Seasonal dynamics of dissolved organic matter along an intertidal gradient in semi-arid mangrove soils (New Caledonia)

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Response to Reviewers

Reviewers' comments:

RC #2:

The manuscript entitled "Seasonal dynamics of dissolved organic matter along an intertidal gradient in semi-arid mangrove soils (New Caledonia)" by Mouras et al., is a nicely presented case study on dissolved organic matter dynamics along a tidal elevation gradient during contrasting seasons. The flow of the manuscript is very clear and well structured throughout, making it easy to follow the work. The data are well prepared and presented and my comments only relate to minor corrections and clarifications. I do suggest the authors to carefully assess the manuscript for minor punctuation and spelling mistakes (in many cases related to plural or tense).

We sincerely thank Anonymous Referee #2 for their time and constructive feedback, which have helped improve our manuscript. We have carefully considered all suggestions and carefully revised the manuscript to correct punctuation, spelling and grammatical errors in the revised version.

Abstract

Lines 21-22: What do you mean by "…DOM also originates from biological activity, …"? All DOC does. Be specific about what differentiates the DOC here to that in the Rhizophora stands.

We thank the reviewer for this comment. We agree that our sentence was too general. What we intended to highlight was the stronger contribution of microbially produced/processed DOM in the salt-flat and *Avicennia* stands compared to the *Rhizophora* stand. We therefore revised the sentence to clarify that this difference is supported by higher BIX values and enhanced microbially derived fluorescent components. We added, L. 21: "DOM show a stronger contribution from microbial production, as evidenced by enhanced microbially-derived fluorescent component".

Visual abstract: By substituting the title question with the conclusions, you can save space and be direct about what you found. Something like: Intertidal habitat position impacts seasonal DOC quantity and quality in understudied semi-arid mangroves.

Thank you for this suggestion. We have modified the graphical abstract by replacing the title question with a statement highlighting the main conclusions, as suggested. We added then: *Intertidal habitat position impacts seasonal DOC quantity and quality in understudied semi-arid mangroves.*

Methods

L128-130: Was the cleaning method for DOC and DOM vials the same?

Thank you for this clarification request. The same cleaning procedure was applied to both DOC and DOM vials. All glass vials were cleaned with 10% HCl, rinsed three times with Milli-Q water, and combusted at 450 °C for 6 h prior to use. We clarified this point in the revised manuscript (L. 132).

L157-164: Which instrument was used for which analysis? It may be easier to follow if you list the methods one after the other.

Thank you for this suggestion. We agree that the description of the analytical methods could be clearer. The paragraph has been reorganized in the revised manuscript to explicitly distinguish the instruments and procedures used for DOC and TOC analyses (L. 160-180).

L161: Repetition of triplicate sampling can be removed.

Thank you for this suggestion. The repetition has been removed in the revised manuscript.

Results

I would suggest structuring the results in the same way that you structure the methods section. This basically only relates to the multivariate analysis, but I find it confusing that you list the methods one way and then start the results another. I can understand the reason to put the multivariate results first, to pre-empt differences between habitats and seasons and for a reason to drop the depth results, however, personally, I would appreciate it more at the end of the section to tie the univariate results together and provide a nice overview.

Throughout the results you give significances of below the set alpha threshold ($p < 0.05$) or above for non-significant results. This basically just tells me where your arbitrary significance cut-off is (something you already mention in the methods section), but it doesn't tell me anything else about the test. For an anova report, you should provide the degrees of freedom, the test-statistic (i.e., F-test), and the p-value received from the test. This gives the reader a better idea of how certain the estimate is. Alternatively, you bring the anova table from the supplementary files into the main and refer to it without listing the above.

We thank the reviewer for this helpful suggestion. We chose to present the multivariate analysis (PERMANOVA) at the beginning of the Results section because it allowed us to first assess the relative influence of the tested factors and justify focusing the subsequent analyses on habitat and season, while depth was not retained due to its non-significant effect. This approach was intended to clarify why depth was not further investigated and presented in the figures. However, we appreciate the reviewer's suggestion and have clarified this point in the revised manuscript (see answers to next question).

Regarding the reporting of statistical results, we agree that providing more detailed information would improve transparency. The full ANOVA tables with the degree of freedom and the F-test have therefore been added to the supplementary material (Table A8).

L230-233: This is a valid result and merits a mention in the study. I wonder, however, if there may be subtleties that are masked by the multivariate analysis which may be interesting to some readers. I would suggest including the depth results in the supplementary materials and briefly summarise them in the results section. It is fine not to further discuss them in the manuscript. Also, right now is not clear which depth samples you carried forward into the analysis. Do you only report the surface samples? Or at depth? Or did you pool the results from all depth layers and report the average values?

We thank the reviewer for this helpful suggestion. As recommended, depth-related results have now been included in the supplementary material (Figures. A4-A8). These figures present the variations of the main parameters across the three soil depth layers (0-10, 10-20, and 20-30 cm). A brief reference to these results has also been added in the Results section (L. 260-265).

Because soil depth did not show a significant effect for most parameters, and to simplify the presentation of the main patterns, the values reported in the main figures correspond to averages across the three depth layers. This clarification has been added to the manuscript L246-248.
We completed our sentence by "*Therefore, values presented in the main figures correspond to averages across the three sampled depth layers (0-10, 10-20, and 20-30 cm). Results exploring depth-related variations are provided in the supplementary material (Figs. A4-A8)."*

L291-292: This seems like a repetition of the previous paragraph.

Thank you for this comment. The sentence has been rephrased in the revised manuscript to avoid repetition (L. 335).

L345: Explain somewhere (probably the methods) what C % is. Is C1 % relative to the other three C peaks or is it relative to the overall emission values?

Thank you for this comment. We have clarified this point in the Methods section. L199-201: "*The relative abundance of each component (C%) corresponds to the ratio between the fluorescence intensity of a given PARAFAC component and the sum of the fluorescence intensities of all identified components (C1-C4)."*

Discussion

L460-468: This is an interesting thought. You should be able to see some evidence of this at depth in the Rhizophora samples. Did the FDOM profile change much with changing depths? And did this correspond to redox, or mineralogy?

We thank the reviewer for this insightful comment. Depth-related variations of FDOM were examined and are now presented in the supplementary material (Figure A7). However, no significant differences in the fluorescent components were observed with soil depth in the statistical analyses.

L469: Which stand is meant here? Rhizophora?

Thank you for this comment. We confirm that the *Rhizophora* stand was meant here, and this has been clarified in the revised manuscript (L. 518).

L500: Check the figure reference.

Thank you for pointing this out. The correct reference is Fig. 4, not Fig. 3. This has been corrected in the revised manuscript (L. 551).