

Dear Associate Editor:

Please find our responses to your comments detailed below. I have included the exact location of all changes as requested. All line numbers refer to the second revised version with track changes.

Changes in response to comments by reviewer #1:

Introduction: The reference Salm et al. (2012) has not been added to the introduction, in contrast to your point-by-point response. Please only report changes that have been made. Otherwise, this is really misleading.

RESPONSE: It was not our intent to mislead. We previously added Salm et al. in the discussion (see lines 349-50) as it was most appropriate there.

Section 2.1: The comment of reviewer #1 whether the peat was extracted in the same way and in the same quantity in all sectors has not been addressed. Please do so.

RESPONSE: Information added (Line 97-99) as: "Each field is managed in the same manner with harrowing and vacuum harvesting. Similar amounts of peat were removed from each field through the study period."

Section 2.2: Please add the information about how often the gas measurements were done in each sector, and specify the intervals. The statement "at varying intervals" is too imprecise.

RESPONSE: Passage (Lines 147-49) is re-written as "Measurements each summer were made from June through September depending on weather and industry operations (June 2-15, 2018; June 7-19, July 4-15, July 31-Aug 6, Aug 16-21, Sept 14-16, 2019; July 21-25, Aug 15-27, Sept 14-18, 2020)." The number of measurements is updated in the passage on Line 176. See response to Reviewer #2 below.

Discussion: "no attempt at correlating with time-lag temperature was made". Why not? Please try and present / discuss the outcome.

RESPONSE: Recall that no field equipment could be left in these fields because the companies were actively harvesting peat. We measured from the actively harvested areas and did not create any 'harvest exclusion area to keep collars or sensors in place' because the point of the research was to quantify the fluxes from the actively

harvested sites and excluding operations would invalidate this. No attempt therefore *could* be made because the soil temperature measurements were discrete and made at the same time as the chamber measurements; none of the measurements were continuous in time. The time intervals between these discrete measurements were not constant due to accessibility from weather and field operations. Further, the exact same spatial location could not be measured through time for the same reason as above – the operations involve harrowing the field and vacuum harvesting the peat. All measurements thus are represented by averages per sector and location within sector (e.g. 2016 2m). No change was made.

Changes in response to comments by reviewer #2:

L144-145, revised version: add the information that the collars were inserted only a few minutes before the measurements.

RESPONSE: This (lines 145-146) now reads: “Therefore, at each measurement location on the peat field, a few minutes prior to measurement, a metal collar was inserted approximately 5 cm into the surface of the field.”

Number of measurements: Please indicate the number of valid measurements more explicitly at the appropriate locations, also as per reviewer #1.

RESPONSE: Added information at Lines 176-78 as: “In 2018, 80% of 200 CO₂ were retained. In 2019, 77% of 600 CO₂ and 72% of 600 CH₄ measurements were retained, and in 2020, 89% of 738 CO₂ and 61% of 738 CH₄ measurements were retained.”

Associate Editor's comments:

L62, revised version: Revise sentence to "Globally, there are about 460 Mha of peatlands, of which 50 Mha have been disturbed".

RESPONSE: changed as directed.

L121, revised version: Please indicate already here that gas flux measurements were performed in 2018, 2019 and 2020.

RESPONSE: This information was provided earlier in Line 108. The existing sentence was modified to add the word "all" as: "All measurements were taken over three years in August 2018, June through August 2019, and July through September 2020."

L147-149, revised version: You used three different analyzers. Did you perform a systematic comparison of the analyzers? Were the data comparable? Please provide some basic information on the analyzers' performances (precision and accuracy).

RESPONSE: In our paper, we previously indicated that we compared the results obtained (lines 152-155): "A one-way ANOVA ($\alpha = 0.05$) was conducted between the fluxes from the different analyzers for the 2016 sector 2 m position and 2007 sector 15 m position. There were no significant differences between the means of the fluxes measured with the three analyzers from the 2016 ($p = 0.552$, $F_{2,85} = 0.599$) or 2007 ($p = 0.06$, $F_{2,87} = 2.848$) sectors."

The precision of the instruments has been added as requested in Lines 149-152 as: "In 2018, a PP Systems EGM-4 IRGA (Precision ~ 1 ppm) was used for CO₂. In June 2019, a Los Gatos Research Ultraportable Greenhouse Gas Analyzer (precision CO₂ < 0.03 ppm; CH₄ < 2 ppb) was used and in the remainder of 2019 and in 2020, a LI-COR Biosciences LI-7810 Trace Gas Analyzer (precision CO₂ < 0.04 ppm; CH₄ < 0.25 ppb) was used."

L293, revised version: "2016 drainage ditch flux data" is misleading, as it suggests that you refer to flux data of 2016, but gas measurements were done in 2018-2020 only.

RESPONSE: Again, no intent to mislead. We were referring to a measurement in the 2016 sector. Added word 'sector' (Line 296).

L460, revised version: Change "five-six" to "five to six".

RESPONSE: Done (Line 463).