Atmos. Chem. Phys. Discuss.,
doi:10.5194/acp-2016-281-RC2, 2016
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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Methane emissions from dairies in the Los Angeles Basin" *by* Camille Viatte et al.

Anonymous Referee #2

Received and published: 17 November 2016

Review of Viatte et al.

Viatte et al. estimate methane emissions from a cluster of dairies located in Chino, California in the Los Angeles Basin. They measure methane column abundances using four mobile solar-viewing spectrometers situated about the cluster of dairies for four days in January 2015. They additionally use a Picarro analyzer to measure C12 and C13 methane from a mobile platform during the study, including one extra day in August 2015. These data are used to estimate emissions in two ways: (1) they calculate a crosswind flux using a mass balance approach, and (2) they use an inverse model. They find emissions between 1.4 and 4.8 ppt CH4/s from the cluster of dairies using the mass balance approach, and between 3.2 and 4.7 ppt CH4/s using the inversion technique. This emission estimate falls at the lower-end of previous estimates, which they credit to the declining number of dairies in the Chino area.

General comments

This is a novel method to determine emissions from a relatively confined area source. I recommend publication as long as revisions as described below are adequately provided.

Specific comments

1. How does the width of the FTS instruments' measurement swath compare to the width of the plume? One reason the "golden day" might not work for the basic flux method described here is because the three downwind FTS instruments are only measuring a small portion of the total plume. Please add some discussion of how this may affect the uncertainty of the flux method.

2. Line 455, Are these the results from a Keeling plot? Or are you just looking at the variability of d13C? If you look at the enhancements and a Keeling plot, do the d13C values make sense with the notion that the methane enhancements are consistent with dairy emissions?

3. How does the length of the measurement period couple into the uncertainties of the inversion? Are three days of measurements for this size and strength of emission sufficient? Could you have gotten away with fewer, or would more have helped?

4. Are there methane sources upwind that may contribute to the model placing methane emissions in the southeast portion of the study area? For example, how well does the LANL 16th site provide a background for the H1 16th site? If the H1 16th site sees an enhancement in methane that is not measured at the LANL 16th site, must the inverse model place those emissions in the southeastern most section of the grid?

5. Is there a way to quantify the reduction of dairies between 2010 and 2015? If so, I think this would be a good addition to help strengthen the conclusions based on comparisons with past emissions estimates.

Typos Line 20, 'a high-resolution atmospheric transport simulations' Line 60-61, 'a local

scales' Line 61, change 'apportion' to 'apportionment' Line 98, change 'on a high-wind data' Line 186, mismatch between 'surface emissions' and 'and its associated ... tracers.' Line 256, change 'generate' to 'generated' to match case with 'iterated' Line 357, add 'the' before "golden day" Line 382, I think you mean 'slightly smaller than'? Line 542, change 'pipelines' to 'pipeline'

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-281, 2016.