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Atmospheric Measurement Techniques Discussions

Interactive comment on "Airborne remote sensing and in-situ measurements of atmospheric CO_2 to quantify point source emissions" *by* Thomas Krings et al.

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The authors describe two methods for quantifying point source emissions, one based on in-situ mass balancing and one on remote sensing coupled with an inverse Gaussian plume model, along with field data comparing the two methods. I would like to add three comments on the description of the in-situ method, which I hope will help strengthen that section.

It was surprising that Gordon et al. 2015 (AMT 8:3745-3765) and Cambaliza et al. 2014 (ACP 14:9029-9050) are not discussed or even cited, given that they both investigate in detail the uncertainties of the in-situ aircraft mass balance methodology. Gordon et al. 2015 discusses issues of interpolation, extrapolation, turbulent fluxes,

and issues related to determining the background concentration in the context of determining emissions from an elevated source as was done here, while Cambalizia et al. 2014 also considers interpolation, boundary layer entrainment, and other effects. On page 4 transparency of interpolations and extrapolations is claimed as a benefit here, but seem less well developed than in either of those papers. The description of both on Page 8, is actually specifically not transparent and neither seems to be included in the error budget of Table 4. Part of the reason why the in-situ method is discussed in such detail seems to be because a variation on the mass balance method is presented, however the differences and benefits are not clearly distinguished in Section 4.1 or the results.

I also recalled that Figs 3, 4, and part of 2 are identical to Figure 3 in Hacker et al. 2016 (Animal Production Science 56:190-203), who cited the report from the authors of the current paper, Bovensmann et al. (2014). Since the figures are now also in Hacker et al., I think that the original Bovensmann et al. (2014) should be referenced here to avoid confusion.

Finally, it would be helpful to know whether the turbulent (5 Hz) could be resolved as indicated in the caption for Figure 3 or if there was attenuation, and how the inclusion of the turbulent flux compares to not including it.

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