Review: bg_2022-58

Linkosalmi et al.'s study looked at vegetation phenology at three different boreal peatland sites across 5 different years, linking imagery taken from digital cameras, satellite imagery and productivity data from eddy covariance flux towers. The authors used the green chromatic coordinate to investigate patterns of greenness, and to evaluate the influence of environmental parameters such as temperature and water table level on GCC and subsequent gross primary productivity measurements. I would like to thank the authors for what is a nicely written paper. Overall, it was clear and concise, presenting the data in a coherent and logical manner. You do state you look at water table, but this was not clear to me in your analyses (in fact, it seems missing from the statistical analyses? I would like the authors to expand on how they related GCC and GPP exactly as I felt this was lacking.

Detailed comments:

Line 10: When you state leaf area, do you mean the physical leaf size?

Line 14: I presume you mean air temperature here?

Line 29: Same as abstract, do you mean leaf area as in differences in leaf size?

Line 39: Vegetation phenology is quite a broad concept (incorporating a variety of things such as flowering, leaf out etc). I would maybe include the phrase green leaf phenology here to acknowledge this paper is looking at simply 'greenness'.

Lines 59-63: I was a little confused by the wording here. You state there are three peatlands measured across 5 growing seasons. Your first objective is states however that you would use GCC to describe phenology between sites and among different plant communities at one site. I understand that you are looking at species/community differences within a site, but this makes it sound like you only did this at one site.

Lines 85-101: Did you consider using any other metrics, even other chromatic coordinates such as the Red Chromatic Coordinate?

Lines 195-201: Really nice to show the GCC vales of different species/communities – this is not all that common in the literature, especially for peatlands.

Lines 240-250: This section was a little hard to follow, and I would encourage the author to re-word. It was detail heavy (which is good) but makes it really quite dense. In line 242, you mention a p value, but no other information from the results of the statistical test. I would like more details here. A p value alone is not sufficient when reporting the outputs of statistical analyses.

Figures 7 and 8: Could you maybe incorporate these two figures to show comparison between GCC and GPP more easily? I'd recommend two columns, left hand side GCC, right hand side GPP, with each site in a column (I hope this makes sense). In Figure 8, for Halsiappa, what is the explanation for the yellow shaded area?

Lines 265-268: The wording of the sentence here is quite confusing. So the difference in GCC was significant between Lompolojankka and other two sites in all years, but only significant between Halsiappa and Kaamanen in the last 3 years of study? Think this could be re-worded to be easier to understand.

Figure 9: Your GCC values for some of the sites are really quite high (much higher than other boreal peatland studies such as Peichl et al. 2015 and Davidson et al. 2021). Why is that? Was Halssiappa really that much greener at around Day 240

Line 319: Again, state green leaf phenology here

Line 326: Wording is a little awkward. You state that Lompolojankka is flatter, but the rest of the sentence also makes it sound like there is pronounced microtopography. This should be clearer.

Line 328: 'This affects THE fen's' – word the is missing

Line 330: I'd expanded this section. What might a fen dominated by sedges be doing over say, a bog? Higher productivity in the short term? But faster turnover? Discussion section overall seems rather superficial in areas such as this and could benefit from being expanded upon.

Line 333: How small are the shrubs in this area? Shrubs would typically have a higher GCC unless they are really quite small (thinking Betula spp.?)

Line 336: I wouldn't use the phrase plant growth here, that indicates to me the physical size of the plant, I'd say strictly green leaf phenology.

Lines 340-343: Really cool that you are able to investigate the GCC dynamics of individual plant communities. I would like to highlight another recent paper, investigating GCC dynamics in boreal peatlands, that also looked at community level (finer spatial resolution of 60 x 60 cm) by Davidson et al. 2021:

Davidson, S.J., Goud, E.M., Malhotra, A., Estey, C.O., Korsah, P. and Strack, M. (2021) Linear disturbances shift boreal peatland plant communities toward earlier peak greenness, Journal of Geophysical Research: Biogeosciences https://doi.org/10.1029/2021JG006403

Line 344: This paragraph seemingly comes out of nowhere, and I think it would benefit from having a linking sentence between the previous paragraphs.

Lines 371-372: This sentence is awkwardly worded and I'm not sure I get the meaning. What does phenological courses mean?

Lines 378-380: I may have missed it, but this key information here about the drought in 2018 – could that be included in the study site? I think some more meteorological data would be a really nice inclusion? Show air temperature and precipitation patterns across the 5 year period (and compared to the climate normal)

Conclusion: Unfortunately, I feel like the conclusion lets down what is otherwise a nice paper. I would encourage the others, rather than just summarise the paper here, really place their results within the bigger picture. What can this data help with in the future? There is very little discussion about the usefulness of this type of data beyond explaining productivity patterns at these specific sites. Could this data be used to parameterize models? I don't think you need to go crazy here and go beyond the scope of the paper, but I do think summarising just the paper here weakens the conclusion.