

Interactive comment on “Quality control of CarboEurope flux data – Part II: Inter-comparison of eddy-covariance software” by M. Mauder et al.

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Regarding the remark of Referee #1 we admit that there are some conditions when the LI-7500 open-path analyzer does not measure accurately. However, alternatives such as closed-path sensors are also far from being without any problems (e.g. Ibrom et al., 2007a; Ibrom et al., 2007b). The LI-7500 produces a so-called AGC-value, which is a measure for the quality of the measurement. Moisture or dust on the windows can be detected that way, as mentioned on page 4082, line 6-8. This signal is only available in the digital output. Since this is not standard within CarboEurope it was not included in the test datasets. However, some of the compared software use this variable for data filtering, e.g. eth-flux or EddySoft. A recent study by Serrano-Ortiz et al. (2008) investigates the effects of floating signals due to contamination of the optical windows. Another problem with the LI-7500 open-path analyzer is related to additional

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heat transfer produced by the sensor itself (Grelle and Burba, 2007). Further research is necessary in this area.

We agree that errors in the Webb correction can be substantial due to inaccuracies in the sensible and latent heat flux measurements (e.g. Leuning, 2007). Although it is not presented in the manuscript, both sensible and latent heat flux estimates were also compared, and differences in those fluxes could not explain the observed differences in CO₂ fluxes. Probably necessary corrections of the Webb correction for lack of energy balance closure (Liu et al., 2006) and window purity (Serrano-Ortiz et al., 2008) are not standard procedures within CarboEurope-IP and were therefore not included in this study.

For the applicability of the planar fit method, the length of the dataset is not necessarily decisive but rather whether a wide range of wind directions is covered. We agree with Paw U (2000) to conduct a planar fit separately for different wind direction sectors if the terrain is not planar. Nevertheless, the conditions were the same for all software and the comparability between the different software packages was not constricted by that.

We agree with the referee that in rare case a difference in flux estimates can occur whether the delay correction is applied before or after the coordinate transformation. The maximization of the covariances is expected to find the true delay/separation between two independently measured signals. In TK2, this automatic delay correction is applied before the coordinate-transformation because the concept of this software is to compute uncorrected covariances first, and then apply all corrections afterwards to these covariances. This allows quick and easy changing of the correction settings, e.g. the planar-fit coefficients, without the need for a time-consuming re-computation of the covariances. The covariance between a transported scalar and both the vertical as well as the horizontal wind components is assumed to reach a maximum for zero delay/separation. Moreover, In TK2 it is assumed that there is no time shift between w and u . Therefore, theoretically even if a portion of the horizontal wind component is represented in the vertical velocity signal, as it may be the case before a coordinate

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transformation, the delay should be the same as for the rotated covariance.

p. 4069, l. 20: the wording has been changed in the revised manuscript p. 4072, l. 14: the abbreviation QA/QC has been explained in the revised manuscript p. 4073, l. 20: 'in' has been added p. 4075, l. 23: 'EdiRE' has been added p. 4073, l. 3: the reference for Lee et al. (2004) has been added p. 4077, l.1: the sign has been changed Fig. 5: The measurement of +20 may be erroneous or not. This question is not within the scope of this study. The goal is to examine differences between software. However, this CO₂ flux was actually measured at this LIT-A6 and all four software including TK2 agree quite well for this measurement. Fig. 2: We agree that fluxes more negative than -35 appear to be extreme. As mentioned before, it is not the objective of this study to make statements about the absolute accuracy of the flux measurements. The idea is that all software producers started with the same datasets, and they should therefore compute the same fluxes if the underlying assumptions are the same. This is also stated in the manuscript: 'This study is therefore only a relative intercomparison to identify differences between software without necessarily aiming at estimating the "true flux" for the ecosystems where the datasets were measured.'

We thank Referee #1 for pointing out some unresolved issues regarding flux calculations. We hope that we added some further arguments about these questions even if they are not directly related to this software comparison. The comments of Referee #1 resulted in some improvements of the revised manuscript.

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