

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

Anonymous Referee #3

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The authors report on near-road and background measurements of air pollution in Toronto and Vancouver, Canada. The manuscript includes an interesting and insightful comparison of methods for separating the local and background contributions to each pollutant measured at the near-road sites. Ozone and PM_{2.5} are identified as regional and mostly secondary and as a result their concentrations are not well-associated with local emissions on adjacent roadways. Carbon dioxide has high contributions to overall concentrations due to global background levels, though a contribution due to local traffic is still discernable at the near-road sites. The time series analysis/interpolation of windowed minima methods are a particularly interesting aspect of the manuscript. The manuscript is interesting and should be published in AMT after the authors consider and respond to the following comments.

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Major Comments

1. In Tables 2-4, the authors should reorganize their presentation to show and directly compare results of all three methods for estimating local contributions (C_L) to measured concentrations at NR-TOR-1 (Table 2), NR-TOR-2 (Table 3), and NR-VAN (Table 4). The current organization of these tables emphasizes comparisons across the measurement sites, whereas the main point of the paper is to compare methods for estimating C_L .

2. I suggest the authors verify their regression coefficients relating pollutant concentrations to wind speed are consistent via separate analysis of weekday and weekend conditions: traffic conditions and emissions change on weekends, whereas average meteorology should be the same.

3. The presentation of NO/NO_2 ratios is unconventional. I suggest reporting NO_2/NO_x instead, where $NO_x = NO + NO_2$. The reasons for variations in NO_2/NO_x among sites should consider differences in background ozone, transit/residence time in near-roadway setting, differences in diesel truck fractions (diesel has a higher NO_2/NO_x ratio in primary emissions). Also it appears the calibration of the chemiluminescent NO_x analyzers was only checked regularly for NO . Was there any checking of NO_2 converter efficiencies?

Minor Comments and Technical Corrections

Line 158, 193: minutely should be rewritten as one-minute

Line 242: many such algorithms (omit “of”)

Line 302: non-tailpipe PM emissions such as brake and tire wear and road dust are expected to be predominantly in the coarse mode and should not contribute much to fine particle mass ($PM_{2.5}$).

Lines 319-320: fix wording: the reason these values. . . is believed to be due the following reason

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