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Interactive comment on “Diesel-related hydrocarbons can dominate gas phase reactive carbon in megacities” by R. E. Dunmore et al.

Anonymous Referee #1

Received and published: 1 May 2015

Opinion This paper is well written, with clear and well-supported conclusions. I would recommend for publication following minor revisions.

Summary

Using long standing measurements of gas-phase compounds up to C13 in London, and guided by the knowledge emissions of >C10 hydrocarbons (HC) in London are dominated by diesel vehicles, Dunmore et al. estimate unobserved >C13 HC emissions and predict the consequences of the under-representation in emissions inventories. Current C9-C13 emissions estimates are calculated to be low by a factor of 50 to 80. The higher OH reactivity for longer chain (>C9) alkanes makes them significant to dominant in the production of SOA and ozone and the loss of OH (OH reactivity). Trends in

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future emissions are predicted to increase diesel emissions, further emphasizing the importance of including the impacts of >C9 compounds on urban air quality.

Specific Corrections

OH reactivity should be clearly defined (i.e. lifetime of OH w/r to HC#) and discussion of its importance given a sentence or two.

Page: 9542 / Line: 17 “unaccounted for, but very significant,..”

9543/13 Add references such as: Robinson et al., “Rethinking organic aerosols: Semivolatile emissions and photochemical aging”, Science, 2007.

9543/17 change to read :“hydrocarbons 1,3 butadiene..” (remove a comma)

9543/28 change to read : “driven policy, regulation, and observation strategies”

9544/10 Add references such as: Jimenez et al., “Evolution of Organic Aerosols in the Atmosphere”, Science, 2009. Donahue et al., “A two-dimensional volatility basis set – Part 2: Diagnostics of organic-aerosol evolution”, ACP, 2012.

9544/18 “combined approach” : this statement is a bit vague, please clarify further

9544/20 Please add explicit references to the publications on the field studies to which you refer such as: Gentner et. al., "Elucidating secondary organic aerosol from diesel and gasoline vehicles through detailed characterization of organic carbon emissions", Proceedings of the National Academy of Sciences, 2012.

9545/4 “as well as warm.” Do you mean warm starts? This phrase may not be necessary or should be clarified.

9554/20 Add references such as: Ensberg et al. “Emission Factor Ratios, SOA Mass Yields, and the Impact of Vehicular Emissions on SOA Formation”, ACP, 2014. Bahreini et al., “Gasoline emissions dominate over diesel in formation of secondary organic aerosol mass”, GRL, 2012.

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9555/10-12 This is likely to be a good assumption, but please add references to support low SOA from aqueous/GLY sources: e.g. Knote et al., “Simulation of semi-explicit mechanisms of SOA formation from glyoxal in aerosol in a 3-D model”, ACP, 2014.

9555/25 Please clarify differences between “real-world conditions” of driving and dynamometer tests

9551/22 Change to read: “Assuming that:” (use colon)

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 9541, 2015.

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