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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Southern California Megacity CO_2, CH_4, and CO flux estimates using remote sensing and a Lagrangian model" *by* Jacob K. Hedelius et al.

Anonymous Referee #2

Received and published: 28 June 2018

This paper uses TCCON measurements at Caltech and Lancaster, together with a simple Lagrangian model, to estimate LA fluxes of CO2, methane, and CO. It also applies OCO-2 CO2 data with the same method to estimate CO2 fluxes.

I found the paper to be very informative and thorough, and overall correct as far as I can judge. It does get buried in detail and side alleys and repetitions that make it difficult to read. The authors might consider cutting back unnecessary parts. Also, the advertised premise of the paper is to demonstrate a simple remote sensing method that can be used for estimating urban fluxes worldwide, which a reader might expect to mean using satellite observations, but in fact much of the analysis rests on the TCCON

sites (all of it for methane and CO), and LA is of course an unusually large city which makes the application easier. TCCON is of course "remote sensing", but the title and conclusions may be a little misleading.

The above general comments are simply for the authors to consider at their discretion.

I have a few other minor specific comments below.

1. Introduction: not obvious why one needs top-down estimate of urban fluxes, particularly for CO2 where bottom-up estimates (it seems to me) are likely more reliable. It would be good to give some justification of the need for top-down approaches.

2. Introduction: not clear what the "100+ cities" refers to.

3. Section 2.2: I presume that seasonality of the CO2 flux is neglected since I saw no mention of it. It would be worth making the point that the biospheric term is small in LA, because I wondered about it. Is there also no seasonal pattern in fuel usage?

4. Section 2.4: if the linear inverse model is the way to go why even mention the other two models? Why detail them in the Appendix?

5. Section 4.1: I didn't understand the sentence on "Blooming effects"

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