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Biogeosciences Discussions

Interactive comment on "Tree proximity affects soil respiration dynamics in a coastal temperate deciduous forest" *by* Stephanie C. Pennington et al.

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1 **"Pennington et al report on a well designed study of the effect of nearby trees on soil respiration, which finds that nearby trees increase the temperature sensitivity (but not the rate) of soil respiration except during dry periods and during the dormant season. The topic is important and appropriate to the journal, and the article is very well written. It was a pleasure to read."**

Thank you for the kind words.

2 **"My general criticism is that the article does not discuss what for me is the 'elephant in the results'. The authors take the effect of BA5 on the T sensitivity of Rs to mean that Ra is more sensitive than Rh to T. The logic is that when there is more nearby basal area (and hence, by assumption, root biomass), Ra is a greater component Rs. However, BA5 was not found to be a significant driver of the spatial variability of Rs. It seems to me that the only way to reconcile those two ideas is to suppose that as root biomass increases, Ra increases but Rh decreases by the same amount in order to keep Rs the same, which as far as I know is not something that is believed to happen. If anything, the literature suggests that root exudates fuel soil respiration, rather than competing with it. I therefore think the discussion needs to acknowledge this paradox and tackle the question of how roots could plausibly impact the T sensitivity of Rs without impacting the magnitude of Rs. Could it be some kind of statistical artifact? The article doesn't necessarily have to have the answer, but it should at least lay out the key questions and suggest what kind of further work might be able to answer them."**

Thank you for pointing this out. This is not an artifact, but it is a consequence of the model we used, which was not well communicated. Localized basal area entered the model as a fixed effect (i.e., testing whether it raised Rs by itself; this was not significant) and in an interaction with temperature (testing whether it changed temperature sensitivity; this was significant). Because, over the course of the day/month/year, temperature varies significantly in these forests, the result is that the changed temperature sensitivity results in a higher cumulative Rs flux for collars in high-BA locations. This can be seen by plotting the raw respiration data and fitting a loess curve, separating the data into low- and high-BA colors (see Fig. 1).(Conversely, one could imagine a situation where these lines were perfectly parallel throughout the year. In this case the BA effect would be significant, but there would be no difference in the temperature sensitivity.)

3 OVERALL RESPONSE:

Thanks for the thoughtful comments. We will clarify the point made in 2 in the text, and think that including a version of Fig. 1 in the revised manuscript will help readers understand the practical consequences of the statistical model.

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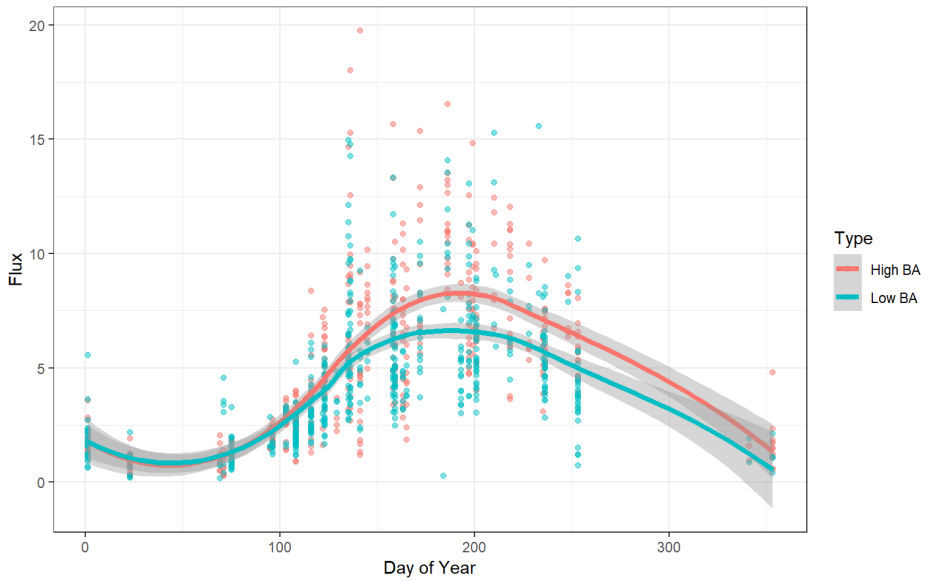

Fig. 1. Flux in (μmol CO2 mˆ-2 sˆ-1) is shown by day of the year. Collars that "see" high basal area are in red, and low in blue (cut off by the median BA value) with a loess fit.