

Biogeosciences Discuss., community comment CC1 https://doi.org/10.5194/bg-2020-488-CC1, 2021 © Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.

Comment on bg-2020-488: Pestiaux, L., Schoenmakers, E., Thomson, L., Macfarlane, A., Griffin, S., Steel, J.

Murray Benjamin Collins

Community comment on "Carbon balance of a Finnish bog: temporal variability and limiting factors based on 6 years of eddy-covariance data" by Pavel Alekseychik et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2020-488-CC1, 2021

Pestiaux, L., Schoenmakers, E., Thomson, L., Macfarlane, A., Griffin, S., Steel, J.

Overall summary of the paper:

The study aimed to quantify the carbon dioxide (CO2) and methane (CH4) fluxes on boreal mires in southern Finland. It also aimed to identify the environmental factors controlling these ecosystem-atmosphere exchanges and which might be responsible for seasonal and inter-annual variability of carbon fluxes. Lastly, the study investigated if the CO2 and CH4 fluxes could help detect the heterogeneity of the surface. The study is innovative as it uses long-term data (six years of data from May to September, representing the growing seasons) measured by eddy covariance (EC) techniques.

The results of the CO2 and CH4 fluxes in the study site were similar to other boreal bogs. The variation in fluxes exchanges were driven by air and peat temperatures and the water table depth was a factor driving the atmosphere-ecosystem exchanges in dry years. Lastly, there was no relationship between CO2 and CH4 fluxes and the surface heterogeneity of the site. This was due, in part, to the uncertainty of the models used. This study will hopefully introduce further research of peat fluxes exchanges using EC techniques and will allow a better estimation and interpretations of the estimates.

General comments:

The different conclusions and results drawn from the study are valuable to our

understanding of peat bogs dynamics. However, given the length of the paper and the amount of detail contained therein, it becomes difficult for the reader to identify the most valuable information and differentiate between this and the other findings included. We suggest that the authors could clarify the main findings they want to share with the readers and make these very apparent (e.g. a clear introductory sentence at the beginning of the section and paragraphs).

Dates and periods of data collection

The paper would benefit from clarification of the exact periods from which data were collected, since the terms 'annual' and 'growing season' are used interchangeably in the paper. This can be confusing, since with the former, we would expect to see 12 months of data, and the latter, only a subset of the year. This information could be specified in:

- lines 24 (what do the authors mean by "the study represents a complete series"?),
- line 29 (did the authors consider data collected in winter? What do the authors mean when they say that the contribution of October-December CO2 and CH4 fluxes was 'not negligible'?),
- line 62 where 'annual' is used interchangeably with 'growing season'.
- Line 304, "The importance of the non-growing season fluxes was also analyzed" meaning that annual data was indeed collected; again, reducing clarity on exactly when the work was undertaken.

Comments on the Method section

Line 110: We enjoyed the details to which the authors described the study sites. These detailed information enable the reader to understand better the environment in which the study was conducted.

L120: Figure 1.b could be expanded to match the size of the photo and a more detailed map of the Siikaneva-2 site with the location of the EC tower could be added. We understood that some data were gap filled with a closely situated site, Siikaneva-1. It would be valuable for the reader to have an idea of the location of Siikaneva-1 and be able to see the similarity in environmental conditions between these two sites. Are these sites similar enough to use the data interchangeably? A close-up of the map showing the

replicates of the study (line 157-158) as well as the different land cover would improve the method section.

Unless the information presented in line 255, in section 3.1 (results) are information from data collected by the authors, we suggest the section (Environmental conditions) should be moved to the method section as these are background information.

Some information found in the Discussion and Results sections should be explicitly set out in the method and should not be stated at the end of the paper. Line 304 ("the importance of the non-growing season fluxes was also analyzed"), should be stated in the Method section.

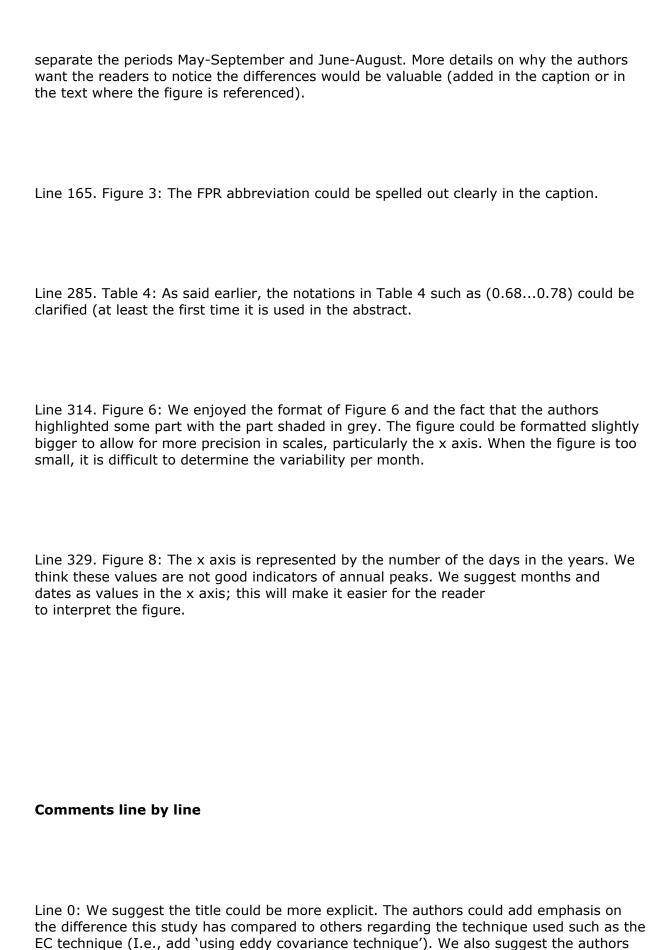
Line 254: Section 3 is called "Results and discussion". This is confusing as there is another "Discussion" section later (on Line 406). It would be clearer for the readers to have well-delimited and defined section enabling them to locate themselves in the paper.

