

Interactive comment on “Evaluating multi-year, multi-site data on the energy balance closure of eddy-covariance flux measurements at cropland sites in southwest Germany” by Ravshan Eshonkulov et al.

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General comments

The article is well written and relevant to the topic of energy balance closure. The use of such a long-term dataset gives strength to the results and conclusions. The introduction is well written and covers all the issues and approaches regarding the energy balance closure. Site and instrumentation are properly described. From the methodology, it is clear that all appropriate methods and corrections to field data were

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used.

I recommend minor revisions that included additional terms in the energy balance closure, or justification for not considering those terms. In addition, references to experiments and published results on advection should be included, since advection can have a large impact on measured fluxes over non-flat terrain.

Specific comments

Page 2, line 18: Replace “mesoscalic” with mesoscale

Page 7, line 12: Replace “instalment” with “set up” or remove it

Page 7, line 16: It would be better to rephrase “time variable canopy height” with something like: canopy height, which changed over time due to crop growth. Question here: how was the canopy height used in the flux software? Some flux software have the option to input heights over time. If this was the case in TK3, how frequently was the crop height changed in the software (bi-weekly, monthly...)?

Legend of Fig. 10: Space between “2017study”

Page 12, 25-30: If the storage due to photosynthesis is straightforward to calculate from CO₂-fluxes, why was it not included in this study? How about the heat storage in the soil layer? It can be derived with measurements of soil temperature and soil moisture, which were available in the experimental setup described in this study. Both terms were included in the EBC for crops in this study:

Zeri, M.; Anderson-Teixeira, K.; Hickman, G.; Masters, M.; DeLucia, E.; Bernacchi, C. J. Carbon exchange by establishing biofuel crops in Central Illinois. *Agric. Ecosyst. Environ.* 2011, 144, 319–329, doi:10.1016/j.agee.2011.09.006.

It would greatly help if both terms were included for at least one year per site, to compare with the use of only R_n, G, H and LE.

Page 14, line 15: “Moreover, the sources of secondary circulations are unclear, and

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they are most probably not well linked with the locally measured available energy” Complex topography can induce advective fluxes of CO₂ and energy (Feigenwinter et al. 2008; Rebmann et al. 2010).

Rebmann, C.; Zeri, M.; Lasslop, G.; Mund, M.; Kolle, O.; Schulze, E.-D.; Feigenwinter, C. Treatment and assessment of the CO₂-exchange at a complex forest site in Thuringia, Germany. *Agric. For. Meteorol.* 2010, 150, 684–691, doi:10.1016/j.agrformet.2009.11.001.

Feigenwinter, C.; Bernhofer, C.; Eichelmann, U.; Heinesch, B.; Hertel, M.; Janous, D.; Kolle, O.; Lagergren, F.; Lindroth, A.; Minerbi, S.; Moderow, U.; Mölder, M.; Montagnani, L.; Queck, R.; Rebmann, C.; Vestin, P.; Yernaux, M.; Zeri, M.; Ziegler, W.; Aubinet, M. Comparison of horizontal and vertical advective CO₂ fluxes at three forest sites. *Agric. For. Meteorol.* 2008, 148, 12–24, doi:10.1016/j.agrformet.2007.08.013.

Page 15, line 23: Another reference to katabatic advection:

Heinesch, B.; Yernaux, Y.; Aubinet, M. Dependence of CO₂ advection patterns on wind direction on a gentle forested slope. *Biogeosciences* 2008, 5, 657–668, doi:10.5194/bg-5-657-2008.

Page 15, line 25: Advective fluxes are mentioned here but not explained before or any citation to experiments are given.

Page 16, References: Missing reference cited in the text:

Zeri, M.; Sá, L. D. A. The impact of data gaps and quality control filtering on the balances of energy and carbon for a Southwest Amazon forest. *Agric. For. Meteorol.* 2010, 150, 1543–1552, doi:10.1016/j.agrformet.2010.08.004.

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