

Responses to comments from RC2

Manuscript: Effects of plant traits on the regulation of water cycle processes in the Amazon Basin

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Dear editor,

With this letter, we provide our reply to the comments provided by RC2 to our submitted manuscript entitled “*Effects of plant traits on the regulation of water cycle processes in the Amazon Basin*”. We appreciate the time that RC2 took to review our work and have seriously considered and appreciated all the comments by the reviewer. We detail in the following our plan to address the comments in a revised version.

General Comments

This study aims to investigate the effects of plant traits on regulating water cycle processes in the Amazon basin. However, the author refers to ‘water process parameters’: yet, ET, PET, VPD, LST, and SM are not strictly ‘parameters’. Additionally, the paper lacks clear organization; the Discussion section contains significant overlap with the Introduction.

Response: Thank you for your comments on our work. We will revise the terminology in the manuscript. Additionally, we will restructure the Discussion and Introduction sections to enhance relevance and reduce overlap.

RC2.1. *Abstract: could the author specify how much of the variation in ET, PET, and other variables can be explained by plant traits?*

Response: The explained variance relating to ET, PET and other variables could be found in the Results section (Figure 3).

RC2.2. *Clarity of research focus - *... to examine how plant traits respond to parameters related to regulation of atmospheric water content ... * This is unclear. It suggests an analysis of how external processes influence plant traits, while the rest of the paper seems to focus on the opposite direction - how plants regulate water cycle processes. This should be clarified.*

Response: We aim to link plant traits to water process variables, treating water process variables as response variables and plant traits as explanatory variables. We apologize for the lack of clarity in the manuscript and will clarify this in the revised version.

RC2.3. **We found that SLA had the strongest relationships with parameters ... * The author should specify the strength of these relationships - e.g. correlation coefficients.*

Response: We agree and will include the corresponding correlation coefficients in the revised manuscript.

RC2.4. *Do Figure 4 and Figure 5 provide new insights, or do they largely repeat the information already presented in Figure 3?*

Response: The information in Figures 4 and 5 differs from that in Figure 3. Figures 4 and 5 illustrate the direction and slope of the quantile regression, whereas Figure 3 presents the explained variance.

RC2.5. *While the paper highlights the importance of plant trait diversity and spatial heterogeneity, it assumes a unidirectional relationship between plant traits and water cycle processes. In reality, these interactions are bidirectional—plant traits regulate transpiration, leaf temperature, and soil moisture dynamics, but environmental conditions also influence plant traits through acclimation or adaptation. The paper focuses on analyzing forward relationships, but this approach alone may not be sufficient. I strongly suggest employing causality inference methods to examine these relationships in a more robust manner.*

Response: We agree with the argument raised by RC2. We will reconsider our analysis approach in a revised version of the manuscript.

RC2.6. *L260-263: The author should provide stronger evidence to support their claims rather than attributing unexpected results solely to data limitations. Simply stating that the data are insufficient is not a compelling explanation.*

Response: We appreciate this suggestion and agree with the point raised by RC2. In the revised version, we will provide stronger evidence to support our claims and explore alternative explanations beyond data limitations.

RC2.7. *Establishing a direct link between LPC and VPD seems problematic, as VPD is primarily a meteorological factor. While vegetation dynamics can influence background climate conditions, this relationship should be better justified.*

Response: We appreciate this feedback and will revise the manuscript to clarify the relationship between LPC and VPD. We will provide a more detailed justification, including relevant literature and additional analysis, to explore the potential influence of vegetation on background climate conditions.

RC2.8. *Section 4.3: Why do plant traits significantly relate to transpiration but not to soil moisture? A more detailed discussion or additional analysis would be helpful.*

Response: We will revise the manuscript to provide a more detailed discussion on the relationship between plant traits and soil moisture.

RC2.9. *Figure 1: I suggest using illustrations (e.g., arrows, plus/minus symbols) to better depict the proposed mechanisms while keeping explanatory text within the main text. Additionally, the left-side arrow should be explicitly labeled (e.g., transpiration and soil rehydration) for clarity. Figure 2: the unit for each panel is missing. What is the unit of LST? And the tick labels on both axes are wrong. You may either leave them blank or use the correct latitude and longitude like panel (a). The caption for Table 1 is too brief.*

Response: Thank you for your comments and suggestions. We will revise the figures and the table accordingly.