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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Carbon Dioxide and Methane Measurements from the Los Angeles Megacity Carbon Project: 1. Calibration, Urban Enhancements, and Uncertainty Estimates" *by* K. R. Verhulst et al.

Anonymous Referee #1

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1 Overview:

Review of "*Carbon Dioxide and Methane Measurements from the Los Angeles Megacity Carbon Project: 1. Calibration, Urban Enhancements, and Uncertainty Estimates*" by Verhulst *et al.*

Verhulst *et al.* presents a new greenhouse gas monitoring network in Los Angeles and is generally well-written. I would recommend publication with some minor revisions to clarify several points.

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2 Minor comments:

2.1 IRV site

On page 11 (3rd paragraph), the authors discuss why IRV is inconsistent with the results reported by Feng et al. (2016) and attribute it to the spring/summer data used in Feng et al. It seems that this should be easy to test. Are the real measurements from spring/summer consistent with the results from Feng et al?

2.2 Background values

On page 15 (1st paragraph), the authors discuss their background concentration selection. Criteria 2 seems like it would be difficult to obtain due to meteorology. Won't daytime PBL growth will impact the concentrations? Even if you have no local sources you could still have fairly large hour-to-hour variations due to meteorology. This criteria would make sense if you were, say, comparing the observed and modeled concentrations (if the residuals were small then you've captured all of the sources & meteorology), but that would be more involved than the implied goal of this section: to derive a simple background estimate to facilitate near-real time analysis.

Following onto this, in the following paragraph it looks like the authors use 6-hours as their time range. A plot of the diurnal cycle (maybe monthly averaged) could be useful to understand the time ranges that should be used.

2.3 Background uncertainty

It seems like using some combination of background sites could be a better method for getting the background uncertainty. For example, computing a running standard

deviation (over a moving window) of the differences between the various background sites. How would that compare to your background uncertainty estimate?

It would also be nice to see a bit more discussion on the background uncertainty, especially since it is found to be the largest source of uncertainty. There are about 7 pages devoted to the analytical uncertainty and 2 sentences devoted to the background uncertainty.

3 Specific comments:

Page 2, Line ∼25: Maybe include a reference to the San Francisco/Berkeley network (e.g., Shusterman et al., 2016).

Page 11, Line 30: wouldn't lower night time PBLs mean higher sensitivity? Isn't this a big part of why we have a diurnal cycle that is out of phase with emissions (emissions peak during the day but surface concentrations are near a minimum due to the PBL).

Page 18, Line 10: wouldn't the converse [that SCI and LJO are not relevant background choices when flow is from the continent] also be true? Or the more general statement that the background data used should be based on the prevailing flow patterns (similar to how McKain et al., 2015 chose their background values)?

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