Comments on the figures

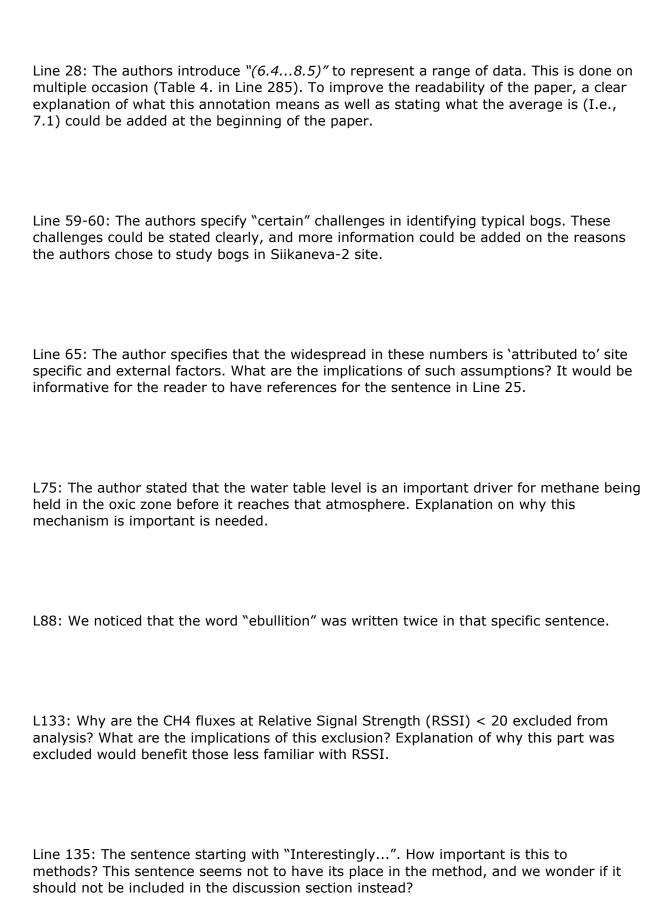
The authors present many figures which make it hard for the readers to understand what the most important results and main messages are. On a general note, it is easier for the reader to have the whole figure on one page and avoid the graph being cut (for example, Line 375).

Line 140. Figure 2: The surface energy balance closure (SEBC) should be defined in the figure description or in-text. Whilst the formula is written (which is great), the variables are not defined.

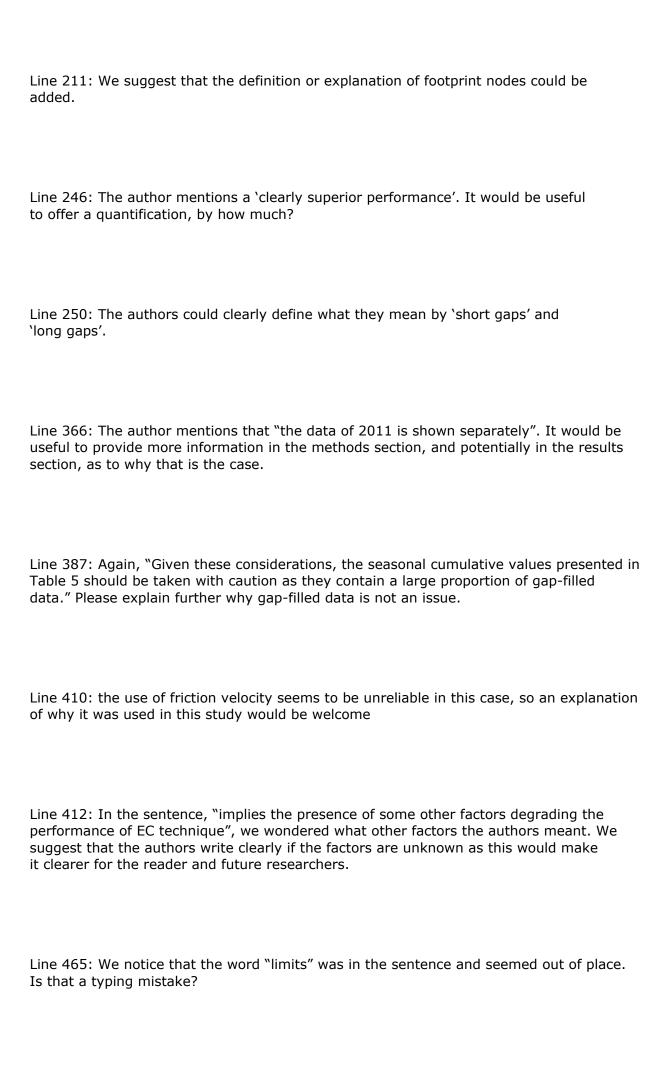
Line 145. Table 1: We do not understand why the authors



could add information about the investigation of methane balance in the title.







Line 506: The rhetorical question "what might cause such a peak in Ch4...?" may not be necessary as it could add confusion to the reader.