Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., referee comment RC3
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Comment on amt-2021-249

Anonymous Referee #2

Referee comment on "Importance of the Webb, Pearman, and Leuning (WPL) correction for the measurement of small CO_2 fluxes" by Katharina Jentzsch et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-249-RC3, 2021

General comment:

This manuscript presents a new criterion for quality selection of small carbon dioxide fluxes. Those fluxes are mostly subject to a relatively large Webb Pearman, and Leuning (WPL) correction affecting flux direction and magnitude significantly. Therefore, the proposed WPL quality criterion could improve flux data quality. Overall, the concept is introduced well and could be implemented in flux processing software with manageable effort.

However, I have some minor points and one major, which should be addressed by the authors before the manuscript is suitable for publication in AMT.

Minor comments:

Line 11: The word "multiple" is a bit imprecise. Maybe you can provide numbers instead?

Line 19: Could you give examples of eddy-covariance packages using WPL? Flux-processing scripts using mixing ratios do not need the WPL correction for flux calculation. I would suggest rewording it to "in software packages using molar densities, molar fractions, etc. as concentration unit for …". Consider replacing "uniform" with similar.

Line 21: add commas: , for instance of CO_2,

Lines 52-55: Are these values adapted from literature or measurements? Generally, the findings are interesting. Could you give more details to these numbers or support them by a figure which shows the temperature dependence?

Lines 57-61: I would suggest to move these lines to the introduction, for example to line 30ff. since they seem repetitive to me.

Line 64 and 65: Consider adding town and state to the description of the instruments.

Line 65: Please add the version number of EddyPro and a citation.

Lines 66-67: "measurements of this site were published several times" but only two publications are mentioned. Consider rewording of this sentence or provide more references

Line 68: I would add that negative fluxes indicate uptake, positive fluxes emission.

Line 69: "Also, …"

Line 69: "… is well below 50%" of the corrected flux?

Line 70: "During the short period, …"

Figure 1 and 2: I would suggest to use colors instead of different shades of gray, denote the 2 in CO2 as subscript, and maybe put a box around the legend.

Caption of Fig. 2: Denote the 2 in CO2 as subscript and add a left bracket to Eq. 1)

Line 76: "In Fig. 2, …"

Lines 83-84: What do you mean with “The typical measurement error”?

Line 97: Can you provide a range of factors instead of using multiple?

Major comment:

You showed the applicability of a new quality criterion for flux measurements on a certain event. I think it would strengthen the manuscript significantly if you show the impact of the new criterion on the entire flux time series of 2015. Testing the criterion for a completely different ecosystem may also be possible. How does the WPL criterion affect annual carbon budget? How much of the measured fluxes are filtered out by the new criterion? Are physically plausible events affected by the WPL quality check?