

Interactive comment on “Long-term observations of tropospheric particle number size distributions and equivalent black carbon mass concentrations in the German Ultrafine Aerosol Network (GUAN)” by W. Birmili et al.

W. Birmili et al.

wolfram.birmili@uba.de

Received and published: 23 June 2016

Referee: Section 3.6 Hohenpeissenberg: This description does not include the starting dates of the key instruments, or the start date of the observatory.

Reply: MAAP measurements started in December 2003 while SMPS measurements started in 2008. The observatory has delivered atmospheric data as part of GAW since 1994, starting with elemental carbon (EC), total suspended particulate matter (TSP), and total particle number. This will now be mentioned in the text.

C546

Referee: Section 3.11 Leipzig-West: The section mentions that the apartment blocks are heated by ‘district heating’. What exactly does ‘district heating’ mean? Is the heat generated centrally (perhaps external to the area)? Is the purpose of the statement to indicate that the heat source is away from the measurement area, so not a contributor to this background measurement? If not, it may be of interest to know the fuel source for the heat.

Reply: We used ‘district heating’ in the meaning of heat being generated centrally, and away from the area. In the specific case of Leipzig-West, hot water is generated in a power plant 20 km south of the measurement site, outside the city. The hot water is conducted through pipelines and being used for central heating systems in the buildings surrounding the Leipzig-West site. It is not expected that the emissions generated at the power plant site have any significant influence on the measurement at Leipzig-West. This is now clarified in the text.

Referee: Section 3.13 Mülheim-Styrum: The section states that this station is a “regular” observation site in the LUQS network. What does that mean? Are there regular and irregular observation sites? Or is this simply a statement of membership in LUQS? Sections 3.14 Neuglobsow and 3.16 Waldhof: Also use the phrase regular observation network. Same questions as above.

Reply: The phrasing “regular” indeed just refers to the stations’ membership in their corresponding measurement networks. We therefore changed the phrasing in all three cases, e.g., “Mülheim-Styrum belongs to the air quality monitoring network of North Rhine-Westphalia (LUQS).”

Referee: Section 4.1.2 SMPS (other designs): Two changes are discussed in this paragraph. Did these occur during the measurement period or in the design stage? If the instruments were changed mid-time series, was there an observable change in the measurements corresponding to the change, and how is this handled?

Reply: The upgrade mentioned as “aerosol dryer for the aerosol sample flow” has been

C547

considered in the data processing by assuming particle losses across an extra piece of equivalent pipe length. The second upgrade (change to positive polarity at site 17) has been considered as well, by assuming a different bipolar charging probability during the inversion. All those technical changes have therefore been reflected during the data processing. This is now clarified in the text.

Referee: Page 953, line 13: Is there a need to name the internal format “scientific data format” if there is no description as to what that means? It is probably sufficient to say that it is stored internally. If this is important information, is it archived somewhere and therefore retrievable if necessary?

Reply: We will change the name “scientific data format” to “extended raw data format”, and explain this in the text. So far, this data has been stored internally only. The extended data could come to use if at some point in the future, the radiative transfer algorithm to retrieve eBC from the MAAP measurement might be improved or changed for some reason. This is now clarified in the text.

Referee: Section 5 Quality assurance: The statement is made that sometimes not all QA measures are possible because of funding and man-power issues. Are these periods noted in the data record?

Reply: These periods are, at present, not mentioned in the data record. We plan to include the actually performed Q/A assurance experiments in the online description of the data.

Referee: Section 5: Quality assurance: This is a nice discussion of the procedures to ensure the measurement and maintenance of data quality standards. It might be nice to lead this with a note on what the tolerances are on the data quality in order for the results to have scientific merit.

Reply: Thank you for your suggestion. We consequently reformulated the text in Section 5 as follows: “Quality assurance (Q/A) in GUAN includes a number of measures

C548

that ensure measurement data to stay comparable to each other and, beyond this issue, comparable to a defined standard. Temporal or spatial trends in atmospheric pollutants often occur in the range of a few per cent of the absolute value of a specific parameter. The issue of Q/A is therefore vital in order to successfully address scientific questions on the basis of these data. It has been a target in GUAN to ensure an accuracy of the eBC mass concentration measurement within a few per cent, of the particle sizing measurement in number size distributions in the range of a few per cent, and particle number concentrations in number size distributions the range of $\pm 10\%$ over the entire measurement period.”

Referee: Grammatical / word choice comments

Reply: Thank you very much for your rigorous proofreading. We will correct all these findings in the revised version of the manuscript.

Interactive comment on Earth Syst. Sci. Data Discuss., 8, 935, 2015.

C549