

Interactive comment on “Quantifying the Loss of Processed Natural Gas Within California’s South Coast Air Basin Using Long-term Measurements of Ethane and Methane” by D. Wunch et al.

Anonymous Referee #4

Received and published: 21 June 2016

General comments

Wunch et al. derive emissions of ethane in the South Coast Air Basin dating back to the late 1980s. They further derive emissions of methane from 2012 to late 2015. They use two Fourier Transform Spectroscopy instruments to make measurements of atmospheric enhancements of ethane, methane, carbon monoxide, and acetylene, along with a South Coast Air Basin inventory estimate of carbon monoxide emissions, to derive emissions of ethane and methane. They also use ethane/methane enhancement ratios and their abundance in natural gas delivered to the region to determine that approximately half the methane emissions are due to leaking natural gas infrastructure.

Overall, this paper is well-written and the analysis is interesting, pertinent to megacity

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greenhouse gas emissions, and the conclusions are mostly well-supported. However, some of the conclusions seem to be at odds with another paper currently submitted to ACPD, Wong et al., that concludes that methane emissions in the SoCAB have been decreasing since 2011, albeit with a low confidence interval. Some discussion comparing and contrasting the conclusions of Wong et al. is warranted. For instance, how well does the Caltech FTS represent the entire SoCAB methane emission, compared to the multiple measurement locations described by Wong et al.?

Specific comments

Line 42, the sampling location of Hopkins et al. and Townsend-Small et al. were heavily skewed toward the western SoCAB. How well do those studies represent emissions to the entire region?

Line 110, why do you subtract the daily mean of ethane, CO, and acetylene and not the lowest value?

Line 111-113, by aggregating for an entire year, how do you account for this slope not representing the seasonal variability instead of variability due to emissions?

Line 185, is there an earlier reference you could use to support your conclusion that ethane emissions from automobiles would not have accounted for the emissions decline in the late 1980s? The conclusions from the mid-90s on are well supported, but it is unclear they are relevant to the 1980s.

Line 236, can you confirm with your data that the Aliso Canyon leak did not occur before October 23? There have been some reports of skeptical homeowners questioning that it may have been leaking before this date.

Line 245, is the ethane emission from Aliso Canyon found by multiplying the 4.28% anomaly by the Conley et al. methane emission of 97.1 Gg? If so, this should be stated more clearly.

Line 250, please state which 100-yr global warming potential you used. 25?

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Line 262, what is the uncertainty of the $\sim 20\%$? This would help in the comparison with Wong et al.

Technical comments

Line 72, equation 2, a subscripted “dry air” might fit better for the “column dry air”, similar to how it is done for the molecular mass?

Line 143, Conley et al. state the facility has a capacity of 168 billion cubic feet, and a “working capacity” of 86 billion

Line 151-152, Suggest swapping “near the facility” and “from aircraft”

Line 167, change “represents” to “represent”

Line 282, please define “HF”

Figure 4 might look “cleaner” if you used the daily average production for a given month. The variability of the days in a month results in a $\sim 3\%$ noise, which is close to the noise between 2003 and 2010.

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