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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Direct measurements of near-highway emissions in a high diesel environment" *by* H. L. DeWitt et al.

Anonymous Referee #1

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Overall Comments –

This paper describes an experimental study of near-highway (~15-20 m away) air pollution concentrations in a diesel dominated environment. They measured ambient concentrations using a suite of high resolution instruments (HR-AMS, SMPS, and PTR-MS). They also collected filter samples for offline analysis (OC/EC, sulfate, organic molecular markers). They performed what is now relatively routine PMF analysis of the AMS data, presenting a 6 factor solution. They performed some analysis of the PTR-MS data, focusing on nitrogen containing fragments. They analyzed aerosol nitrate using approach of Farmer. They compared the results to other previous field studies (they largely agree). They present results from fossil/modern carbon analysis – as expected for this sort of site two-thirds or more of the carbon is fossil.

The paper is well written and very comprehensive (16 figures and 2 tables!). The experiments seem to be well executed. There is nothing fundamentally wrong with the paper, but I found it relatively uninteresting. It breaks little new ground, rather it presents results that are basically consistent with the current AMS world view. The points made are largely those that have been made by previous studies. The most potentially interesting result was that almost none of the oxidized organic aerosol appears to be fossil. The paper could be improved by streamlining (cut the number of figure in half) and focus on the more novel aspects of the results relegating the rest to online supplement.

Specific comments:

The paper frequently references BC concentrations. It was not clear how they were measured. The paper does discuss thermal-optical analysis of quartz filters to determine EC concentrations. Did they just switch terminology? EC and BC are different quantities. If they are using the thermal-optical analysis then I would recommend that they refer to it as EC. Figure 3 suggests they were running an Aethalometer or PAX.

I found the discussion of the fossil/modern carbon data (Figure 16) to be the most interesting part of the paper. The figure suggests that very little of the oxidized organic aerosol (i.e. SOA) is fossil (I assume fossil SOA would be the bright green part of bar, but was not entirely clear to me when I read the text). This seems surprising (e.g. see Zotter et al. JGR 2014). A key detail here may be how they determined BC concentrations. Is this a true carbon measurement (i.e. thermal optical) or was it inferred from an optical measurement? If it was inferred from the optical measurement what mass absorption cross section was used to convert the absorption data to carbon? This is a critical detail because as an optical measurement often overestimate the true elemental carbon concentration (many intercomparison studies have been published that show this) – potentially by as much as a factor of 2. This detail could change the interpretation of this figure substantially.

Figure 15 – I assume that the light/bright green is the defined as the difference between

the other quantities? This needs to be clarified.

Figure S1 compares filter and AMS data. The AMS data in this figure are uncorrected? If so that should be noted in the caption. What does the comparison of organic carbon look like?

They mention using a TEOM but never discuss the data. How was the mass closure between the speciated and the mass based measurement? If there is poor mass closure then what does that mean for the results?

The two papers from Hellebust seemed interesting, but neither are published. Not clear it is appropriate to reference.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 27373, 2014.