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Interactive comment on “Airborne determination of the temporo-spatial distribution of benzene, toluene, nitrogen oxides and ozone in the boundary layer across Greater London, UK” by M. D Shaw et al.

Anonymous Referee #2

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Comments on the manuscript entitled: “Airborne determination of the temporo-spatial distribution of benzene, toluene, nitrogen oxides and ozone in the boundary layer across Greater London” Author(s): M.D. Shaw, J.D. Lee, B. Davidson, A. Vaughan, P.M. Purvis, A.C. Lewis and C.N. Hewitt acp-2014-760

General comments:

This paper reports aircraft measurements of benzene, toluene, nitrogen oxide and ozone from Greater London, UK. The paper is very well-written and the authors did

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[Interactive Discussion](#)

[Discussion Paper](#)



a good job in explaining their results, experimental setup, calibrations and the rationale behind the flights. From the introduction it seemed that one of the main objectives for this manuscript was to re-validate the National Atmospheric Emission Inventory (NAEI), which I think the authors did not do a good job in achieving this goal. I have very minor suggestions that the authors need to clarify before the manuscript goes to publication:

1. With the re-validation of the NAEI objective in mind, why did the authors only report benzene and toluene measurements? The PTR-MS is a powerful instrument that can measure a vast array of VOCs? Did the authors have in mind another manuscript to do so? It looks like it is a waste of money and resources for both the aircraft and ground site campaigns to report emissions of 2 aromatic compounds. 2. Pages 27340-27432, it looks like there was different measurement rates depending on the instrument, for instance GPS data were collected at 20Hz, NO_x at 10 Hz, VOCs at 5 Hz, what did the author do to compare all their measurements is everything converted to 20 HZ to be able to compare with GPS data? 3. Also, in the NO_x sampling section, the acquisition frequency was 10 Hz but why the detection limit is reported at 1 Hz? The VOC sampling was at 5 Hz why did the author use a repetition rate at 2 HZ? 4. Page 27342, lines 11-12, the authors stated that they used a combination of stainless steel and Teflon tubing to minimize memory effect however on page 27343 lines 19-20 the author stated that the inlet was PFA? I think this caused some confusion so may be the authors can explain the setup better, which part of the inlet was made of Teflon and which part was made up of stainless steel? 5. Page 27345, lines 4-6, the authors specify that "benzene, toluene and NO_x shared anthropogenic sources with very few biogenics" how did the authors reach this conclusion and was it based on their measurements? How big is the influence of biogenic emissions on Greater London? 6. Page 27345, lines 5-10 on the time scale of the flights and in an area that is highly influence by fresh vehicular emissions of toluene and benzene? How big of an influence is photochemical aging? 7. Page 27348, Lines 1-5, It looks that within experimental error there is no difference in T/B ratio between suburban and south-western London, it looks that both are coming from fresh emissions so why did the authors use photochemical aging to

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Interactive Discussion

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interpret their results? 8. Page 27355, in the conclusion section the authors did not mention how well their measurements agree with NAEI 9. Did the authors see more photochemical aging in the flights parallel to wind direction (were these considered to be transformation flights)? I recommend this manuscript for publication in ACP.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 27335, 2014.

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