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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Impact of aftertreatment devices on primary emissions and secondary organic aerosol formation potential from in-use diesel vehicles: results from smog chamber experiments" *by* R. Chirico et al.

Anonymous Referee #1

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This manuscript describes results from smog chamber experiments aiming at the characterization of the primary organic aerosol (POA) and the secondary organic aerosol (SOA) formation for three in-use diesel vehicles with different exhaust aftertreatment systems: one vehicle without exhaust aftertreatment devices, one vehicle with a diesel oxidation catalyst (DOC) and one vehicle with both a DOC and diesel particulate filter (DPF).

General comment:

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Discussion Paper

The work is technically sound and the quality of the experiments and measurements are good. There is a very good data here that should be published, and many interesting results are presented. However, I find the manuscript difficult to read – it seems to be more of a report of many observations, with none being emphasized more than the others, so there is a little sense of what is the most important here. The manuscript is too long (roughly 30 pages) and it contains too many figures (14). In my opinion, this manuscript can be shortened and the clarity of presentation improved.

Specific comments: 1. It would be helpful if the authors list the most important findings from this work in the conclusion section. As it is currently structured, the abstract contains more information than the conclusions. 2. Although the authors list three vehicles with different exhaust aftertreatment systems, the vehicle with DOC and DPF is used for one experiment only (gas phase photooxidation, page 16085). This should be made clear in the introduction and experimental sections. 3. The authors found vehicle exhaust consisted mainly of black carbon (BC) with a low fraction of organic matter (OM/BC<0.5) at both idle and 60 km/h conditions. This is in contrary to some other reports (see for example Shah et al., 2004) that found much higher contribution of OC at idle conditions. The transfer line from the vehicle exhaust pipe to the chamber and the diluter (Fig. 1) were heated to 150° C. At this temperature, semi-volatile organic species would be mostly driven out of the particles. Can the authors comment on this? 4. Page 16057, line 6: remove "as" before PAH 5. Page 16061, line 20-22: please correct the sentence: "...for those species object of this work." 6. Page 16077, line 7: "..with as carbon number decreases?"

Reference: Shah, S.D., Cocker, D.R. et al., Emission Rates of Particulate Matter and Elemental and Organic Carbon from In-Use Diesel Engines, ES&T, 2004, 38, 2544-2550

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 16055, 2010.