

Editor comments to the author:

Dear authors,

both reviewers have rechecked your proposal and reviewer #1 suggested technical corrections whereas reviewer #2 suggested minor corrections:

"Although the manuscript has improved substantially, there are two sections in material and methods that I think need further improvement. I am referring to section 2.1 Experimental design and section 2.2 Water collection, incubation setup and sampling; specifically section 2.1 on experimental design.

In my opinion, the modifications introduced in this new version of the manuscript do not help to understand the experimental design. Once screened water and filtered water are clearly differentiated, the whole process becomes clearer. I do not think it is necessary to name the screened water as unfiltered water in any case, since all collected water was screened to eliminate predators. It is important to make very clear that equal parts of mesocosms water (50% filtered and 50% unfiltered) were used in the inorganic treatments, to which nutrients were added at the level of the deep water in the corresponding HN and LN treatments. In the previous version, it was already clear that 50% of filtered water from stations A and B (HN and LN treatments) was added the organic treatments.

Honestly, I think this part of the manuscript needs improvement. The experiment is complex and the reader must easily understand what has been made, in order to also be able to follow and understand the results."

Thus, it is required to take this into account in your revised version of the ms!

Author response to the Editor

Dear Editor,

We thank you for your feedback as well as the referee comments. This guidance has certainly refined and improved the methods and results section as addressed these comments and describe these changes below the relevant comment below.

The experimental design is complex and we carefully considered how to best present this information and have modified this section considerably and also consulted colleagues who did not participate in this study and are not co-authors to clarify which aspects were difficult to understand and needed revising. One referee seemed very satisfied with the manuscript after the last revisions as well as with how we responded to referee remarks, and one referee was less so. The order of presentation is what we understand as the main criticism, rather than any crucial information missing. We respond in more detail also to this comment below. Our responses are highlighted underneath each referee comment using bold text.

We thank you for considering our manuscript for publication and look forward to hearing from you soon.

Your Sincerely,

Allanah Paul

On behalf of all co-authors

Referee #1 comment: Suggestions for revision or reasons for rejection

Review of the revision of Paul et al 'Upwelled plankton community modulates surface bloom succession and nutrient availability.....' submitted to Biogeosciences
General comments.

The results section of this revised version is much more understandable and greatly improved. The authors considered all remarks of the 2 referees and corrected the ms accordingly. To my opinion, the ms is now ready for publication without major modifications.

I have just some minor points: (I refer to the line numbers of the ms with track changes)

Line 292. As NO_x is now defined as nitrate + nitrite, the sentence should read : ' Overall, the nitrate + nitrite (NO_x).....'. The same line 393. However, if you want to refer only to nitrate concentrations on lines 292, 293 then you should not write the abbreviation 'NO_x' but just write 'nitrate'.

Thank you for picking up on this. We use NO_x in Line 292 to refer to the measured nitrate + nitrite concentrations (as defined in lines 175 and 290) and high/low nitrate when referring to the nutrient level as we defined in Fig. 1 and have checked for consistency across the manuscript as this was a detail both referees identified.

Line 394. Remove 'levels'

This change has been made to line 294, which we assume the referee meant here rather than line 394. After revision, this is now line 292.

Line 295. Instead of '... within each nutrient level...' write '...with each nutrient treatment (HN, LN)....'

We thank the referee for the suggestion, but we used the term "within" here deliberately and do not agree that "with" would correctly describe this, however we changed the sentence structure that we hope increases clarity (now lines 293-294). We also kept the use of "level" rather than treatment so this remains consistent with Fig. 1 and the experiment design described in Sect. 2.1.

From line 299 and after in many places, the authors introduced the term 'incubations' (lines 417, 427, 439, 449, 451, 453 ...) or 'levels' (line 405). Instead, everywhere, I suggest to write "treatment" as the 6 combinations (HN LN or biology, organic, inorganic) were defined as 'treatments' on line 94. **On line 93, we refer to the "... six treatment combinations ..." because in the experimental design, we have 2 nutrient treatments (i.e. "levels") and 3 deep water treatments (what we term "components") that were combined. These are the terms we introduce in Fig. 1 which illustrates the experimental set-up and these treatment combinations and we wanted to have distinct terms for these different factors. We use the term "incubations" to refer to the individual containers e.g. lines 297, 416, 426 including within a nutrient level e.g. line 403. We have reviewed the discussion to ensure there is consistent use of these terms e.g. "incubation" line 339, 343, 347, 426-427 and where possible used "treatment" or "treatment levels" as suggested e.g. lines 329, 340 and hope this clarifies these terms.**

line 416. At the end of the added sentence '....detailed elucidation' I suggest to add something like '... as information on the heterotrophic community is not available (heterotrophic bacteria, nano and microzooplankton grazers.)'

This information has been added as suggested to lines 414-415.

Line 447. Write 'heterotrophic' bacterial production

This has been added as suggested to line 446.

Line 502. Write '... were sustained in one of the HN.....'

This has been changed as suggested in line 500.

