Atmospheric
Chemistry
and Physics
Discussions

Open Access

Interactive comment on "Aerosol-CFD modelling of ultrafine and black carbon particle emission, dilution, and growth near roadways" *by* L. Huang et al.

L. Huang et al.

li.huang@utoronto.ca

Received and published: 10 September 2014

We thank referee for their comments, and address specific issues that they raised below.

1) Recent studies (DOI: 10.1016/j.buildenv.2014.04.013) have shown that inflow and modelling parameters (e.g. aerodynamic roughness) can have a large impact on the prediction of ABL flows. You might consider investigating the sensitivity of your results to a few (key) uncertain parameters in BCs or physical models.

As our first effort to develop a CFD-based aerosol model for the near road environ-

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

ment, this manuscript focuses mainly on establishing a methodology, which properly includes the key factors governing the dispersion and dynamics of UFP. We have assumed neutral stability conditions for our base case and conducted sensitivity test on such parameters as meteorology, traffic volume and exclusion of individual aerosol dynamical processes. This initialization would set the stage for further discussion and more sensitivity study (e.g. atmospheric stability conditions, tailpipe emission strength, and so on) to be further discussed in a subsequent paper.

2) The ABL model is used everywhere in the domain without taking into account the possibility of employing a different approach for the wake regions, as it was done in 10.1007/s10546-011-9621-5. This could be fine depending on the zone of interest for pollutant analysis. However, I think it would be interesting to discuss/investigate the influence to that.

In this work, we did employ a different approach for the vehicle wake regions, as described in 10.1007/s10546-011-9621-5 (Parente et al., 2011). This approach allows a gradual transition in SÉŻ and C_μ from the fully developed ABL (dominated by ABLT) to the wake region (dominated by VIT). Following the above-mentioned article, a co-efficient was defined as the deviation of the actual local velocity profile with respect to the inlet logarithmic profile, which was used in a quadratic transition function to blend SÉŻ and C_μ to account for the transition from fully developed ABL to the wake region. A brief description of the procedure has been added to the Supplement, along with the above references being cited.

Finally, we thank the reviewer for the compliments and feedback. This is very much appreciated.

Reference:

Parente, A., Gorle, C., van Beeck, J., and Benocci, C.: A Comprehensive Modelling Approach for the Neutral Atmospheric Boundary Layer: Consistent Inflow Conditions, Wall Function and Turbulence Model, Bound.-Layer Meteor., 140, 411-428,

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

10.1007/s10546-011-9621-5, 2011.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 12235, 2014.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper