

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

Stephanie C. Pennington et al.

stephanie.pennington@pnnl.gov

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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.

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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 R_s to mean that R_a is more sensitive than R_h to T. The logic is that when there is more nearby basal area (and hence, by assumption, root biomass), R_a is a greater component R_s . However, BA5 was not found to be a significant driver of the spatial variability of R_s . It seems to me that the only way to reconcile those two ideas is to suppose that as root biomass increases, R_a increases but R_h decreases by the same amount in order to keep R_s 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 R_s without impacting the magnitude of R_s . 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 R_s 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 R_s 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.)

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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.

Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2019-218>, 2019.

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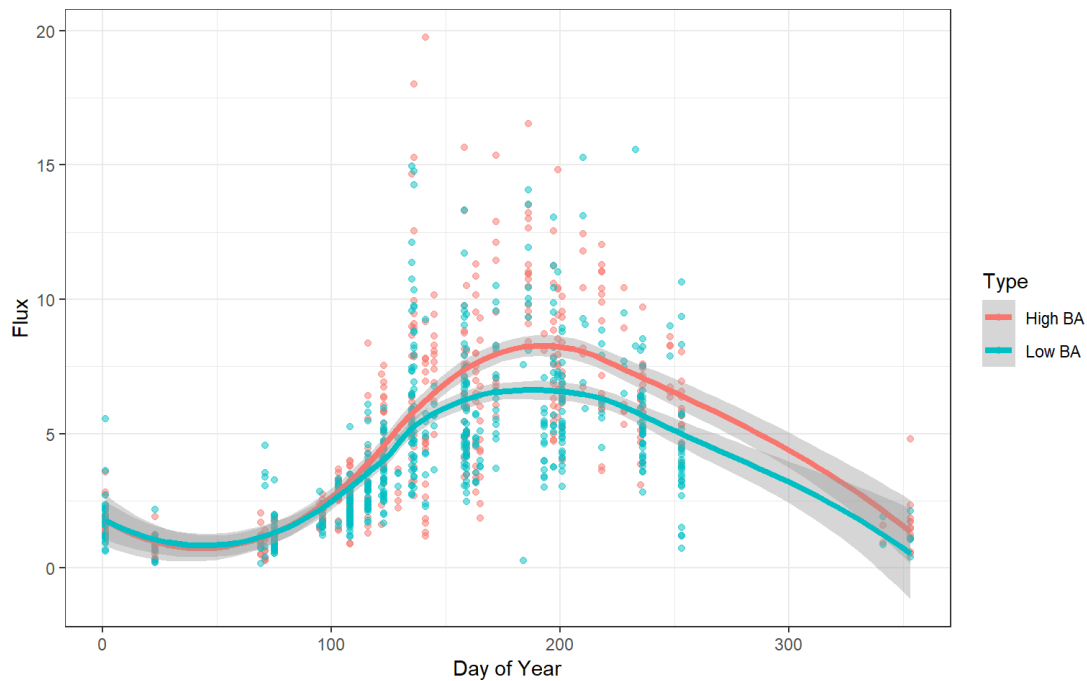


Fig. 1. Flux in ($\mu\text{mol CO}_2 \text{ m}^{-2} \text{ s}^{-1}$) is shown by day of the year. Collars that "see" high basal area are in red, and low in blue (cut off by the median BA value) with a loess fit.

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