

Interactive comment on “Surface flux estimates derived from UAS-based mole fraction measurements by means of a nocturnal boundary layer budget approach” by Martin Kunz et al.

Anonymous Referee #1

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General: The ms is focused on the application of multi rotor drones and custom build CO₂ sensors to estimate nocturnal fluxes and storage in the lower boundary layer. This is a new application of a promising tool and a potential solution to a stability issue in flux measurements that is problematic to EC measurements and the budgetary numbers that we can provide during night-time. Nice work ! I have a few issues that in my opinion could strengthen the ms at this stage; As the authors also conclude, the flux estimates using the NBL seem high and more background information on the site could be useful to assess if the estimates are too high. Information like soil type and organic content as well as NEE flux during the day- time could help in this context, as well as the storage term calculated from the 9 m profile tower at the site. Since this is a well

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know methodology, but used in a new context it is of course important to add credibility from as many other sources as possible, especially since the chamber measurements are quite ambiguous. The instrumental setup seem to work well and fine, but I miss arguments for choosing a custom-made gas analyzer over those relatively cheap and light commercially available analyzers in the market, like e.g. LiCor Li-840 or others.

Specific:

P2 L5: I would assume that sporadic turbulent events would be measured by EC but not molecular diffusion, please consider rephrasing.

P2 L7: you could mention storage estimates by use of concentration profiles in a tower, could be mentioned.

P3 L:31: please provide crop type and vegetation stage.

P7 L13: It could give the impression that a tower of a considerable height is needed in addition to the UAV approach, is that so? Please specify

P11 L22: I guess if you could assume that day and night time fluxes were even in magnitude, you wouldn't have to measure the night. Consider rephrasing – order of magnitude maybe?

P22 L27: it is well known that chamber measurements can give quite different fluxes within short distances, and since the small are only available part of the time it would make sense to try to establish the storage term of the tower, for comparison.

Fig. 12 I'm not sure this increases the confidence in the method because it basically show a very wide range of possible flux during the two nights.

P27 L4 check fig numbers