

Interactive comment on “The use of tunnel concentration profile data to determine the ratio of NO₂/NO_x directly emitted from vehicles” by X. Yao et al.

Anonymous Referee #3

Received and published: 6 January 2006

This paper reports measurements on NO and NO₂ concentrations from two different tunnels in Hong Kong. The potential of the work is excellent. Very little data exists in the open literature on NO:NO₂ vehicular emissions, but the subject is of immense importance in understanding ambient NO₂ concentrations. Even slight changes in primary NO₂ emissions would have the potential to jeopardise air quality compliance in many cities.

As the authors mention, tunnel measurements can provide complimentary information to rolling road or instrumented vehicle measurements. The later focus on a limited sub-

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper

set of the fleet, whereas tunnel measurements are generally more representative of the whole vehicular fleet in one area. The differing results from the north and south tunnels emphasise that emissions can be fuel and fleet dependent and therefore that tunnel measurements are required in many different locations. Conversely, it also means that the reader requires detailed information on the fleet and fuel characteristics to compare the data from this study with other work.

Despite the excellent potential of the work, I have serious concerns about the paper in its current state. Many of these may be straight forwardly addressed by the authors, but other issues may require further consideration.

1. More experimental detail is required. Methodology (presumably standard NO_x and O₃ boxes), position of sampling inlet. Response times of the instruments and calibration methods should be given. How many measurements were taken in the tunnels. The text mentions an average of 5 runs; 5 runs on the same day or different days? How reproducible are the profiles and concentrations from day to day?
2. The effects of the tunnel ventilation should be described in much greater detail and incorporated into the analysis. It surprises me to see that the authors were able to observe significant O₃ concentrations in the tunnel, when it's lifetime in the presence of even 1 ppm of NO is only 2 seconds. Would it be possible to measure the ambient NO, NO₂ and O₃ concentrations at some of the ventilation inlets?
3. The potential for the generation of NO₂ from the 3rd order 2NO + O₂ reaction should be considered more quantitatively.
4. More details should be given regarding the fleet using the tunnels (e.g. distribution of ages, % with catalysts, fuel types, speeds, fuel composition etc).
5. It would seem sensible to present the CO and SO₂ data mentioned briefly in the same paper.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 12723, 2005.

[Full Screen / Esc](#)[Print Version](#)[Interactive Discussion](#)[Discussion Paper](#)