

Review of Photosynthesis of tropical Andean tree species: Insights from mechanistic modelling and sensitivity analysis

By González-Caro et al.

General comments

In this manuscript the authors aim to better understand tropical montane forests' thermal acclimation capacity and evaluate the key factors affecting photosynthetic rate in different thermal regimes (at different elevations). The authors highlight the importance of customised parametrisation of montane tropical species in models to decrease uncertainty in carbon sequestration predictions.

The paper is within the scope of the journal and addresses a relevant topic that is of interest for both the ecologists/ecophysiologicals, as well as the modelling community. I find that the study findings are valuable and promote further investigation into the performance differences between tropical lowland and montane species. However, the manuscript would benefit from a clearer presentation of its key findings, stronger integration with existing literature, and some structural and stylistic refinements.

Note: Supplementary material: I can't seem to be able to find the referenced supplementary figures and tables in the preprint document or elsewhere

Specific comments

The current title is somewhat generic and does not reflect the key features of the study. Please consider alternative titles that reflect either the key results or methods applied (which are nicely summarised in Fig. 1).

Introduction:

I would suggest reformulating the last paragraph where the study aims are defined – it seems like these can be into two sub-groups: an empirical and a modelling focused one.

- Aim 1 (empirical): data from a transplant experiment:
 - Intraspecific variation of physiological traits
 - Their relative contribution to A_{net}
 - Relative contribution of environmental drivers to A_{net} in 2 or 3 thermal regimes
- Aim 2 (modelling): evaluate how well mean parameters of lowland species perform in modelling A_{net} of tropical montane forest species

Materials in methods: Please consider re-ordering the method sections so they follow the presented aims' order (e.g. transplant experiment, photosynthesis model, parametrisation, evaluation, sensitivity analysis)

L107: models in plural? Do you mean the same model different parametrisation?

2.5. Model application: This analysis would benefit from referring to observed photosynthetic rates if available from a site with similar species composition.

Limitations: How does the differences between juvenile and mature trees' characteristics affect the interpretation of your results?

Results:

Table 1 with the species list should be presented earlier in the text.

Discussion:

L435: Section 4.4. would benefit from the inclusion of reference studies when stating models would benefit from customised lowland/montane parametrisation.

Technical corrections

L55: edit reference formatting

L65-66: "Photosynthesis is one..." Please rewrite this sentence so it flows better with the rest of the paragraph. (Even though photosynthesis... traits employed...)

L80: "real response" Please reformulate this sentence (simulations with average trait values may not yield realistic response to environmental change?).

L106: Please use the same tense within a paragraph. ("used", "investigate")

L120: Eq. 2 formatting

L128: Do you assume that the juvenile trees' gas exchange is comparable to those of mature trees and literature estimates? If yes, please state it here or where you make the comparison later on.

L130: The 26 °C group is not shown in your results, is there a reason you focus on the 22 and 14 °C groups?

L139: kg

L150: "We evaluate ..." Please edit/reformulate this long sentence.

L169: extra parenthesis

L234: For clarity, I would suggest using either the elevation or temperature groupings (assuming temperature classes are the proxy for elevation), rather than both.

Results

L249: spelling ("there")

L251: language use ("best")

L253: language use ("very good")

L301: consider changing “discrepancies” to differences

Discussion

L316-321: “For example...” Please review this long sentence.

Figures

Fig. 2.: Please consider adding a legend with the montane and lowland species datapoints for the scatterplots.

Fig. 3.: Can you/Do you explain in your text what interactions (“*Int*”) denote?

Fig. 4-5.: Please consider adding more straightforward axes labels (especially x-axis).

Fig. 6.: Please consider adding a legend with the red and black dots for improved readability. Why are A_{net} values multiplied by 1000 on the y-axis in subplot A) and B)?