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Discussions

Interactive comment on "Vegetation heterogeneity and landscape position exert strong controls on soil CO$_2$ efflux in a moist, Appalachian watershed" *by* J. W. Atkins et al.

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We would like to thank the reviewer for their review of and comments on our manuscript. Their time and consideration is appreciated. We have included the reviewer's original questions, which are numbered, followed by our response.

1. The use of an 11oC temperature threshold is still not clear to me. How did the authors arrive at this threshold? Were there any a prior analysis which the authors have not described?

- Our goal is to assess and focus on carbon fluxes when they are not limited by temperature. Our analyses, particularly the piece-wise regression outlined in our previous

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author comment, indicated that 11 degree was an optimum change-point. Application of a technique such as piece-wise regression, which will be outlined further in the methods section of the final submission of the paper, allows for reproducibility of these methods both in analyzing our own data, but also in other studies.

2. One of the disadvantages of the threshold approach is it is empirical in nature and hence cannot be applied beyond the particular research area. In that case, how are these results applicable in understanding carbon fluxes across other similar humid watersheds in different parts of the world?

- While the exact threshold of 11 degrees C may not be applicable for other systems, the approach itself we feel is quite valid. Either through the use of piece-wise regression or perhaps Bayesian change-point analysis or related technique. Identifying these thresholds and analyzing any possible differences could be incredibly important in quantifying/qualifying how carbon fluxes differ across systems. If analyzing another system we find the threshold to be 13 degrees C, it would be of interest to examine what could be controlling the difference in threshold.

3. By not delimiting data based on phenology (growing and dormant season), are the authors not losing the ability have a better understanding of the interaction between hydrometerological factors, phenology and soil respiration? This aspect needs to be discussed?

-This is an excellent point. Phenology is accounted for implicitly as a function of both that ascribed temperature threshold and also through our experimental design whereby we chose plots based on vegetation cover type. Our temperature threshold is also in line with the growing season. While phenology is not our primary focus here, we feel this aspect is accounted for. We can expand the discussion to more explicitly allay this concern.

4. In section 2.3.1, plots were sampled between 9: 00 and 16:00 EST. It still isn't clear to me how the authors accounted for the diurnal variation in soil respiration? Were any

time correction factor applied during calculation of soil respiration?

- Our sampling followed a rotating scheduling whereby for one sampling period we would start at say the HIGH elevation, then proceed to work down the mountain (MID, then LOW), and the next week we would start at the MID and then work down to the LOW, then finish with the HIGH and the next would then start at the LOW, then HIGH, then MID, and so on. This method was followed through the experiment and was deemed the most suitable way to physically take all of the measurements, complete all of the work, and to best take into consideration the diurnal dynamics that outlined in your question. We can detail this more thoroughly in our methods.

Interactive comment on Biogeosciences Discuss., 11, 17631, 2014.