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Comment

## ***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.***

### **Anonymous Referee #1**

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The manuscript presents a long-term dataset of sub- $\mu\text{m}$  Particle Number Size Distributions (PNSD), sub- $\mu\text{m}$  non volatile PNSDs (300°C), and aerosol absorption coefficient (and equivalent Black Carbon mass concentration, eBC). The great importance of these variables, and of their long-term concurrent observations, has emerged in the last years, as regards both climate change and health effects studies. The authors introduce and discuss these aspects in the paper. The dataset includes observations taken by state-of-the-art equipment, at 17 sites, in Germany, representative of pollution conditions ranging from rural mountain to roadside. Observations were taken for

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several years: (i) from 2012 to 2015 (all the stations), (ii) from 2009 to 2015 (most of the stations), (iii) from before 2000 to 2015 (a couple of stations). Data, stored at the World Data Center for Aerosols EBAS data base, are freely available, and can be accessed by a given persistent identifier. Data online are Quality Assured and controlled (QA/QC), processed and validated. Relevant methods, QA/QC procedures, validation criteria and processing, and references, all are clearly described in the paper. The whole dataset is separated into sub-datasets by year, station, and observed variable. Protocols, metadata, and data formats are the long result of previous top research projects, as presented in the paper.

The end result is a high quality, unique, and easily accessible dataset that will undoubtedly be useful in the future.

Overall, I believe the paper is well written, and therefore should be published after incorporating the following minor comments:

1. There has been an enormous effort to produce this dataset, as regards manpower and labor costs, planning and maintenance, scientific and technical work. The authors introduce previous papers that have already used this data set, and give a clear idea of the future potential use of the dataset. It would be an added value to conclude the work here (or to start) by a very preliminary outlook of what the dataset shows (e.g., by adding some relevant figure) . This is only mentioned (for different purposes) at the very end of the paper (Fig.3, and references to previous papers).

2. To date, the data submission is not complete. This is discussed in the paper. Data are presented as either online/complete, or online/not yet complete, or under verification at EBAS, or under processing at TROPOS. This might cause some confusion, but will be improved in the future. Actually, to help users navigate online data (even when data-set will be complete), and understand what these data can be useful for, I recommend adding to the online dataset the following information (or making them clearer): (a) data coverage by year (number of data available against maximum num-

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ber of data ); (b) site representativeness ; (c) ancillary measurements available (gas concentrations, meteo), both by site, and by year.

3. The authors clearly indicate that eBC observations suffer from different sampling heads used ( $PM_{10}$ ,  $PM_{2.5}$ ,  $PM_1$ ), and give indication on how to harmonize BC data to  $PM_{10}$ . This is a very important issue that should be clearly mentioned online, as well.

4. Measurements were taken at dry conditions. There is a number of ambient measurements of PNSD and eBC this dataset might be compared to in future studies. As differences can be important, this point should be mentioned in the online data version, together with some suggestions on what this kind of comparison can generate.

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

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