Biogeosciences Discussions

Biogeosciences Discuss., referee comment RC1
https://doi.org/10.5194/bg-2021-15-RC1, 2021

Comment on bg-2021-15

Anonymous Referee #1

Referee comment on "Effects of clear-fell harvesting on soil CO_2, CH_4, and N_2O fluxes in an upland Sitka spruce stand in England" by Sirwan Yamulki et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2021-15-RC1, 2021

Yamulki et al. present a four-year study quantifying the effects of clearfell harvesting on important soil greenhouse gas fluxes. Overall, the study is well designed and executed and descriptions of methodology and interpretation of results are thorough. Studies monitoring GHG fluxes across ecosystem and biomes are imperative to assessing present and future carbon source-sink dynamics following disturbance. However, I suggest the authors consider several comments below before a decision on acceptance. These concerns primarily relate to justification of scientific significance and clarification of how GWP results complement GHG flux analysis.

General Comments:

Justification of scientific significance: The authors argue that there is inconsistency across the literature regarding the effect of clearfelling on soil GHGs. They present an extensive literature review of these inconsistencies, making up a bulk of the introduction. However, by the discussion and conclusion sections the authors have not specifically addressed how this study has helped to resolve the inconsistency issue, creating some disconnection between the knowledge gap that was set up in the intro and the interpretation of results. A meta-analytical or synthesis framework would be more appropriate to address this issue of inconsistency, which is not the goal of this contribution. Therefore, the authors should consider revising this initial pitch laid out in the introduction and focus more on knowledge gaps that this study directly addresses in order to avoid overstating or misrepresenting the scientific significance.

Clarification of how GWP results complement GHG flux analysis: The authors do a thorough job interpreting results from each GHG flux, but there is a lack of synthesis to highlight the most important results and the broader implications of those results. Specifically, while I think the addition of GWP is an intriguing and powerful part of the analysis, the significance, relevance and context isn't fully developed relative to the GHG flux analysis. Authors state they measured GWP to assess the total GHG budget following clearfelling and alluded to the importance of including emissions from clearfell management in IPCC reports, for which it currently does not. However, they do not follow-

through with how these results could be contextualized in this applied context and what conclusions can be made about "predicting rate and duration of changes in GHG balance by clearfelling..", as they stated in the introduction. Without such discussion, the calculation of GWP seems out of place and incomplete.

Specific (line-by-line) comments:

Introduction:

Line 57-79: This paragraph is very lengthy and could be reduced to fewer examples of incontinences in the literature.

Line 81-82: There is very little explanation of why long-term studies of soil GHG are important, or could potentially clarify the inconsistency problem.

Line 83: "life-cycle analysis" needs to be defined/clarified.

Methods:

Figure 1: Include a scale for map

Line 102: Specify distance between A and B sites.

Figure 2: Consider moving this figure to an appendix

Line 178: If soil parameters were only taken once, differences between felled and unfelled could also be site-level variation. Authors should acknowledge this limitation.

Table 1: Consider moving this table to an appendix

Results:

Table 2: Consider adding significance levels to this table.

Figure 4: This graph is clunky and challenging to read. Consider substituting for a line graph.

Table 3: Consider condensing this table down to the most important output and the rest could go in the appendix.

Discussion/conclusion:

Line 443-473: The main take-away from the N_2O results are not made clear in this section. In previous paragraphs, authors led with a concise summary of how CO_2 and CH_4 were overall affected by clearfelling, but that type of synthesis is lacking in this section.

Line 487-489: The sentence starting with "Over the 3 years since felling…" is the most important and concise synthesis of the GWP results from all GHG fluxes, consider emphasizing this point in the conclusions and placing this sentence towards the beginning of the paragraph.

Line 503-506: Authors stated large discrepancies (3 fold differences) between GHG flux estimates and the previously published EC ecosystem respiration measurements at their site, calling to question the accuracy of scaling to large earth-system calculations of GWP, which rely on accurate absolute flux measurements. While it is important authors acknowledged this limitation here, they should also consider including this potential source of error directly in their discussion of GWP.