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***Interactive comment on* “The CarboCount CH sites: characterization of a dense greenhouse gas observation network” by B. Oney et al.**

B. Oney et al.

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Anonymous Referee #1

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Overview: The paper presents the ability and the limitation to capture the carbon flux on a regional scale by an observation network combined with a particle dispersion model. The four sites of the network were characterized and compared with respect to the local meteorology, the surrounding land use and topography, and the sensitivity to surface fluxes derived from modelling. From the observed similarities and differences at the individual sites the authors identified the occurrence of strong local influences and complex terrain as main challenges to

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be taken into account for the application of atmospheric transport and terrestrial carbon flux models, as well as for the selection of site location and tower height of the measurement station. The study is well elaborated, and the text clearly structured and written. Besides a few minor revisions which I would like to suggest is the paper highly recommended for publication in ACP.

Within the complete text, in Table 1 and 2, and in the text beneath the figures: ‘Beromünster, Frübüel and Lägern-Hochwacht’ the mutated vowels are displaced to the left

The figures 2, 3, 10, 12 and (in particular) 4 are quite small. If possible please enlarge them.

The authors would like to thank anonymous referee #1 for the comments, and positive review. The mutated umlauts will be fixed, along with the “ff” ligatures. In the final publication, the figures will be checked for legibility, but special attention will be paid to Figures 2, 3, 10, 12, and especially 4. In the following, the reviewers comments will be in bold font, and the responses will be in plain font, with suggested new text being quoted.

Minor comments Page 12919, line 12: ‘... height a.m.g. (“model”) ...’ interspace

Page 12920, line 16-17: ‘... topo – graphy...’ line break

Page 12921, line 4: ‘... needle-leaf forest...’ hyphenated

Page 12928, line 19: ‘... at the mountain top sites likely due to ...’ syntax

Corrected as suggested.

Page 12930, line 18-19: ‘... and December.’ I am surprised because of the month. Are the cattle still grazing there in winter time?

We thank referee 1 for his/her attention. This was indeed a mistake. Bamberger et al. (2015) list the exact dates of grazing during 2013 as 05-02–05-08, 06-06–06-14, 09-23–10-02, and 11-07–11-13. We feel that this information is not urgently required here and intend to remove this sentence. New paragraph: “At Frübüel, local topography is

not conducive to a stable nocturnal surface layer, and therefore the nighttime regional CO₂ signals are likely not as high as would be expected in flat terrain. The summertime peak in nighttime regional CO₂ signals is not as intense as Gimmiz, but shows similar annual variation, pointing towards respiration fluxes. As at Beromünster, relatively low wintertime CO₂ measurements indicate minimal anthropogenic influence. The higher daytime regional CH₄ signals during summertime coincide with the location in an area of high cattle density, also similar to Beromünster.”

Page 12930, line 23: ‘Furthermore, the daytime values ...’ The higher daytime values become not evident in Fig.9

We agree with referee #1 that the higher daytime values are barely evident in Figure 8. Therefore we plan to remove this part in a revised version of the manuscript. New paragraph: “At Lägern-Hochwacht, observed diurnal variation of regional CO₂ signals is small, similar to Beromünster (Fig. 9). During winter, the elevated day- and nighttime regional signals indicate a strong anthropogenic influence, which aligns with the surrounding industrialized area.”

References

Bamberger, I., Oney, B., Brunner, D., Henne, S., Leuenberger, M., Buchmann, N., and Eugster, W.: Observation of atmospheric methane and carbon dioxide mixing ratios: Tall tower or mountain top stations?, submitted to Boundary Layer Meteorology, pp. 1–29, 2015.

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