Atmospheric
Chemistry
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Discussions

ACPD

Interactive
comment

Interactive comment on "A transition in atmospheric emissions of particles and gases from on-road heavy-duty trucks" *by* Liyuan Zhou et al.

Anonymous Referee #2

Received and published: 8 November 2019

This study reports roadside measurements of 556 heavy-duty trucks in Sweden. The paper uses these measurements to investigate how several pollutants of interest vary by each truck's Euro pollutant emissions standard, and carries out several additional analyses including the skewness of the distribution of emitters. In addition, the study does a very extensive comparison to past relevant literature. I think the paper is a valuable contribution to the literature and should be published after considering the comments below.

The comments below that I think require the most attention have to do with adding additional analysis or at least discussion on how various amounts of exhaust dilution

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Discussion paper

impact your particle number emission factors. This includes both variability in dilution among different trucks in your measurements, and especially differences between your study and the past work used for comparison.

Comments:

Line 104: Please consider adding a short statement here related to how the uphill conditions could impact results. You discuss this later in the paper, but you might want to alert the reader to this, and point to where you discuss it.

Line 163: Please discuss how you chose t1 and t2 for the integration. And more importantly, how did you deal with the different plume widths for NOx versus other pollutants? How sensitive are results to chosen t1 and t2?

Line 188-200: See major comments above. PN measurements would be highly dependent on the amount of dilution the plume has undergone between the engine and the measurement. I would imagine this would contribute to differences between your measured emission factors and emission standards. What are the dilution requirements when certifying for Euro standards?

Line 200-202: Could variability in dilution contribute to the scatter too? Please think this through for all sections that discuss PN emissions results.

Line 240-241: Please make sure to include text in figure captions when you are not including data from all trucks. Are you sure that leaving these data out doesn't lead to a problem with biasing the results? I would imagine that if you are not including results for trucks that have measured concentrations below measurement detection limits, you'd be leaving out the cleanest trucks (though could also be due to the plume missing the sample line). Please think this through for all sections that report results that remove trucks with measurements below detection limits.

Table 1: I don't understand how you've categorized this table. For example, I see studies in this table that are not performed in Europe but are under the Euro VI cat-

egory. Also, I noticed papers that you are citing in the study and that have emission factor results, but are not in this table. Please ensure you have considered all relevant studies.

Figure 2: For Euro III, it seems that the EF for black carbon is higher than for PM. How could this be?

Figure 4: This is very interesting. You might consider comparing these size resolved emission factors to previous studies that report similar EFs.

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2019-728, 2019.