CC2 comment

Some more comments:

0) Table 1 could do with some information on slope within each sub-catchment (as this will influence runoff and erosion and residence time). Maybe some information on this can be added?

1) The Figure 1 could be improved by chosing a different colour for the catchment outline of Drained, Restoration, Non-drained. Currently it is easy to overlook this (font could also be bigger and bold for the conditions (e.g. Drained).

2) To my knowledge the Ball (1964) LOI conversion has never been tested for POC from peatlands. Our comparison did not provide good results and C/N analysis provides a better alternative. Could this have impacted the results?

3) Table 4 correct NS to ns in last column.

4) Fig. 4 This is a nice graph but more informative would be to have the discharge expressed per unit of sub-catchment area (to allow a weighted comparison).

It is good to see the BACI approach discussed - we need more of it - and also the various C export aspects (although I have been wondering about how CO2 evasion from streams might actually be from aquatic organisms unrelated to the actual peat body and its C balance - they fix and respire C as well !).

5) Finally, I wonder about a mention in the discussion around the fate of the exported C. We really do not know yet how much of the DOC & POC will be 'lost' via stream and river transport. The results vary a lot and the measurements were often artificial (cuvettes), possibly not accurately mimicking temperature and light conditions (in stream/river conditions). Further resarch is needed ...

Author reply

Thank you for your helpful comments. Please find our responses as follows:

0) We agree that this information is useful for interpretation and have added information to Table 1 on mean slope for each sub-catchment. The mean slopes are subsequently referred to in discussion in terms of erosion potential.
1) We have amended the figure as specified.
2) Loss on Ignition following the Ball (1964) conversion method has been used to detect POC concentrations from peatlands in previous studies (Dinsmore et al., 2013), yet it is acknowledged in Dinsmore et al. (2010) that "…given the generally low concentrations of POC in water samples, analytical error is acknowledged to be significant, runs containing deionised water in place of sample (blanks) produced an error of ~15% of the mean POC concentration". We have added a statement about the uncertainty introduced by this analytical method when it is introduced in the text.
3) Corrected as specified.
4) We have amended figure 4 to express the discharge per unit area.

We agree that examination of the origin of dissolved CO_2 (i.e. from soil supersaturation, geological sources, or from in-stream microbial activity) is an interesting research question. Isotopic analyses combined with 14-C dating may provide further elucidation, and in a past study conducted in UK and Finnish peatlands it was strongly suggested that a significant proportion of CO_2 lost from headwaters by evasion was *not* derived from within-stream breakdown of DOC, as evidenced by the difference in the $\delta^{13}C$ and ^{14}C signatures of DOC and evasion CO_2 (Billett et al., 2015). However, variation between different peatlands is likely to be high, and these isotopic data would certainly be of interest for our Flow Country monitoring sites to help understand the origin of dissolved CO_2.

5) The fate of exported C is a very interesting research topic. All sub-catchments within this study drain into the Halladale, which is a short-residence time river with very high aquatic DOC fluxes at the tidal limit in the context of GB (Williamson et al., 2021). Given the short transit time of water within the freshwater continuum and lack of any standing water bodies within the catchment below these sampling stations where biogeochemical transformations are likely to occur (Anderson et al., 2019), it is probable that much of the carbon is transported conservatively until it reaches the estuarine environment. We have added information on the fate of C to the discussion to put our findings into a wider carbon balance context.

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