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comment**

Interactive comment on "Quantifying alkane emissions in the Eagle Ford Shale using boundary layer enhancement" *by* G. Roest and G. Schade

Anonymous Referee #1

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In the manuscript "Quantifying alkane emissions in the Eagle Ford Shale using boundary layer enhancement", Roest and Schade use atmospheric enhancement of alkanes from five measurements sites, with back trajectory and dispersion modeling, to quantify alkane and methane emissions in the Eagle Ford Shale region in Texas. They determine that an emission rate for raw natural gas that is consistent with the EPA's methane bottom-up estimate (1.1% of production). When they also consider storage tank leakage, the median emission rate is, however, 2.2% of production. Knowledge of shale gas regional emissions in general, is limited, and this very well written paper contributes significantly to the scientific base of knowledge. The authors are careful to adequately describe assumptions in their work (associated with mass balance approach and ethane/alkane ratios) and also include a Monte Carlo simulation to assess uncertainty. I recommend this paper for publication in Atmospheric Chemistry and

Physics, with technical/minor revisions, listed below.

Specific comments

Section 2.1: I had a hard time figuring out how many sites were used in the analysis based on the description in Section 2.1 and Figure 1. Table S1 was helpful for me to understand - consider moving it to the main paper. Indicate that there are five total sites. Section 2.1 says there are "several sites in Corpus Christi, including Hillcrest and Oak Park" but only those two are indicated in Table S1. I would also use a different color and/or more prominent symbol for the TCEQ sites in Figure 1 - as it is the symbols are hard to find, especially ones inside the circles indicating large cities.

Section 3.1: Mention Floresville. Even though the measurements didn't start until 2013, the signal is prominent in the figure.

page 11, line 12: Specify that the emission rate displayed no trend *over the period 2013-2015*. (Otherwise seems inconsistent with results from Figure 2.)

There are many acronyms in this paper. Readability might be improved if the authors wrote some of them out instead. RNG (raw natural gas) and TG (tank gas), for example.

Technical comments

page 2, line 7: "associated with gas produced" instead of "associated gas produced"

page 10, line 1: "significantly more constrained" instead of "significantly more constraint"

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-861, 2016.