Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2018-1188-RC1, 2019

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Photochemical Production of Ozone and Emissions of NO_x and CH_4 in the San Joaquin Valley" *by* Justin F. Trousdell et al.

Anonymous Referee #1

Received and published: 19 February 2019

The manuscript describes a number of flights over the San Joaquin Valley which measured NOx, O3, and CH4. These measurements are used to estimate surface emissions. For NOx and CH4, the surface emissions are much higher than inventory values.

General comments:

1) There are numerous typos and grammatical errors. Some of these are listed below, but I would suggest a thorough proof-reading before resubmitting the manuscript. Some of the language is also vague and inappropriate for a journal paper (e.g. "stuck out", "more or less", "more and more", "a lot").

2) No details of the flights are presented, with the exception of two sentences in Sec-

Printer-friendly version

Discussion paper

tion 3.3. Figure 1 gives some idea of the horizontal extent of the two flight campaigns, although it is difficult to see the EPA flight lines and it is impossible to distinguish individual flights. We are given some windows of time (but no actual flight durations) and an altitude range "from the surface up to 4 km". Presumably the surface measurements are at the start and end of each flight, unless there were multiple landings at different airports. Given the importance of the vertical coverage on the emission calculation, much more detail is required.

3) The description of the NOx processing (Section 4.1.1) lacks detail. Why one standard deviation? How much data are removed? If this all occurs in the late afternoon, why not just reject data from that time of day? And if fire smoke is entrained during that time period, why is this effect not discussed for O3 and CH4?

4) If emission rates are measured over the course of a few hours for 6 days, then presenting these values as month or yearly rates (i.e. tonnes/year) is not "averaging" or "converting" - It is extrapolating. For the most part this can be fixed by using the correct terminology. However, due to variations in emissions with time (some of which are discussed, such as the "weekend effect"), extrapolating these hourly time scale values to yearly values has an associated uncertainty that should be discussed.

5) The consideration of uncertainties is generally weak. For example, in Section 3.4 (page 8, line 16) it is simply stated that the approach is justified and that 20% in conservative without any reference to where that number comes from. In Section 4.4, two values (1 ppb, 50 ppb) are chosen "because the term is estimated by eye". For wind, 0.1 m/s is based on the "measurement capabilities" of an instrument which isn't named or referenced.

6) Correlation length is typically calculated at the 1/e value, not the "crossing of the zero-correlation line". This is primarily because small amount of noise in the correlation values can significantly change when the zero line is first crossed (Figure 12 demonstrates this effect). Smoothing the correlation or fitting an exponential decay to

determine the value at 1/e gives a more accurate measure of the correlation length that isn't subject to the effects of noisy data.

7) It is also not clear why correlation distances are important in the context of the study (expect to inform future satellite resolution values). What is the expected correlation length that would be associated with cities and traffic? Wouldn't this value depend on how far downwind from the source the measurement is (due to horizontal diffusion)? Why are potential temperature and water vapor compared? Do these values relate to the patchiness of land use and the separation of lakes and rivers? Why is this important?

Specific comments:

Page 3, line 9-10: A claim like this is meaningless without defining "limited in duration", "overextended in sampling", and "altogether uncoordinated". If those terms can be defined a citation will also be needed to a substantial review paper that backs up this claim.

Page 5, line 17: For the editor – Is a citation of a manuscript in preparation accepted?

Page 7, line 11: The aircraft doesn't measure "from the surface".

Page 9, line 14: Using WRF parameterizations isn't a measurement.

Page 20, line 12-13: This sentence is very confusing. (e.g. What is "a common time height stamp"?)

Minor comments/corrections:

Page 2, line 23. Sentence doesn't make sense.

Page 3, line 14. Period should be outside bracket.

Page 5, line 3. What does "its" refer to?

Page 5, line 11. Why is the air "unique"?

Page 6, line 13. Should be “Vaisala”. “Ozone” should start new sentence.

Page 9, line 22. Should be “50%”.

Page 12, line 13. This is not a sentence.

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2018-1188, 2019.

Printer-friendly version

Discussion paper