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Discussions

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

Anonymous Referee #2

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This paper addresses a current knowledge gap with forest soil respiration research: how important is the presence of vegetation for helping to explain some of the variability in soil respiration over space? We often treat forests as homogeneous when designing field studies. However, there is an accumulation of research that suggests that the spatial arrangement, size and density of trees can affect soil respiration measured in a particular spot. It's important to be able to characterize this effect for many reasons, which the authors point out - designing the spatial arrangement of measurements, interpreting relationships of soil respiration with environmental variables and seasonality, to name a few. I appreciate the authors' study design, especially their decision to sample sub-monthly and not just focusing on the growing season but also reporting results

from the dormant season. The paper has some weaknesses that dilute the impact of the study, I believe, that can be improved. There are also some omissions that should be included, and some of the statistical approach should be re-considered. The paper is generally well-written but (like most papers) could use some further clarification in places.

I have concerns with the title of the paper that affects some of the text in the paper and the way the problem is framed and studied. 'Tree proximity' implies that the research is focused on understanding how the degree of closeness of trees to soil respiration measurement influences respiration. This is not what the study is doing. Rather, I think a more accurate title would be something like "localized basal area affects soil respiration dynamics in a coastal temperature deciduous forest". This is because the only variable included in the models that involves trees is basal area within a 5 m radius, and the focus of the statistical modeling was on determining if localized basal area had an effect in addition to temperature and moisture. Based on the title, I was expecting a different kind of analysis, such as kriging or a spatial regression. 'Tree proximity' could be interpreted to mean different kinds of things. 'Localized basal area' is more specific to the actual variable that was examined.

Parts of the discussion and conclusion involve making assumptions about autotrophic and heterotrophic respiration based on their findings. It is tempting to make these statements (I've been there before), but you have to be careful here. Trees do not just influence autotrophic respiration - they provide fresh substrate for heterotrophic respiration as well. I think it is okay to include some speculation of how tree presence/absence might influence respiration rates, but try to avoid the assumption that trees only affect the autotrophic side of things.

The statistical methods used to determine whether variables were stronger or weaker and to compare dormant season model fit to growing season model fit should be re-examined. Differences in R^2 and AIC between models that use different input data do not necessarily indicate that the fit is better or worse. You could look into using an ef-

fect size analysis or examining relative importance of regression parameters (package relaimpo in R).

Overall, this is an interesting study that investigates the influence of localized basal area on soil respiration - with some improvements, this should be an impactful contribution to the literature. Keep up the good work.

Line by line edits: 23: I would remove all mentions of 'proximity' (since you aren't measuring how close each tree is to the collars) and replace with something more descriptive. 'Presence' would work here. 24: Again, I would replace 'tree proximity' with 'localized basal area'. 26: Needs to be more specific - within a 5m 'radius' 46: This statement is misleading - large whole-tree chambers, for example, are in effect measuring soil respiration at scales larger than 1 m. Re-write this sentence to better say what you mean. 74: 'Higher' would probably be better than 'stronger' 90-101: A description of the soils present at the sites should be included. 99: Need more detail here - was the separation distance randomly selected, the direction from plot center, or. . .? 132: I don't think you need the second 'h' in homoscedasticity. I could be wrong though. 145: It would help the reader if you explicitly stated what you were looking for in your models (even though it should be obvious). For example: 'a higher parameter for BA5 in the dormant season model would support the hypothesis that. . .' 227: This is confusing - how would you have a temperature effect after controlling for temperature effects? 227: I disagree - you cannot attribute an effect of trees solely to autotrophic respiration. Tree presence is also correlated with substrate for microbes. 246: This is another assumption that is not well-supported - that trees do not have shallow roots that contribute to respiration. 248: I suggest searching the literature for more references on soil moisture restrictions on respiration from deciduous forests. Here are a couple to get you started:

Contosta, A.R., Burakowski, E.A., Varner, R.K., Frey, S.D., 2016. Winter soil respiration in a humid temperate forest: the roles of moisture, temperature, and snowpack. J. Geophys. Res. Biogeosci. 2016JG003450. https://doi.org/10.1002/2016JG003450

Jiang, H., Deng, Q., Zhou, G., Hui, D., Zhang, D., Liu, S., Chu, G., Li, J., 2013. Responses of soil respiration and its temperature/moisture sensitivity to precipitation in three subtropical forests in southern China. Biogeosciences 10, 3963–3982.

288: Autotrophic and heterotrophic respiration were not partitioned in this study - please revise this sentence to better communicate the overall finding of your work. 479: Column header abbreviations should be defined. 'DF' should be clarified as 'denominator degrees of freedom'.

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