

Dear Authors,

I am really glad to read the revision of the manuscript. I do believe that this manuscript is substantially ready to be published in *Biogeosciences*.

During the review processes, I am really impressed by the way the author thoroughly discuss their findings and claims, very clear and detail. The authors choose the wordings prudently and reverently when expressing to disagreements.

Meanwhile, please allow me to remark on some points and leave the eagerness to response at the authors' discretion.

Thank you very much.

Regards,

Santosa Sandy Putra

Indonesia

Referring to document bg-2022-218-author_response-version1.pdf

Section 1. Main modifications, 1.1. Boussinesq equation and numerical schemes

“We went back to the classical formulation of the Boussinesq equation¹ in terms of h for the peat hydrological module (PHM).”

Reviewer 1 remark: To be crystal clear, this statement means that the approach about Θ (presented in section A. Appendix: Mathematical error, in document bg-2022-218-AC1-supplement.pdf), is not being implemented in this paper.

Section 1. Main modifications, 1.3. Other minor changes

“Additionally, we added the weather data to the data and code repository, as reminded by Reviewer 1.”

Reviewer 1 remark: Thank you. I think the presented data have not been accompanied with metadata, including units, benchmark coordinates, operated instruments, and information of data collectors. The metadata will allow reader to interpret the data with minimum helps of the authors.

Section 3. Modifications to figures

“Figure 5 contains the results of the new reality check, together with the separation between modelled and measured data proposed by Reviewer 2.”

Reviewer 1 remark: I think the measured and the modelled data are still presented together (no separation) in Figure 5.b.

I think there are too many lines in Figure 5.b that are probably hard to be distinguished by the readers (the lines are presumably from 141 measurement points). Will it be better to present fewer lines taken from some representative measurement points?

Will it be better to provide a zoom view that captures a particular shorter time (e.g., 10 or 30 days)?

Referring to document **bg-2022-218-AC1-supplement.pdf**

Section 1.1 General comments, Subsection 1.1.1

“The reality check requires that the input data (weather data) and the reference data (WTD) represent the same conditions, and therefore they must be from the same period.”

Reviewer 1 response: Thank you for the definition and also for the improvement presented in the revised manuscript (Line 244 and Line 293).

I think it means that the reality condition can only be approached instead of be captured.

Please consider to substitute “reality check” with either “field check” or “field comparison”.

Section 1.1 General comments, Subsection 1.1.2

“We think that our claim that “blocks are most effective during dry periods” is well supported by the results we present.”

Reviewer 1 response: Sorry that I cannot provide clear comments earlier about the purpose of seasonal analysis for this study.

Nevertheless, finally the authors presented extreme dry period analysis that is very important related to the results interpretation. The authors make an additional conclusion, which is:

“during the long drought the gap between the blocked and unblocked scenarios gets smaller and smaller”. It is great to see the fifth outcome discussed in Section 4.2 Block impact on WTD (in Line 391 (new)).

“Nevertheless, we agree that adding a table summarizing the key results will improve the readability of the text. We will compose a table that captures mean WTD and possibly other relevant metrics out of the results presented in Figure 6 and Figure 7.”

Reviewer 1 response: I might be wrong but I have not seen the mentioned table in the manuscript. If the manuscript is too long already, probably the authors can cancel the plan or present the table as Appendixes.

Section 1.1 General comments, Subsection 1.1.3

Reviewer 1 response: Thank you very much for bringing new insights that enhance my perspective.

Please consider to summarize or discuss this paragraph into the manuscript:

“On the other hand, our study area was large and there was a large amount of heterogeneity in the block locations, which capture some of the spectrum of block density present typically in tropical restoration projects: the western part of the catchment, for instance, had more blocks per unit area than the south-eastern part. Indeed, this is exactly what we see in Figure 8: There was a fair amount of variance in the distance up to which blocks affected the WTD.”

