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Interactive comment on “Technical note: Dimensioning IRGA gas sampling system: laboratory and field experiments” by M. Aubinet et al.

M. Aubinet et al.

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Comment : General: The paper describes an important topic necessary in the EC community and evolving networks. This is a very interesting content, but value could be added to this publication by more precise formulations, descriptions and graphs. Field tests as well as lab in-vestigations were performed to describe the behavior of different filters and rain guards used with the LI-7200. In the abstract it seems that several analyzers were tested but only the LI-7200 was investigated with different designs.

Reply: Thank you for the feedback. Let's specify that we didn't compare different analyzers but had the opportunity to run three LI-7200 simultaneously. We thus equipped

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each of them with a different filter, put them at the same site and compared the GSS characteristics.

Comment : The rain guard is very specific for the LI-7200...

Reply: One important feature of the paper is that rain cap has a huge impact on high frequency losses by the system. This result was totally unexpected and we think that it does not refer only to the LI-7200 but also to any (en)closed system equipped with a rain cap/guard or an entrance of some volume. In order to make our discussion more general, we gave more detail about the rain cap design and, especially found (after suggestion by S Sargent) that the cut off frequency at a given flow rate was linked with the rain cap volume. A figure was added to the paper to highlight this point.

Comment : ...and has to be tested under field conditions more intensively.

Reply : We fully agree that more field testing is necessary, especially to evaluate performances of the new LI-COR rain cap. This was said in our conclusions (P10745 L25)

Comment : Lab measurements: how did you ensure that always the same amount of CO₂-free air was injected per pulse to make sure that mixing is always the same?

Reply : I let our colleagues from Reims laboratory reply on this point.

Comment : As stated by referee #1 I also stumbled over the 'stuffing gland': could you please draw a figure/sketch?

Reply : We didn't want to focus on the rain cap design (we are not rain cap designers) but simply show that the design (and more especially the inlet volume) was critical. We added some information about the home made rain caps (dimensions, shape, volume) and showed more clearly in a figure the dependence of cut off frequency on rain cap volume (see Figure 6 in the pdf attached to the reply to referee 1).

Comment : As well as over the definition of the cut-off frequency which is commonly

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defined as $\sqrt{1/2}$.

Reply : That was corrected. See our replies to preceding reviewers.

Some other items may be repeated in the following but were already written down:

Comment : P10740L14: ‘..modulation frequency can only.. P10740L17: cut-off frequency defined as $\sqrt{1/2}$, to be checked P10741L23: can be cited as Kolle, O. and Rebmann, C., 2007. Eddysoft - Documentation of a Software Package to Acquire and Process Eddy Covariance Data. 10, Technical Reports - Max-Planck-Institute for Biogeochemistry 10, Jena, Germany.’

Reply : all modifications / additions made. Thank you

Comment : P10742L5: re-formulate: ‘The response of pressure drop to flow rate across the tube

Reply : We reformulated : The response to flow rate of pressure drop along the tube and the filters

Comment : P10742L15: to which extend do exchange surfaces vary? Could this information be added in Table 1?

Reply : See also our reply to rev #1: The exchange surface of ACRO 50 is 19.6 cm². Those of PALL 2 μ m membrane is 9.6 cm². The surface exchange of the Swagelok is much greater but could not be quantified as the filter is constituted by a sintered element.

Comment : P10742L17: re-formulate: ‘The response of cut-off frequency to flow rate due to tube effects and filters P10742L22:re-formulate: ‘The observed cut-off frequencies are however systematically 1 Hz lower than the theoretical ones,

Reply : Changes made. Thanks. ’ Comment : P10743L6-L7: Please extend the formulation: ‘Results are summarized ::They::differed from’.

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Reply : Sorry, we don't understand the comment.

Comment : P10743L19: 'The lowest cut-off frequency corresponded::: the highest:::

Reply : This result was expanded and a figure presenting the relation between rain cap volume and cut off frequency was added (see above) ' Comment : P10744L17: re-formulate: ':::not exhaustive, not all types of filters being tested.'

Reply : "Not all types of filters having been tested"

Comment : P10744L19: see above, to which extend do exchange surfaces vary? How large is large?

Reply : We don't speak about surface exchange here but about the filter volume. A volume comparable to those of the large rain cap (some tens of mL) would probably affect the cut off frequency too. This was not tested in the field here.

Comment : Tab. 2: as a lazy reader, I would prefer to see in the table which system contains which filter, rain cap.

Reply : OK. The best way is then to merge Table 1 and 2. We did it.

Comment : Fig. 1: 'computer' instead of 'computeur'

Reply : OK Done Thanks.

Comment : Fig. 2: why did you use an arbitrary scale?

Reply : As the cut off frequency definition is based on a ratio of amplitudes, the scale is not critical here. It is indeed a concentration but its value depends on the set up and is not important by itself.

Comments : - Fig. 3: symbols for Pall 2um are squares, not crosses, for no filters these are dots or circles - Fig. 4: legend and figure description do not fit for red circles and green squares, 'losange' is not a common word in English (diamonds?). - Re-formulate figure caption: 'Cut-off frequencies [Hz] as a function of the flow rate ...', Continuous

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line: theoretical estimate of cut-off frequencies according to::: - Fig. 5: legend and figure description do not fit for HM1 and HM2

Reply : All changes made, thanks

AMTD

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Interactive comment on *Atmos. Meas. Tech. Discuss.*, 8, 10735, 2015.

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