Answer to Anonymous Referee #1

Thank you very much for your review! We formulated a point by point answer to take note of all your comments and questions:

page 4988, line 21: why only focusing on EC technique here? There are many other micromet technique the have been intensively used for the determination of CO2 fluxes.

→ Eddy covariance technique was chosen in this study as the most direct technique without any parameterisation. You are right that there are many other micrometeorological techniques for the determination of $CO_2$ fluxes. We reformulate the sentence and mention “micrometeorological techniques” in general.

page 4991, line 5: what do you mean by time window scheme?

→ Parameterization in those flux partitioning models is commonly done by binning observations into temperature classes to capture the temperature dependence of the carbon assimilation (Falge et al., 2001; Ruppert et al., 2006; Zhao et al., 2014). Using a time-window scheme is binning observations into time intervals of 4 to 15 days (Lasslop et al., 2010) to be able to distinguish periods with different seasonal response (Falge et al., 2001; Moffat et al., 2007; Ammann et al., 2007). The required width of the time window depends on how rapidly the vegetation develops (Zhao et al., 2014). For grassland a 5-day time window is suggested (Ammann et al., 2007).

page 4994, line 10: what is this Tx 1937?

→ It supports the identification of a specific association of plants that are part of a specific kind of economic grassland by describing the person who first classified it. In this case Mr. Reinhold Tüxen (“Tx.”) described this Molinio-Arrhenatheretea economic grassland in the year 1937. The literature containing this explanation (Oberdorfer, 2001) will be added in the manuscript.

page 4998, line 22-23: "..., the accuracy of the system delata13C could be maintained...": not clear to me what do you mean by "maintained"

→ The REA system was already applied in 2003 for another study (Ruppert, 2008). For this study the system was repaired, cleaned and some new components were mounted but the standard deviation for $\delta^{13}C$ of the whole REA system did not really change: 2003: n=19, SD=0.014 ‰; 2012: n=10, SD 0.011 ‰. The sentence in the manuscript will be reformulated to clarify this.

page 5002, lines 27-28: two time first in the same sentence

→ Corrected

page 5003, line 4: figure 7a comes before figures 5 and 6

→ Corrected

page 5004, line 20: any reason why there is no difference in up- and downdrafts?

→ This is typical for the evening hours but well-marked on this day (please see u, T and $K_{in}$ in Figure 4a). Due to reduced incoming radiation turbulent exchange is reduced, stable stratification starts to develop, assimilation comes to a standstill. This last value of June 22 should just show where this REA-based experiment does not work anymore.

page 5004, lines 22-24: could you be more explicit about "..this adds up to an even smaller 2.5% 13CO2 flux as part of the entire CO2 flux..."?

→ Thank you for this comment. It drew our attention to a statement that was not necessarily relevant in the context of the manuscript. The paragraph in its original version probably was too short to adequately explain the issue, anyway. Thus, we reformulated the section:

> Furthermore, the isotopic signature of the turbulent exchange is shown in Figure 7. Combined with the isotopic signature of the source it is a measure of the $^{13}C$ discrimination – the $F_{ISO}$ / $F_{EC}$ ratio. The more negative this isotopic signature is, the more the air above the vegetation is affected by the assimilation process. A more negative value indicates that the $CO_2$ in the source air is enriched with $^{13}C$. The values vary in a range from –22 to –42‰ during the day. This is comparable to other studies investigating C3 ecosystems (–20 to –35 ‰, Dawson et al., 2002; -26.0 ±3.2, Ruppert, 2008; –37.4 ‰, Wichura, 2009). Due to courses which are quite similar in size, $F_{ISO}$ and $F_{EC}$ balance to some extent except for the last value of 22 June, when the proportion of isoflux and $CO_2$ flux was close to zero due to missing differences in up- and downdrafts. This is a consequence of reduced incoming radiation and reduced turbulent exchange in the evening. Stable stratification starts to develop and assimilation comes to a standstill. Then the REA technique does not work correctly anymore. This decoupling, combined with accumulation of respired $CO_2$, can be also an explanation for the very negative last value of 25 August.

page 5005, lines 20-29: this seems to me to be more a discussion on the FP model. Is this useful here?

→ It was necessary to discuss why the results of the isotopic flux partitioning approach may be better related to real assimilation and respiration fluxes than those of the common flux partitioning tool.

page 5006, line 9: "...event to negative value": this is not true for mean value

→ Corrected

page 5006, lines 17-18: REA was developed for compounds no accessible at high rates of sampling 10Hz). So EC and REA are not supposed to be deployed together as suggested, or only for testing/development of the technique

→ Corrected

page 5023, figure 4: colour is not really necessary for that figure

→ Corrected

page 5026, figure 7: the two dark lines have the same colour

→ Figure 7 corrected (is now Figure 6!) Thank you very much for all your comments.

## References


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