Section 1.2 Minor issues, Subsection 1.2.5

“For a recent review, see [6] and the references therein. Also worth mentioning are the works by some of the authors, [4, 5].”

Reviewer 1 response: Please allow me to have a different interpretation to reference [4, 5, and 6]. To me, those articles mentioned the possibility of vegetation changes in post drainage conditions. Article 4 explicitly mentioned about *Acacia* plantation. Therefore, I do not think it is suitably just to bring the proposed productivity term into a restoration perspectives. In a restoration perspective, I believe net biomass productivity is more important than gross biomass productivity (omitting biomass degradation).

Section 1.2 Minor issues, Subsection 1.2.9

“We will add these coordinates in the final version.”

Reviewer 1 response: Will it possible to mention the coordinates in the text too (e.g., in Line 65 of the latest manuscript)? Not only in the caption of Figure 1?

Section 1.2 Minor issues, Subsection 1.2.11

“Reviewer 2 asked to restate the DTM resolution in the Figure caption, a somewhat contradictory requirement to the suggestion by this reviewer.”

Reviewer 1 response: It is great to mention the DTM resolutions in Figure 1. In case there is a comment that is contradictory according to the authors, although so sorry that I personally cannot perceive it, please eliminate it. Thank you.

Section 1.2 Minor issues, Subsection 1.2.13

“This escapes our possibilities. The typesetting strategy in LaTeX is to “float” the figures and tables, i.e., to let the software decide on their best placements.”

Reviewer 1 response: I suggested to put Table 2 in Page 8 of the manuscript (new). It is because Table 2 is firstly referred in Line 158, in Page 8.

The proposed suggestion might help the reader to observe Table 2, which contains peat properties scenarios. I guess the suggested position is somewhat better than locating Table 2 in Page 11, under Section 2.3.1 Weather scenarios.

I extremely agree with the authors. In a research, there are many things out of our control.

Visualizing in LaTeX is one of the example. However, it might be helpful to look at these references, as some programmers seem to disagree to our claim of table positioning settings in LaTeX.

<https://en.wikibooks.org/wiki/LaTeX/Tables>

<https://stackoverflow.com/questions/1673942/latex-table-positioning>

<https://tex.stackexchange.com/questions/9485/how-to-fix-table-position>

Section 1.2 Minor issues, Subsection 1.2.18

Added after L233: “The typical block is made out of surrounding peat, and covers the canal width entirely up to the local peat surface.”

Reviewer 1 response: It will be completely great to describe not only about the 203 permanent peat compaction dams but also about the 87 temporary box dams (see line 68 of the new manuscript). Have those two the same construction structure?

Section 1.2 Minor issues, Subsection 1.2.19

Reviewer 1 response: The current position of Figure 4, under the subsection 2.3.3 Peat hydraulic properties in the new manuscript, is better than my initial suggestion. It looks OK now. I am so sorry initially I forgot that K has different units than T .

Moreover, I accepts the authors’ explanations about the line styles and does not insist the authors to change the line styles anymore. It might be interesting to find some perspectives in the literature that answer: Why presentations with different line types (e.g. using dashed) might be generally better than presentations with different line colours only? A suggestion is a book by Prof. R. S. Clymo, “Reporting Research: A Biologist's Guide to Articles, Talks, and Posters” (see <https://doi.org/10.1017/CBO9781107284234>).

Section 1.2 Minor issues, Subsection 1.2.24

Reviewer 1 response: I am sorry for the unclear comments.

I just want to highlight the main approach of the authors, which is: "This work does not try to isolate the effect that a single block might have in the WTD of a tropical peatland area, but rather to investigate how the WTD might raise in a typical restoration project under different conditions."

In other words, the authors agree that several canals and/or blocks simultaneously affect the WTD at the study sites.

Section 1.2 Minor issues, Subsection 1.2.27

"We forgot to include the precipitation and evapotranspiration data. We thank the Reviewer for the notice. We will upload it."

