

Interactive comment on “Traffic-related air pollution near roadways: discerning local impacts from background” by Nathan Hilker et al.

Anonymous Referee #1

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This is a thorough application of three methods to distinguish traffic-related air pollutants from background concentrations, applied to three road-side stations in two cities in Canada. The results are novel, interesting, well presented. The manuscript should be accepted for AMT after authors' response to the issues as raised below.

Of course, it makes a big difference if a roadside station is located 6 m away from the nearest traffic line or 10 m. Actually, any different position may lead to different concentrations, because the variability of air pollutant concentrations varies largely spatially. The authors are aware of that. However, the tone sometimes suggests that the results (concentrations!) are transferable to other locations or situations. For example, the last sentence of the abstract (“Downwind conditions enhanced local concentrations by a factor of ~ 2 relative to their mean, while upwind conditions suppressed them by a

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factor of ~ 4) is, on the one hand, perfectly fine. On the other hand, there is no caveat saying: “This applies to this very specific situation, don’t generalize!” Also, referring to lines 289 – 299 and Table 2, the absolute numbers of C_L are not comparable to each other between sites, even though drastic differences between the sites are apparent. The authors are asked to go through their manuscript and find more cautious wording in this respect.

In the eyes of this reviewer, the data set allows much more interesting analysis of emission factors, for example between NO_x and CO_2 . How do NO_x/CO_2 ratios or UFP/CO_2 ratios compare to the results of similar studies? Similar applies to CO . It is however acknowledged that this is outside the scope of this study.

Section 4.3 and Table 4: Why not did authors apply his method for ozone? When using maxima instead of minima for the time series analysis this should be no problem to do. The justification given in lines 362 – 364 is not convincing. The urban background concentration of O_3 could have been quantified that way, and be compared with the respective results of methods 1 and 2.

Eq. 2 seems screwed. Probably, a parenthesis is missing on the right-hand side, opening before $C_{NR}[i]$ and closing after $C_{BG}[i]$

Line 187: A justification should be given as of why M and N are typically not identical. It is a bit counterintuitive.

line 194: Why did you choose 75 % here? Likely, the results are more reliable if 100 % is used. See also line 413.

The $PM_{2.5}$ results are puzzling indeed. It could be the precision and accuracy of the analyzers not being able to resolve the small differences in concentrations between stations and within time series. If so, the results are not statistically robust. This issue should be analyzed in more detail and be presented and discussed in the manuscript.

Again, a fine analysis!

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