. rainfall patterns, sea level, air pressure, wind direction and speed, etc) establish horizontal and vertical salinity, density, light and nutrient availability gradients in the harbour.

The results presented in DeSanto et al. (2020) show that microbial community composition shifts along the gradients as they exist in Macquarie Harbour. Thus, it is reasonable to assume that environmental gradients are key drivers of microbially mediated biogeochemical processes (e.g. production of N_2O and CH_4).

We will clarify this in a revised version of the manuscript.

- Line 162: At this point, I was curious to know how many basins there were in the harbor, how deep they were, etc. and was curious if there was a map or drawing of them. I see later in Figure 10 this is shown, but it may be good to have another figure earlier showing this since these deep basins are a large part of your story.

We will amend Figure 1 to include a harbour cross section highlighting the basin morphology

- Line 165: Please add the accuracy/precision of your YSI
- Table 1: Perhaps add maximum depth of each station?
- Figure 2: Why are there not groupings provided above A and B?
- For the final publication, note that Figures 5 and 8 are a bit blurry.
- Figure 7 was really nicely done – good way to display many different variables
- Figure 8: Because you have the y-axis crossing at 0 it becomes somewhat hard to tell where one plot ends and the next begins, and also hard to read the axes on plots that cross the y-axis. Perhaps have the y-axis cross at a negative x-value to avoid this and add a dotted line to indicate where 0 is?
- Figure 9: same comment about crossing the y-axis as in Figure 8
- Figure 10: Really informative figure, curious here about feedbacks of the increased OM loading under high flow – if this will also work to exacerbate low oxygen in combination with the lack of DWR?

We agree that increased OM loading to the harbour has the potential to exacerbate low dissolved oxygen conditions in the basins, however Maxey et al. (2020) could not resolve the effect of increased DOM loading on oxygen consumption rates in the system's basin waters. There are many reasons why this may be the case, but an obvious reason may be the reduced ability to resolve the effect of OM loading on oxygen demand due to a limited number of measurements (6 months in the case of Maxey et al. 2020). The rates of oxygen demand in the basin waters of this system are relatively low, but despite this hypoxia forms regularly and for prolonged periods due to limited basin flushing.

- One other thing to consider is that deoxygenation of the deep waters outside the harbor will also decrease the O2 available in the water coming up during these DWR events, so this may also further inhibit relief from low oxygen?

We are unaware of any evidence that suggests this may be a contribution factor to the deoxygenation of Macquarie Harbour's basins. In fact, in Hartstein et al. (2019) rapid changes in basin water dissolved oxygen (as well as temperature) was used to detect DWR. The West Coast of Tasmania is still relatively pristine, and it would be interesting to understand

how the DOC-rich harbour water might be affecting dissolved oxygen concentrations in the coastal ocean as is exits the system. To date, this remains unresolved.

- Data Availability: Will the dataset be made available following publication? For transparency and ethical scientific practices, the data used should be made public.

We plan to make the data available upon the completion of the PhD research.

Technical Corrections:

- Title: “its” should be “the” or “their”
- Line 22 : “predicts”
- Line 62: “it” should be “they” or “these factors”
- Line 90: “it’s” should be “the”
- Line 95: Please define DWR before using acronym