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

Anonymous Referee #2

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Review of the manuscript: "The CarboCount CH sites: characterization of a dense greenhouse gas observation network" by B.Oney et al.

The paper is describing the new regional network in Swiss Alps of four atmospheric stations for the measurement of CO₂ and CH₄ mole fractions. It is focused mostly on the characterization of the footprint of each site, using local observations of CO₂, CH₄ and meteorological parameters, and a high resolution particle dispersion model. The paper is well written with clear figures, even though there are several elements repeated throughout when scanning the four stations. The main limitation of the study is the fact that authors develop only the sensitivity to the atmospheric transport, and not to the surface emissions variabilities. This limitation is mentioned once in the paper but I think the authors should remind it, or discuss it, in the presentation of the results.

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With this clarification and few minor revisions detailed hereafter I do recommend the manuscript for publication in ACP.

Abstract: I suggest to add the period of the measurements considered for the paper. I found the period only in Figure 4. I may have missed this information earlier.

Introduction: (p.12914): "It aims to quantify terrestrial carbon fluxes": is the separation of different sources contributions considered in the project ?

(p.12915): "use only afternoon measurements. . .": this is true for flat terrain, but not for mountain sites for which only nighttime values are generally used (e.g. Schauinsland, Mauna Loa, . . .)

Data & methods: (p.12916): Measurement data: please add the date of installation for each station in table 1/ I do not understand why the 'Local site characteristics' (par. 3.1) are not included in this description of the sites and instruments. I suggest moving the whole paragraph here.

(p.12917): "the anthropogenic and biospheric contributions": As the atmospheric measurements of CO₂ and CH₄ mole fractions provide only information on the total fluxes, to specifically address the terrestrial component need extra measurements or hypothesis. The separation of terrestrial versus anthropogenic fluxes is not really discussed in the manuscript. For example CO data are not considered. Could you please elaborate your strategy on this issue ?

(p.12917): ". . .an accuracy of $\hat{\Delta}$ 4 ppbv": is it also true for the HORIBA instrument ? Do you have the same accuracy with HORIBA and PICARRO analyzers ? By the way if the CO data are not discussed in the analysis I suggest to remove this details.

(p.12920): Land cover dataset: ". . .to evaluate the sensitivity of the measurement sites to different land cover types (LCT)". As mentioned in the metrics description the comparison of LCTs is made with the hypothesis of "equal surface flux strengths" (p.12922). However I would appreciate that you make it clearer in the discussions about the sen-

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sitivity to the different LCTs and to local emissions. I suggest at least to systematically use the term 'potential' sensitivity since it is of course dependent of the intensity of surface fluxes, which also may vary a lot in space and time (both at seasonal at diurnal scales).

(p.12926): "...respired ΔCO_2 ": you cannot exclude a contribution from combustion sources. CO variation could be interesting as a tracer of combustion. By the way the CH₄ shows the same signal so it cannot be attributed only to respired CO₂.

Results: (p.12929): high cattle density: the attribution of the summertime CH₄ high values both at Beromünster and Frübüel, to this specific source appears very speculative.

(p.12930): Gimmiz: I agree that the high values and variations observed at this station are "difficult to understand". I am also surprised that you do not use the CO observations as a tracer of anthropogenic sources versus biogenic ones.

Figure 3: I suggest to remove Goggle aerial phot which do not bring any additional information.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 12911, 2015.

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