

Biogeosciences Discuss., author comment AC2
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Reply on RC2

Sirwan Yamulki et al.

Author comment on "Effects of clear-fell harvesting on soil CO₂, CH₄, and N₂O fluxes in an upland Sitka spruce stand in England" by Sirwan Yamulki et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2021-15-AC2>, 2021

Authors comment (AC)

We are grateful for the careful consideration of our paper by the referee, and have considered all the points; our responses are given below.

Referee #2 comments (RC2):

This is a very clear and well written paper on the impact of clearfelling of adjacent Sitka Spruce stand on GHG fluxes. As the authors say, there are not many studies on this topic, and IPCC inventory currently does not include the impact GHG emissions from felling and thinning operations. So, this paper will add considerably to the literature.

The authors could only investigate GHG fluxes from areas where brush mats were cleared. To measure brush as well would have required two eddy covariance towers (in site A and the other in site B), and I suppose this was not an option.

Their CO₂ methodology is not the standard gas flow through system (IRGA), but instead the authors opted to use the static chamber, taking 4 samples over the chamber closure period, and analyses these gas samples also for CO₂. They provided a convincing comparison of both systems, and demonstrated the differences in soil respiration rate measurements were very small. I certainly agree, that the large heterogeneity of the forest floor would have not enabled a direct comparison of CO₂, N₂O and CH₄ fluxes, and that using the IRGA outside the static chamber would have been probably more uncertain than providing data from the SAME chamber for all 3 GHG.

AC: We thank the referee for the positive comments.

RC2, Line 136-137: Could you add how many samples had to be discarded

AC: Thanks for the enquiry. Overall 18 samples were rejected, 9 of which were during a snow fall period in January 2016. This has been added to the paper as requested.

RC2, Line 141: delete 'also'

AC: Thank you - corrected

RC2, Figures and tables, were appropriate: It would be clearer if you mention that there are 8 chambers per site

AC: Thanks for the suggestion. We've added this to Figure 3 (will be Figure 2).

RC2, Table 4: there are two overlapping values, last column, 1st row.

AC: This is a misplaced line number – corrected.

RC2, Line 182: At what temperature did you dry the soils?

AC: The soil was dried at 105 °C until constant weight. This has now been indicated in section 2.4 of paper.

RC2, Line 183: 'Soil tree live and dead fine root biomass' The 'Soil tree' part of the sentence is very confusing. Do you mean to say: 'Live and dead fine root biomass'?

AC: Thank you – corrected as suggested.

RC2, Line 235: Table 2: 'area A (mature spruce stand) and area B (clearfell area after year 1)' It would be clearer if you write: 'area A (mature spruce stand, remaining) and area B (a mature spruce stand clearfelled after year 1)'

AC: We agree with the referee and we've now changed the table as suggested.

RC2, Line 256: '(1.6 t ha⁻¹ cf. 4.9 t ha⁻¹)' what does cf stand for?

AC: 'cf.' is a widely used abbreviation meaning 'compare with', but for clarity we have put 'compare with' on first use, and await advice from the editor over its use.

RC2, Line 262: a fullstop is missing.

AC: Thanks for the correction.

RC2, Line 291 Table 4: There are two overlapping values in Row 1, Column 7

AC: see above – misplaced line number

RC2, Line 372/373: Q10 comparison with Siberian Larch and UK Oak forests. Would it not be more meaningful to compare your data with CO₂ Q10 values from temperate climate Sitka spruce plantations?

AC: Thanks for the suggestion. We've revised the sentence to compare the results with example reference from the UK (Fenn, K.M., Malhi, Y. and Morecroft, M.D.: Soil CO₂ efflux in a temperate deciduous forest: environmental drivers and component contributions. Soil Biol. Biochem., 42, 1685-1693, 2010).

RC2, Line 415: 'reflect a time lag in the microbial community change' fair enough, but should you not also mention that fungal decomposition also causes this time lag. Can you provide a reference?

AC: Thanks for the suggestion. We've revised the sentence as suggested and will add a reference e.g. (Glassman, S.I., Weihe, C., Li, J., Albright, M.B., Looby, C.I., Martiny, A.C., Treseder, K.K., Allison, S.D. and Martiny, J.B.: Decomposition responses to climate depend on microbial community composition. Proc. Natl. Acad. Sci. U.S.A., 115, 11994-11999, 2018).