Reviewer 1 response: Please see the comments of the data repository (in Section 1. Main modifications, 1.3. Other minor changes, referring to document bg-2022-218-author_response-version1.pdf).

It is favourable to make the data being informative to readers, which means low supports from the authors are needed to read the data.

Referring to document bg-2022-218-manuscript-version3.pdf

Minor issues

1. Line 3: Probably delete the word “however”. Please make a double check whether the authors want to write “the WTD monitoring data is ...” or “the WTD monitoring data are ...”.
2. Line 15: Please separate the aerial unit to the CO₂ emission unit (e.g., use Mg of CO₂ per ha). It is preferably to be applied for the whole documents.
3. Line 70-72: Please give some example of species that are categorized as pioneering native forest species.
4. Line 75: “The peat depth averages at about 5 m.” How the authors or the surveyors estimate this value? How the peat depth inventory was conducted? Is it an experts/ practitioners guessing? This is also related to Line 195-196.
5. Line 76: Please mentions the specifications of weather monitoring instruments and WTD loggers concisely. The specifications can be mentioned here or in the metadata file in the shared repository.
6. Figure 1: What is the elevation reference of the DTM? Is that the mean sea level?
Please consider or rephrase this caption for Figure 1.b:
Original 100 m × 100 m resolution of the square mesh of the digital terrain model, which was later interpolated to 50 m × 50 m of the triangular mesh of the peat hydrological module (PHM).
What are the green texts D=0 and D≠0 presented in Figure 1.c? Do you mean T=0 and T≠0?
7. Line 103: Please consider this “where p [m] is the local peat surface (canal bank) elevation above the reference datum.”
8. Table 1: For z , as far as I am aware, it is common to use “canal depth” over “canal height”. As another comparison, river engineers usually use river depth instead of river height.
9. Line 114: Please consider “As an approximation approach, the friction coefficient in this zone must be ...”
10. Equation 4: I am still confused with the appearance of comma inside the equation, the comma in between 0 and h . Clarify and reformat?
11. Line 169: Please mention that unstructured mesh (triangular unsymmetrical mesh) is used in the peat hydrological module (PHM).
12. Line 194: Please consider “... the raster was interpolated to 50 m × 50 m of the triangular mesh.”
13. Line 200: “Each simulation started from the same initial WTD (see Subsection 2.3.5).”

14. Figure 3: In the caption, please use mm d^{-1} or mm^1d^{-1} instead of mmd^{-1} . It is preferably to be applied for the whole documents.
15. Line 220: I suggest “both” is removed. It is because we usually pair “both” and “and”.
16. Line 235-238: Please use m d^{-1} or m^1d^{-1} instead of md^{-1} . It is preferably to be applied for the whole documents.
17. Line 264: “... the WTD at the dipwell locations for each of the 50 rasters (the 50 daily results) ...”
18. Line 288: Please add “The sensors with an annual ... patrol post transect.” in Figure 5 caption.
19. Line 300-301: Please consider “It is also remarkable that the modelled WTD in most of the peatland area far enough from canals (e.g., $> 1\text{km}$) was ...”
20. Line 305: Please consider “..., regardless of peat hydraulic properties or weather conditions (except during the extreme dry periods).”
21. Line 335: Please separate the time interval unit to the CO_2 emission unit (e.g., use Mg of CO_2 per ha per year). It is preferably to be applied for the whole documents.
22. Figure 9: Please use Mg per ha instead of Mgha^{-1} .
23. Line 343-344: Please consider to add an extra comma “Finally, in order to make generalizable claims, the sensitivity to weather conditions and peat hydraulic properties should be accounted.”
24. Appendix A: I tried to compare the patterns presented in Equation A5 to the one in Equation A8. Unfortunately, I got confused with the difference in sign (+ and -) and the sign function. Does $f_{sign} = 1$ when $h_i^n < h_k^n$ and $f_{sign} = -1$ when $h_i^n \geq h_k^n$? Please explain or modify Equation A8. Thank you.