

Interactive comment on “On the choice of the driving temperature for eddy-covariance carbon dioxide flux partitioning” by G. Lasslop et al.

G. Lasslop et al.

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Reply to reviewer 1

We thank referee 1 for the review and constructive comments.

The review criticises that “the paper is poorly written, discussion is incomplete, and there are some strained interpretations of results”. The paper was read by a native speaker before publication in Biogeosciences Discussion, nevertheless we improved readability by reducing the density of the writing style and checked the manuscript again for any errors. Moreover we were advised that all manuscripts in BG undergo copy-editing by default. We improved the discussion and interpretation for the points that were indicated in the comments of the reviewer.

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The review notes that we “wrote that this study showed different result from previous studies on the correlations of air/soil temperatures to nighttime NEE in Section 3.2.” This probably refers to the study of Pilegaard et al. (2011). We mention this study in the context of negative correlations between nighttime NEE and temperature. This study was mentioned to give another reason for negative correlations. We clarified this by starting the sentence with:

“One reason for negative correlations. . .”

The reviewer mentions that “Detailed analyses on the weight parameter of T_{opt} can produce the information about why the driving temperature for eddy covariance CO_2 flux varies among observation sites”. We did additional analysis on the weighting parameter, but no consistent pattern could be found. Therefore it was not included in the manuscript. We now mention this negative result in the text.

We reply in the following part to the specific comments, the reviewer’s comments are cited with quotation marks and in italic font:

“P. 9832, L. 15: It is preferable to cite references in this sentence “... they take place.””

We added a reference at the end of the indicated sentence.

“P. 9839, L. 13: New paragraph.”

We started a new paragraph.

“P. 9840, L. 8: New paragraph.”

We started a new paragraph.

*“P. 9840, L. 8–P. 9841, L. 8: Fig. 3 is insufficient in information. You should specify the values of median and correlation in Fig. 3 and then discuss the difference among T^{***} based on the specified statistical values.”*

We included the median values in the figure caption. In Fig. 3 one correlation value

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(the correlation between NEE and T^{***}) for each year of observations for each site is included. Therefore, we think that the demand for the correlation values is based on a misunderstanding.

“Nighttime eddy covariance fluxes are contaminated by non turbulence atmospheric motions. I believe all data with negative correlation between nighttime NEE and temperature should be removed from the analysis. Otherwise, you should produce the evidence that water stress forces the negative correlation using moisture observations, such as VPD and soil water content.”

For the flux partitioning schemes negative temperature sensitivities are not used. In the analysis presented in the manuscript we exclude the negative correlations from the statistical significance tests of the differences between the correlations. Nevertheless we think it is important to show that these negative correlations occur. We added to the discussion about the negative correlations the possibility that nighttime eddy covariance fluxes are affected by non-turbulent atmospheric motions:

Another reason for negative correlations could be advection, which can cause problems in eddy covariance nighttime data.

“P. 9840, L. 23: New paragraph.”

We started a new paragraph.

“P. 9841, L. 1–3: In the previous studies,”

This comment seems to be incomplete or may refer to a different sentence.

“P. 9841, L. 8: Again please specify the statistic.”

We specify the statistic now.

“P. 9841, L. 24–28: Are the differences of correlations in Fig. 6 statistically significant?”

In the revised manuscript we indicated the significance.

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“P. 9842, L. 15–16: Could you estimate soil temperature at 5 cm depth at Hyytiälä site using interpolation and discuss how sensitive is the difference of soil temperature measurements between 2 cm and 5 cm depths to the correlation with nighttime NEE?”

We do not understand the question as it is phrased. We guess that the reviewer would like to know how sensitive the correlation between nighttime NEE and temperature is to the temperature measurement depth between 2 and 5 cm depth.

We think that interpolating the temperature to a level of 5 cm introduces more uncertainty than could be gained from the analysis. A simple interpolation would also change the statistical properties of the time series and the comparison with the pure observations could be confounded, due to different error statistics.

“P. 9843, L. 8–13: It is difficult to understand this paragraph. What is “conservative estimate”? Please rewrite this paragraph.”

Conservative estimate is a common expression. In this case it refers to the uncertainty estimate and implies that the underlying ‘true’ uncertainty will likely be lower than our estimate.

“P. 9861: Please correct mistaken/missing characters in the text.”

We reworded the figure caption, and added the missing parentheses.

“P. 9862: Please specify the values of median in Figs.”

The median is specified in the revised manuscript.

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