

Dear reviewer,

We appreciate the supportive and constructive comments you provided for our manuscript. We will revise the manuscript based on your review, and are confident that our efforts, with the insight from your end, have improved the manuscript.

Below, you will find the original comments, followed by our response in red font and description of planned revisions to the manuscript, made in effort to address each comment. We include in the response the updated sections of the manuscript corresponding to each comment in italic.

Kind Regards,

Theresia Yazbeck, on behalf of all authors

General Comments

This manuscript presents interesting and important research for quantifying landcover-specific CO₂ fluxes in a heterogeneous ecosystem through an innovative approach. It introduces a practical framework to bridge the gap between small-scale chamber and ecosystem-level footprints by combining UAV, LES modeling, and eddy covariance (EC) measurements. Stordalen, the study site, is highly relevant and illustrates the strength of the method. Overall, the manuscript presents a well-explained methodology with thorough analysis and provides convincing comparisons between chamber and EC data. Taken as a whole, this paper makes a valuable and timely contribution to AMT and is suitable for publication following revisions.

Thank you for this positive review.

Technical Corrections

1. Inconsistency in chemical notation of CO₂ (e.g., line 10-15, 15-20, 95-100, 260)

All "CO2" occurrences throughout the manuscript will be replaced by "CO₂"

2. For R2 as well (e.g., 15-20)

All "R2" occurrences throughout the manuscript will be replaced by "R²"

3. "showing resulting for Simulation 2" -> should be "showing results for Simulation 2" (line 265-270)

The caption will be corrected as follows:

"Figure 5: Similar to Fig. 4 but showing results for Simulation 2 corresponding to the lc_5 configuration"

4. "bag" -> "bog" (line 270 to 275)

The typo will be corrected.

5. "semit-wet" -> "semi-wet" (line 335 to 340)

The typo will be corrected.

6. "while and shrub correspond" -> unclear, might be "while shrub corresponds" (line 335-340)

The sentence will be revised as follows:

"This wetness contrast is coupled in an ecological contrast, where wet and semi-wet bogs correspond to the same or similar vegetation type while shrubs correspond to a different vegetation type."

7. "black dotes in in Figure 7(a)" -> "black dots in Figure 7(a)" (line 385-390)

The typo will be corrected.

8. One citation has a duplicate DOI prefix: <https://doi.org/doi.org/10.1111/gcb.16754>
(line 660-665)

The typo will be corrected.