Finally, I don't see in the revised version of the supplement section the evolution with time of

the other groups gated by flow cytometry (picoeuk, micro I, micro II, Crypto, FL4), which was promised in one of the response to the comments of referee 2: ' We will add these figures to the supplementary material to show how these groups varied by time and treatment'

Thank you for picking up on this oversight. This figure is now available in the revised Supplementary material (Fig. S3) for small and large microphytoplankton, Picoeukaryotes, FL4, Cryptophytes and is referred to in line 313 in the revised manuscript.

Referee #2 comment: Suggestions for revision or reasons for rejection

Although the manuscript has improved substantially, there are two sections in material and methods that I think need further improvement. I am referring to section 2.1 Experimental design and section 2.2 Water collection, incubation setup and sampling; specifically section 2.1 on experimental design.

In my opinion, the modifications introduced in this new version of the manuscript do not help to understand the experimental design. Once screened water and filtered water are clearly differentiated, the whole process becomes clearer.

This detail is described in Sect 2.2 in the manuscript as is stated in the Figure 1 caption. We also worked to refine again the text in Sect 2.2 to which we hope has improved clarity.

I do not think it is necessary to name the screened water as unfiltered water in any case, since all collected water was screened to eliminate predators. It is important to make very clear that equal parts of mesocosms water (50% filtered and 50% unfiltered) were used in the inorganic treatments, to which nutrients were added at the level of the deep water in the corresponding HN and LN treatments.

We agree that this is an important detail and this is indicated in Figure 1 ("Water type added (50%)" and the figure caption ("Sources of inorganic/organic nutrients and the microbial community are in addition to the 50% of mesocosm surface water used as a base in all six treatment combinations.")). This is also described in lines 141-144 where we state that 100 L of surface water was added to each tank followed by the addition of 100 L of specific treatment water. We hope this clarifies this important detail sufficiently.

In the previous version, it was already clear that 50% of filtered water from stations A and B (HN and LN treatments) was added the organic treatments.

Honestly, I think this part of the manuscript needs improvement. The experiment is complex and the reader must easily understand what has been made, in order to also be able to follow and understand the results.

We agree that it is a complex experimental set-up and found it challenging to present this in an easily digestible form. As far as we understand, the feedback from the Referee is related to the order of the presented material rather than any missing details. The current figure placement inside the manuscript file, which will likely change in any published manuscript due to formatting, may add to confusion here. We followed what we thought was a logical order: Section 2.1 describes the experimental design and the distinction between the six treatment combinations used to address our research questions. Section 2.2 describes the water collection in detail, starting with the geographic location and sampling procedures for both the subsurface water and following the work flow steps including the filtration steps and preparation of the six treatment combinations.

Other minor things that I think need correction.

Line 122. Only 40 L of water were collected in the mesocosms?

400 L of water was collected in total. This has been corrected.

Line 156. Light does not pass through black tubes. In the original version black tubes were not mentioned.

Yes, the incubator tubs were made of black plastic but have open tops that allowed the light to penetrate. The measured lux values were taken from inside the incubators and are representative measurements of the light conditions the containers received in these tubs. If that extra detail is confusing, it can be removed.

Line 292. Initial nitrate (NO_x)... I understand that it should be initial inorganic nitrogen. At least this is what can be read in other parts of the text. The entire text should be revised to correct these uncertainties.

Thank you for this suggestion. Line 290 (previously 292) has been corrected to read "... initial nitrate + nitrite (NO_x) ...". A similar change was made to line 173 to clearly state this definition. We revised the entire text to clarify this. There are still some cases where "inorganic nitrogen" is used (e.g. lines 115, 125) but these are not related to measured NO_x concentrations or nitrate levels in this study.

Lines 293-294. This sentence seems somewhat confusing to me, because it can be understood that initial concentrations of inorganic nitrogen were similar in HN and LN. Perhaps something more explicit like: Initial NO_x concentrations were similar in all HN treatments (7.72...) and all LN treatments (2.56...)

We have modified this sentence (now lines 292-293) which we hope more clearly defines the comparison we want to make here between the two nitrate levels: " Initial NO_x concentrations were similar in all 12 high nitrate (HN, [NO_x] = 7.72 ± 0.46 μmol L⁻¹, mean ± s.d., n = 12) and in all 12 low nitrate treatments (LN, [NO_x] = 2.56 ± 0.54 μmol L⁻¹ mean ± s.d., n = 12, Fig. 3B)".

Line 341. Delete the second were from ... were also were observed...

This has been corrected.

Line 405. While nitrate concentrations... should read while inorganic nitrogen concentrations...

This has been changed to NO_x to more precisely indicate the variable we measured and are referring to here.

Line 528. Such physical factors... should read other physical factors.

We do not consider this change is necessary because in this sentence we are indicating specifically which physical factors we referred to as "other physical factors" in line 527.

Lines 540-542. Here it is assumed that they are diatoms. I it should be conditional: probably diatoms, as silicate reduction suggests.

We have modified lines 538/540 to address this comment and use "silicifying phytoplankton" instead of "diatoms" in other cases in the revised manuscript.