

Interactive comment on “Effectiveness of replacing catalytic converters in LPG-fueled vehicles in Hong Kong” by X. P. Lyu et al.

Anonymous Referee #3

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This study examines the effectiveness of replacing catalytic converters in LPG fueled vehicles in Hong Kong. Observed changes in trace gas concentrations are reported and several models are used to interpret the results. This is a worthwhile contribution to the scientific literature on urban atmospheric composition and air quality control and should be published after the authors address the following comments.

General:

The authors currently consider only the importance of this action (replacing catalytic converters) for air quality in Hong Kong. It would be valuable, and of wider interest, to include some discussion on the implications of these results for other regions.

Past studies have shown that a small number of cars are responsible for a large part of

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total mobile emissions. Is there any evidence that the cars in Hong Kong with replaced catalytic converters are typical (or not) of the entire fleet?

Is it possible to estimate the expected reduction from a “bottom-up” approach based on the known number of cars with new catalytic converters and then compare this with what was observed in atmospheric concentrations for this study?

Specific:

Page 35940, line 24: replace “matters” with “matter”

Page 35942, line 21: replace “initialized” with “initiated”

Page 35943, line 24: what is meant by “great”? Do you mean “entire”?

Page 35943, line 24: Is HT representative of marine background or continental background? i.e., does the air tend to come from the ocean or from land?

Section 2.2.2: Given the known challenges in making VOC measurements, the stated accuracies seem very high. The approach used to determine the accuracy of these measurements should be described in more detail and include in the assessment not just of the stated accuracy of the calibration standard. Much of the actual uncertainty is due to interferences, peak integrations, etc. VOC intercomparisons published in the scientific literature typically indicate large differences (>30%) in the values of VOC reported by different laboratories. The comparison between the propane data and those from UCI reported here are quite good but are still beyond the stated accuracy (i.e. they differ by 14% but the accuracy is 10%). What about more reactive VOC?

page 35947, statements about fresh emissions in line 5 and 8 are repetitive

page 35947, line 19: reword to “wind speeds were lower than 2.0 m s⁻¹ more than 95% of the time”

page 35949, line 4: replace “physical” with “transport”

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section 3.1.1: Some indication of the synoptic scale meteorology in 2013 and 2014 should be given to demonstrate whether any differences in meteorology might explain any of the observed change in VOC concentrations.

Page 35955, lines 1-4: The first two sentences indicate that CO should be low for diesel vehicles. This contrasts with the following sentence which suggests that CO should be high for diesel vehicles. I realize that this is discussed in the rest of the paragraph but still the expectation (did you expect CO to be low or high) is unclear here and should be clarified

Page 35955, line 14: what is a "goods" vehicle?

Page 35956, line 25: was the difference between predicted and observed similar to what the background values are? This information should be provided here.

Page 35958, line 25: How can OH be higher than HO₂? This is not realistic and indicates a problem in the model simulation.

Page 35962: How does this compare/contrast with similar studies at roadsides in other cities?

Page 35963, line 5: replace "that" with "the"

Figures 3 through 12: Increase the size of the font- it is too small to read

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 35939, 2015.