

Interactive comment on “Winter and summer time size distributions and densities of traffic-related aerosol particles at a busy highway in Helsinki” by A. Virtanen et al.

A. Virtanen et al.

Received and published: 6 April 2006

We would like to thank the referee for his/her constructive comments and several helpful remarks. Here we refer to them point by point.

Referee #5: Specific comments 1) “The abstract is now almost identical to the conclusions. A short description of the methods (especially the density calculation method) could be inserted in the abstract. The conclusions could contain only actual conclusion.” We have changed both.

2) Long reference list in the introduction.

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper

Now we refer only to the most relevant works.

3) Title to the section 2.

We have added a title “Measurement site description” to the section 2.

4) The density evaluation method. “ the multi-modal density calculation method could be described in more detailed. The multi-modal density calculation method should also be commented for its applicability at hand. Also an explanation to omitting the third mode mentioned into the SMPS data fitting procedure should be given. More confusion is caused by the fact that earlier work by Virtanen et al. includes two references in the year 2004, but they are not separated from each other (with letters a and b).”

The method is now described in chapter “3. Method to estimate particle density”. The method can be used to data at hand, if the impactor kernel functions and charger efficiency curve is known. Thus the impactor individual and the charger should be carefully calibrated. This is now mentioned in the text. The third mode in data fitting procedure is omitted in the case of laboratory measurements, where only two modes existed. In the case of road side data, the mode fitting was always related to the density search method. The third mode was found only a few times. It should be noted here, that only the modes for which the density values are found are accepted as results. If the concentration of certain mode is low compared to other found modes, the simulated current caused by that mode is negligible compared to total current. In this case, the density value can not be found at all or its value can be unreasonable. This is now explained in the text (in chapter 4.2). References concerning earlier work by Virtanen et al. are separated by letters a and b.

5) Experimental setup could be described in more detail

The description of pre-cutting separators and sampling lines and estimation of particle losses in sampling lines has been added to the text (in capter “2.1 Measurement site description”).

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

6) Are the measurement periods long enough to recognize typical diurnal patterns?

Although both winter and summer measurement periods were relatively short, the meteorological conditions and traffic rates were typical for the season. Therefore the results are believed to represent typical particle population at road side of Itäväylä. Thus we believe that the diurnal concentration patterns presented in figure 2 represent well the typical diurnal behavior. This has been added to the text (chapter 4.1).

7) “The authors should comment whether there are major crossroads between the measurement point and traffic census point and whether these affect the traffic density at the measurement point”.

We made occasional short term (three-minute) vehicle counts to check the correlation to the continuous measurements. The agreement was excellent, indicating that the continuous measurement is representative also to the traffic at the measurement location (Pirjola et al., 2006). This text has been added to chapter 2.2.

8) Authors are encouraged to check the English.

The English has been checked and special attention has been paid to the problems which the referee pointed out.

Comment / answer to “Minor specific comments”

550/12: The sentence has been clarified.

551/2-551/15-20: Introduction has been rewritten. These comments have been taken into account.

552/18: The distances of 9m and 65m are related to the nearest edge of the highway. This has been added into the text.

553/18: The nano-SMPS is now defined in the same way as “long-SMPS”.

555/19-20: The difference between measured density values and material bulk densi-

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

ties is less than 15 %. This has been added into the text.

556/4: The traffic is fluent during the rush hours. This is now mentioned in the text.

556/29: The time for maximum concentration was 7:00. This is now inserted to the text.

557/18: We believe that the non-linear dependence of the concentration on traffic rate can be explained by a combination of linear source term and a (time dependent) urban background. This text is inserted to chapter 4.1 (3rd paragraph).

558/13-15: The original sentence was confusing. We really meant that the fraction of accumulation mode particles is higher. This in now corrected.

560/4: The “calculated maximum concentration” is now clarified. The original sentence was replaced by the sentence “The concentration relative to the maximum measured concentration is plotted in Figure 5.”

561-562: The GSD values are now discussed in the text and compared with literature values.

562/6-7: The sentence is corrected. The new sentence says: “They also found out that the soot particles make up 50-60 % of the number of 80 nm particles at the roadside.”

Technical corrections: We have taken care of all these corrections.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 549, 2006.

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