

Interactive comment on “Recent changes in the dominant environmental controls of net biome productivity” by Barbara Marcolla et al.

Anonymous Referee #2

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This manuscript by Marcolla et al investigates global CO₂ fluxes during the carbon uptake and carbon release period and at different time-scales. Overall, the paper is very interesting, the method sound and the manuscript well written. However, I did find that the discussion/broader impact was essentially missing, making it difficult to see what the consequences of this work are for the community. Here are some comments:

1) The title “Recent changes in the dominant environmental controls of net biome productivity” is misleading. This paper does not look at “recent changes” or what the history of environmental controls was, so I would choose a title that reflects the actual paper better.

Following the reviewer suggestion we changed the title into:

“Patterns and trends of the dominant environmental controls of net biome productivity”

We would like to keep the focus also on the temporal dynamics of the controls since this is a relevant goal of the work (see Fig. 4, 5, 6).

2) Section 2.2 is a little laborious, even though the actual analysis method is obvious once the reader gets to the figures. I would suggest illustrating the described analysis with the evolution of a single pixel, it would help clarify the section.

We rewrote Section 2.2 in order to better clarify the applied methodology.

3) Section 3 is a monstrous lock of text describing the figures one by one. The “Discussion” part of this section consists of a few sentences here and there. The paper would greatly improve if 1) The Section was split between “Results” and “Discussion” and 2) the “Results” section was split further into subsection for each type of analysis, just to help guide the reader through the overall progression of the analysis. I think that splitting the “Results” and “Discussion” would force the authors to put this work into perspective and draw conclusions about why this work matters for the different communities that might be interested in these results (flux tower, land surface modelers, global models, etc. . .).

Following the reviewer’s suggestion we separated Results and Discussion into two separate sections. We focused the Results on the most relevant findings and improved the Discussion section.

4) In the Discussion section, it would also be helpful to include some limitations: how is the way vegetation is modeled influencing the results in one direction? Is the modeled known for modeling some aspects better than others? This would be a very valuable addition.

We agree with the reviewer on this point and we have therefore added a first section in the discussion on the limitation of the method.

5) I would move Figures 3 to the Supporting Information since it doesn't actually show new data, just the same data from Figure 2 plotted differently. It is still nice to see though, so the SI would be a good place for it. Similarly, Figures 4 and 5 show essentially the same data. I found Figure 5 more interesting though, so I would again move Figure 4 into the SI.

We think that the bar plot of Figure 3 contains an additional information which is not evident from Figure 2, i.e. the frequency change across temporal scales and this is the reason why we would prefer to maintain the figure in the main text. We agree with the reviewer that Figure 4 and 5 show the same results but figure 4 gives the spatial information which is lost in Figure 5 where results are plotted in climate coordinates.

Edits: overall, the text was very well written. My only minor comment on the text is that at line 142, I would replace "As for radiation" with "Similarly to radiation". The sentence is technically correct, but I found the use of "as" in this specific context to be confusing.

The sentence was changed accordingly to the reviewer suggestion