

## ***Interactive comment on “Source Partitioning of H<sub>2</sub>O and CO<sub>2</sub> Fluxes Based on High Frequency Eddy Covariance Data: a Comparison between Study Sites” by Anne Klosterhalfen et al.***

### **Anonymous Referee #1**

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This manuscript presents a comparison of two turbulence-based flux partitioning methods across multiple sites representing a range of vegetation types (forest, grassland, and crop) and geographic zones. These emerging flux partitioning methods represent an effort to develop partitioning strategies that do not require assumptions about functional relationships, and this comparison between two methods across sites is a highly valuable contribution to the continuing development of new flux partitioning strategies. I have not seen a comprehensive comparison of two turbulence-based partitioning methods like this, and I think it represents an important step forward in understanding the performance of these methods. The comparison of multiple variations of each method and the analysis of specific site factors such as LAI and canopy height and how they

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affect the methods are especially valuable contributions to development of these partitioning strategies. I thought the manuscript was clear, easy to follow, and well written overall. I only have a few comments for areas where the manuscript could be improved:

1. The manuscript refers several times to a manuscript by the same first author that is still in review in another journal. Until that manuscript is available to readers of this manuscript, I don't think it's useful to cite it. In particular, methodological details that have a bearing on this manuscript should be included in the supplemental material or main text, and not only cited to another manuscript that is not available at this time.

2. Tables 2 and 3 and A1 highlight the highest and lowest values of the metrics that they show. This makes it easy to ignore cases where there are multiple high values. It would be better to color code all the cells in the table based on their values, so readers could tell at a glance how the values looked. In addition, I think the correlations in Tables 2 and 3 should show whether they were statistically significant using bold text or asterisks.

3. The analysis used the ratio of LAI to canopy height as one of the predictors because "LAI can correlate with hc of a study site" (page 11, line 1). But LAI does not appear to be strongly correlated with hc for the sites in this study. Unless there is a strong relationship, this ratio seems difficult to interpret and I'm not sure I would include it in the analysis unless there is a clear interpretation.

Technical comments:

Page 7, line 5: Does "two models" refer to the two partitioning methods? They are not referred to as models elsewhere in the manuscript

Page 7, line 21: What distribution were the random numbers sampled from? Normal? If so, what were the mean and standard distribution?

Page 8, lines 7-8: This should include a brief explanation of why that site and those methods were chosen for the examples. Presumably because those methods had the

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best performance?

Page 8, line 21: It should be “fewer data points”

Page 8, line 28: “TH08\_REA\_H performed best” needs more explanation. Based on what metric? Did it perform best for all sites and metrics, or a subset?

Page 9, line 3: The title of this section suggests that the following text will focus on comparing partitioning results to published analyses, but only a couple of the sites compare directly to publications. It might be more accurate to describe this as a detailed description of results for each site.

I think this paragraph should include a reference to Figure 5, since the bar plots are a helpful summary for many of the results described here.

I think this paragraph would be easier to follow if the supplementary figures were in the same order that they were referred to in the text.

Page 10, line 13-14: “both methods converged”: It’s not clear how they converged, or how that is shown in Fig. 6c and d.

Page 11, line 29: It’s not clear how this was contradictory. Contradictory relative to what?

Figure 5: It is difficult to compare the two partitioning methods to each other across panels b and c. I suggest putting the two partitioning methods in the same panel so they can be directly compared, given the importance of these comparisons to the results. Perhaps panel b could show C fluxes and panel c could show LE, with bars for the two partitioning methods side-by-side in each panel.

Table 1: The abbreviations in the site column need to be defined (NL, ST, DE, PNL, . . .). Some of these are countries, some are regions, and some I didn’t understand at all.

Page 29, line 3: The blue and red lettering is not in the table. As I said above, I think

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color coding would be a good idea but it would be better to reflect the actual values rather than just where the highest/lowest value is.

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