Biogeosciences Discussions

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Comment on bg-2022-156

Anonymous Referee #2

Referee comment on "Duration of extraction determines CO_2 and CH_4 emissions from an actively extracted peatland in eastern Quebec, Canada" by Laura Clark et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2022-156-RC2, 2022

General comments.

The manuscript by Clark et al. reports carbon dioxide (CO_2) and methane (CH_4) fluxes (over three summers), and CO_2 production potential, in active peat extraction fields in Canada. The authors report that flux rates were greatest at the youngest site, which they suggest is related to the age of the peat (^{14}C dating), and declined thereafter. Emissions from drainage ditches were found to be much greater than from the peat field. While data from extraction sites are already available, most have been collected from post-extraction sites (bare peat) – data from active extraction sites remains scarce given the difficulties in measuring while machinery passes over the study site. As such, this study provides important information for land managers and GHG inventory reporting.

The manuscript is competently written and I believe that the subject matter/methodology would be of interest to the readers of Biogeosciences. In my opinion, the manuscript requires only minor revisions before it could be considered for publication (see specific comments below).

Specific comments.

L1 "Year of extraction...."?

L14 "..a peatlands control of CO2/CH4" strikes me as odd phraseology. Consider re-phrasing.

L18 “Higher” is used throughout the manuscript to describe some of the results. This can be confusing when the study also involves a vertical aspect, e.g. tree height, peat depth. Consider using “greater”.

L36 Soil C stores.

L40 Carbon dioxide is released.

L50 “Decomposition rates are greatest...”

L63 Vacuum harvesters are not used everywhere peat is extracted – perhaps state “in Canada”?

L64 also, peat structure/porosity after years of drainage?

L67-68 Abdalla et al, 2016 is a review paper – they do not directly measure CH4 or the oxic layer of the peat.

L73 Add “...in North-American undisturbed peatlands” as you do not cite studies from other geographical areas.

L74-75 Too many references cited here, especially as you use e.g.

L76-77 If I were new to peatland research, I would get the distinct impression from reading this introduction that C studies have only been carried out in Canada. Would suggest that you either explicitly state “in Canada” or add references from other parts of the world to support the generalized statements here.

L88 There is no real sense of the composition of the study site. Please add peat depths, bulk density, nutrient composition, C content etc. presence of vegetation in the ditches.

L100-101 Please state the reason(s) for these times? How often were the sites measured

within these dates?

L110 Extraction not production

L116 Previous measurements by others or preliminary measurements in this study? If the former, please state by whom.

L124 Change to "As the first C flux measurements began...."

Fig. 2 I'm struggling to understand this figure. What does the horizontal dashed line represent? A caption should be stand-alone information, so please provide some of the information from L111-114 here.

L131 Collars have not been measured before now. Please add details of size.

L131 prior to measurement? Please state the length of time until the first measurement. Do you think that collar insertion may have influenced subsequent flux values?

L138 Was the chamber equipped with an internal thermometer? In the absence of a cooling system, temperature increases well beyond the ambient air temperature must be a feature, even with opaque chambers. How did you minimise/account for chamber heating?

L158-159 Air temperatures from within the chamber?

L162 Why such a high rejection rate in 2018?

L171-175 Delete "spanning...site".

Fig. 3 Do we assume from the diagram that peat depth at the site is around 85-90cm?

L204 Why were two GCs used?

L270 I don’t think you state the number of flux measurements used. Rejection rates (L162) seem very high so perhaps the number of fluxes left for modelling and discerning a relationship with soil temperature was too small?

L297 I don’t think you state the number of flux measurements used. Rejection rates (L162) seem very high so perhaps the number of fluxes left for modelling and discerning a relationship with soil temperature was too small?

L316-317 And yet they appear in Fig. 8?

Fig. 8 What does the horizontal dashed line represent?

L323-337 It is very hard to read the data in this section – would it be possible to condense the numbers and direct the reader to the relevant figure/table?

L380 I don’t think you state the number of flux measurements used. Rejection rates (L162) seem very high so perhaps the number of fluxes left for modelling and discerning a relationship with soil temperature was too small?

L386 subscript 2 in CO2.

L456 Not surprising if your dataset is too small or you haven’t covered all possible temporal variation.

L469 Please add details of absence/presence of vegetation in drain ditches in Methods section.

L476-477 ...and at other times of the year, especially outside the active extraction period.

L481-482 Is this relevant for how emission factors are derived for this land use category?

Reference list I have only glance through the list but please check the formatting (espec.

Subscript of CO2 etc.)