

Interactive comment on “BAERLIN2014 – The influence of land surface types on and the horizontal heterogeneity of air pollutant levels in Berlin” by B. Bonn et al.

B. Bonn et al.

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p.22, l.27-32, 'could you quantify the 'significant' influence of vegetation on pollutant concentrations? Was it statistically significant? Contribution of isoprenes and terpenes to local ozone formation, was this quantified in the study, or is this derived from models/previous knowledge? The second half of this statement on urban vegetation is more robust and accepted.':

Thanks for pointing this out. We added the definition of statistically significant to subsection 3.5 (see above comments) and will add a table (Table 9) with the corresponding numbers to this important statement. Those are: Compared to the urban background station in Berlin-Neukölln ozone is found to be significantly reduced in

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parks ($-38.7 \pm 2.3\%$) and forests ($-14.7 \pm 2.5\%$), while it is significantly enhanced in agricultural areas ($+30.7 \pm 3.4\%$). In this context coniferous forest types caused more reduction ($-21.7 \pm 3.1\%$) than deciduous forests ($-11.3 \pm 2.9\%$). Carbon monoxide: Significant reduction near vegetated areas, i.e. parks $-28.4 \pm 0.1\%$, forests $-37.0 \pm 0.1\%$ and agricultural areas $-26.6 \pm 0.1\%$, compared to Berlin Neukölln. Nitrogen oxides: Except for agricultural areas NO_x was significantly enhanced, i.e. near parks $+660 \pm 140\%$ and near forests $+31.3 \pm 17.3\%$ (not significant for coniferous types). However summing NO_x and O_3 to O_x there is no significant change except for areas close to parks ($+32.5 \pm 13.5\%$) and agricultural areas ($+14.3 \pm 2.9\%$). The cause is different, as the enhanced NO_x increases O_x near parks, while the already produced ozone by NO_2 photolysis enhances O_x in agricultural areas. O_x nearby mixed forest behave similar as nearby parks. But the number of observations is much smaller (136) than for other surface types (>500). Particle number concentrations (PNC): Observations (bicycle) in vegetated areas display significantly reduced PNC compared to the background station in Neukölln, i.e. in parks ($-8.5 \pm 2.5\%$), in forests ($-29.1 \pm 1.8\%$) and in agricultural areas ($-33.2 \pm 1.8\%$). Using the 'Urban' classifications for bicycle based measurements these reductions increase further. Particulate mass (PM 1 and PM10): Particulate mass reduced in any vegetated area significantly. The reductions for the individual land usage types were found identical for PM1 and PM10 within the range of uncertainty: in parks (PM1: $-34.5 \pm 3.0\%$, PM10: $-38.1 \pm 2.2\%$) and in forests (PM1: $-61.8 \pm 1.6\%$, PM10: $-58.1 \pm 1.5\%$). For agricultural areas van measurements were available only, which were done at the street. Any PNC and PM measurements were found significantly higher than at the urban background site in Berlin-Neukölln indicating the vicinity of sources. Therefore we stuck to bicycle measurements for the above calculations.

p.22, l.33-37, 'again, the resolution of the land use maps considered makes this statement harder to justify, in addition, urban airflow patterns and complex terrain influences on wind and dispersion would need to be taken into account adequately,

which is not within the scope of this study for good reason. Perhaps this section needs to be qualified a bit to reflect these caveats.:

*Agree. We will reformulate the sentences to 'The **general** vegetation effect **described above tends** to dependent on the spatial extent of vegetated areas. Urban parks with a much smaller size compared to urban forested areas were shown to not have significantly lower but rather elevated NO or NO₂ concentrations than the urban background station in Neukölln (NO: >+45% and NO₂: >100%). **This was affected by the street based observations and was most likely influenced the present wind direction on site (no record), which may explain the significantly enhanced NO_x levels nearby areas classified as parks. A future study definitely needs to acquire a higher resolved land surface type map usable for investigating the effect of parks.'***

Figures: 'general point, consider making the background maps slightly less vibrant to better bring out the colours of the measurements, in particular the orange and yellow shades are hard to see. –':

Good point. Will be done.

Fig 6: 'add more legible legends to the graph –':

OK. We can add the longitude and latitude and the mean diameter on the red y-axis. The y-axis description on the lower right plot doesn't improve by any other colour.

Fig 8: 'what are the units for the upper graphs, please add to the legend':

Thanks. The typical units for PNC (cm^{-3}) and for PM ($\mu\text{g}/\text{m}^3$) got lost. Will be done!

Tables: 'Table A1: formatting of the table makes it a bit hard to read, i.e. alignment and space between columns; time resolution is variable for the instruments, relating to the

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comments made above on time-synchronisation’:

The table may be turned by 90 degrees but no clear improvement was found. Concerning the time resolution: Multiple colleagues with a variety of instruments of different possible time resolutions contributed to the dataset analysed. We aimed to gain not an identical time resolved by best spatially resolved information. For all comparisons made the datasets acquired in parallel were averaged to the coarsest time resolution but not with respect to surface classification. This will become important for the video analysis currently conducted.

ANNEX

A2L12 “All particle instruments except the instrument were ...’ which ‘instrument’ are you referring to?’:

Thanks. The ‘DiSCmini’ got dropped and will be inserted. However, as agreed with the first reviewer, this part will be shifted to the supplementary material.

Figure B1: ‘add the unit to the legend in both cases’:

Will be done by reediting the jpg as the software (QGIS) tool doesn’t allow additional modifications.

Table C1: ‘This table is rather dense and could considered to be more accessible as a bar chart?’:

The collaborators discussed about this for long since a bar chart was included in an earlier version. But the information details got lost within. Will be shifted to SOI too.

Figure C2: ‘map zoom and focus is different, making a direct comparison between

PNC and mass concentrations difficult, for no reason? suggest to make sure that both maps show the same area':

Will be tried with the software. Thanks.

References

'For a paper of this substance, some of the recent literature in particular with regard to urban PM seems to be missing, e.g. from the CLEARFLO project (<http://www.clearflo.ac.uk/outreach/papers/>), as well as those on long-range transport contributions and composition of urban PM (see specific comments).':

We will add those references and hope to have improved that important topic.

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