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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Atmospheric chemistry and physics in the atmosphere of a developed megacity (London): an overview of the REPARTEE experiment and its conclusions" *by* R. M. Harrison et al.

Anonymous Referee #1

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REFEREE COMMENTS

For acp-2011-824:

Atmospheric chemistry and physics in the atmosphere of a developed megacity (London): An overview of the REPARTEE experiment and its conclusions

R.M. Harrison, et al.

OVERVIEW

This manuscript provides a comprehensive overview of the REPARTEE project, a major UK based urban measurement project. I find the paper and the project very interesting, and I have only some suggestions for improvement.

This kind of papers always have a problem of either providing no actual new results (acting as a review), or being more of a normal scientific contribution, sometimes resulting in too long and detailed report for use. I think this manuscript has avoided such pitfalls, and I think it acts as a good overview of the REPARTEE papers especially for people maybe not so interested in specific measurements, but more on the particle and gas properties in urban areas in general.

The quality of the writing is very good, and I had no problems following the narrative.

SPECIFIC COMMENTS

My main concern is the representability of the sites, and of the measurement period. For a reader not so directly connected with urban measurements, it would be very useful to have a concise section to explain how representable are the London measurements to other European metropolies. On some of measurements, comparative values from other cities and earlier studies are mentioned, but for some, no mention is made. It would be very useful to also mention, if this is the first time such and such measurement is done (at least to author's knowledge). Particular factors only observed in London should be mentioned, e.g. does the congestion charge affect the traffic patterns and thus the emission factors? Secondly, the periods of measurement are rather short, for understandable reasons. There should, however, be discussion on how representative the periods are of the overall pollutant levels on the other parts of the year.

I recommend the authors to either consistently use shortened versions of the sites, or full names. Now there are three different ways to reference e.g. Marylebone Road (M. Road and MR).

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Some of the figures are already published in earlier studies, some even in the same special issue. Please indicate clearly earlier publication or if the figures are directly based on earlier publications, in the figure captions.

Many figures are almost impossible to read in this resolution. I will mention some later on, but please review the figures to make sure they are in readable resolution.

30156:10 Did the change in RP measurement site affect the measurements?

30159:4 How did the REPARTEE II arrangement changed from REPARTEE I? Does it matter?

30162:2 "REPARTEE special issue (link)"

30162:8 The backscatter is mostly from the coarse particles. Do the smaller aerosol sizes probably have a similar mixing pattern?

4.3 section: Is there major differences between weekdays? Do the measurements (roughly) agree with the size distribiution flux measurements described later on the paper? Were the instruments intercalibrated?

30171:24 CEH not explained (but can be cleared from the author list..)

Fig 15 (and 30170:15) I have really trouble seeing ANY accumulation mode in the number plots. Of course in the volume distribution such mode is visible, but this should be more clearly pointed out in the discussion of a "clear" accumulation mode in BT Tower.

30170:21 Do the PMF methods agree with the cluster methods explained earlier, or are they not comparable?

30172:5 Isn't the boundary layer mixing more dependent on temperature gradient, than on actual temperature levels? I can quess that the solar radiation was weaker in the colder period, was this the case?

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30172:28 How was the emission factor derived?

30173:15 Bonfire night? Was this explained in other analyzes? Could you then include it on the time-series plots.

30175:10 Are the EC fraction of the ATOFMS any way agreeing with the MAAP optical measurements on the sites?

30175:14 I do not understand what a "coarse size distiribution" means

30175 in general: Do the earlier mentions of the size distibition clustering agree with the LRT markers used in the ATOFMS and AMS?

30177 I would recommend trying to include the TEM analyzes somehow more integrated way in the big picture. Now they seem to be very separate from the other analyzes. Did they agree on the parts they could (understanding the limitations) with the other analyzes?

30178:20 Please also indicate the potential LRT period in the figure 19

30179: 13 on: Are these stations different from the main stations used? If not, why explain them again?

30181 On discussing tyhe NO2 emission patterns, some discussion on how typical the vehicle fleet in comparison to other European levels could be useful, especially in context of congestion charges affecting different vehicles differently.

30183:17 I do not see hourly aggregated values in the top panel of Fig 24.

30184:7-8 The "Positive correleation" for O3 is not so clear from fig 25. Is the p-value for the correlation different from random noise?

30184:16 what is reaction R2?

4.9: I could not directly see the connection of the perfluocarbon experiments to other parts of the paper, this should directly connected to main conclusions of the paper.

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30188:11 which roof top measurements?

30189 last line: Equation 1?

30190:13 U?

30193:9 for which time-resolution and data point amount was the R2 calculated for?

30193:18 NAEI?

30195:24-on Are the particle flux time-series similar as the ones measured down below concentration? I.e. can the flux differences seen directly from concentration differences near emissions, or do the micrometeorology affect the diurnal variation strongly?

30195: Ref to fig 31: Are the weekday and weekend spectra actually statistically different? The variation is smaller in weekends, but so is the data amount..

30199:10 I do not understand why such effect on DF/dlogDp?

FIGURES

Overall, please check the figure legends and axes for better readability. I had to guess many of them due poor resolution.

Scaling is a major problem in many figures, e.g. 3, 5(second panel), 12, 19, 20, 24. Also, these figures would greatly benefit from som sort of indication of a) weekends and b) periods of LRT.

Fig 7. Units of vertical wind velocity show poorly.

Fig10 and other concentration figures: Please indicate weekends also on the figure time-axes. This is useful to see if the local emission patterns change significantly the measured concentrations.

Figure 16 is too low resolution. The legend is almost impossible to read. I guess that the bottom part of the legend is "<105 m"?

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Figure 26: The figure is poorly explained in the text. What are the circled areas?

Fig 29: What are the individual lines?

Fig 30: Colour scale is confusing: I recommend to change so that the hour of the day is cyclical (for example, night time dark, day time light)

Fig 31: Y axes confusing

Figure 32. This interesting plot would need to be explained more in detail. However, the caption (last line) is confusing, and I am not sure from the text what can be understood from this.

Figure 34d is repeated in the last panel (there are two same spectra)

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 30145, 2011.

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Interactive Comment