



*Supplement of*

**Long-term observations of tropospheric particle number size distributions and equivalent black carbon mass concentrations in the German Ultrafine Aerosol Network (GUAN)**

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# Supplementary Material

S1: View of the landing platform for data access:

“Continuous data from the German Ultrafine Aerosol Network (GUAN)”,

available at <https://doi.org/10.5072/guan>

## Continuous data from the German Ultrafine Aerosol Network (GUAN)

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### Introduction

The German Ultrafine Aerosol Network (GUAN) is a cooperative atmospheric observation network that addresses climate-related effects, and human particle exposure.

GUAN data are stored at EBAS, a database hosted by the Global Atmosphere Watch World Data Centre of Aerosols. EBAS is operated by the Norwegian Institute for Air Research (NILU).

### Data format

The download links on this page refer to Level-2 data (quality controlled, hourly time resolution, normalised to  $0^\circ\text{C}$  and 1013 hPa). Level-0 data (instrumental raw data) and Level-1 data (processed data at original time resolution and operational conditions) can be obtained on request from EBAS. All data are stored in EBAS NASA-Ames format.

### Download instructions

We ask you to carefully read the text found in the data disclaimer data disclaimer and in EBAS' "info" pages associated to the filter criteria. Having agreed to the EBAS data sharing policy, you will be able to navigate directly to the data sets through clickable links in the Tables below.

[ONLINE - data set complete](#) [ONLINE - data set not yet complete](#) [Under verification at EBAS](#) [Under processing at TROPOS](#)

### Particle number size distributions

No.	Site name	EBAS code	All	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	...	former data
1	Annaberg-Buchholz	DE0061B	All			2013	2012												
2	Augsburg	DE0062B	All																
3	Bösel (Süoldenburg)	DE0056R	All		2014	2013	2012	2011	2010										
4	Dresden-Nord	DE0063K	All			2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002		
5	Dresden-Winkelmannstrasse	DE0064B	All				2012	2011	2010										
6	Hohenpeissenberg	DE0043G	All		2014	2013	2012	2011	2010	2009									1998-2000 <sup>1</sup>
7	Langen	DE0065B	All																
8	Leipzig-Eisenbahnstrasse	DE0066K	All		2014	2013	2012	2011											
9	Leipzig-Mitte	DE0067K	All		2014	2013	2012	2011	2010										
10	Leipzig-Tropos ("Leipzig")	DE0055B	All		2014	2013	2012	2011	2010	2009									
11	Leipzig-West	DE0068B	All		2014	2013	2012	2011	2010										
12	Melpitz	DE0044R	All			2013	2012	2011	2010	2009	2008 <sup>1</sup>	2007 <sup>1</sup>	2006 <sup>1</sup>	2005 <sup>1</sup>	2004 <sup>1</sup>	2003 <sup>1</sup>			1996-1997 <sup>1</sup>
13	Mülheim-Styrum	DE0069B	All																
14	Neuglobsow	DE0007R	All		2014	2013	2012	2011											
15	Schauinsland	DE0003R	All		2014	2013	2012	2011	2010	2009	2008 <sup>1</sup>	2007 <sup>1</sup>	2006 <sup>1</sup>	2005 <sup>1</sup>					
16	Waldhof	DE0002R	All		2014	2013	2012	2011	2010	2009									
17	Zugspitze (Schneefernerhaus)	DE0054R	All		2014	2013	2012	2011	2010	2009	2008 <sup>1</sup>	2007 <sup>1</sup>	2006 <sup>1</sup>	2005 <sup>1</sup>	2004 <sup>1</sup>				

<sup>1</sup>These data sets were processed under former data processing standards. These data lack, particularly, the corrections for the losses in the internal tubing of the mobility particle size spectrometers, which mostly relevant for particle diameters below 30 nm. With time, these data sets will be updated.

### Non-volatile particle number size distributions ( $T = 300^\circ\text{C}$ )

No.	Site name	EBAS code	All	2015	2014	2013	2012	2011	2010	2009
2	Augsburg	DE0062B	All							
3	Bösel (Süoldenburg)	DE0056R	All			2013	2012	2011	2010	
6	Hohenpeissenberg	DE0043G	All		2014	2013	2012	2011	2010	
8	Leipzig-Eisenbahnstrasse	DE0066K	All							
10	Leipzig-Tropos ("Leipzig")	DE0055B	All		2014	2013	2012	2011	2010	
12	Melpitz	DE0044R	All					2011	2010	2009
15	Schauinsland	DE0003R	All		2014	2013	2012	2011	2010	
17	Zugspitze (Schneefernerhaus)	DE0054R	All		2014	2013	2012	2011	2010	

## S1: View of the landing platform for data access (continued)

### Aerosol absorption coefficient (Equivalent Black Carbon)

The aerosol absorption coefficient is usually indicated in  $\text{Mm}^{-1}$ . To obtain equivalent black carbon (eBC) mass concentrations in  $\mu\text{g}/\text{m}^3$ , these numbers are divided by a mass absorption cross section of 6.6  $\text{m}^2/\text{g}$ .

No.	Site name	EBAS code	Matrix <sup>1</sup>	All	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004
1	Annaberg-Buchholz	DE0061B	PM <sub>1</sub>	All			2013	2012								
2	Augsburg	DE0062B	PM <sub>2.5</sub>													
3	Bösel (Südoldenburg)	DE0056R	PM <sub>10</sub>	All		2014	2013	2012	2011	2010	2009					
4	Dresden-Nord	DE0063K	PM <sub>1</sub>	All												
5	Dresden-Winckelmannstrasse	DE0064B	PM <sub>1</sub>	All												
6	Hohenpeissenberg	DE0043G	PM <sub>10</sub>	All					2011	2010	2009	2008				
8	Leipzig-Eisenbahnstrasse	DE0066K	PM <sub>1</sub>	All		2014	2013	2012	2011	2010	2009					
9	Leipzig-Mitte	DE0067K	PM <sub>10</sub>	All		2014										
10	Leipzig-Tropos ("Leipzig")	DE0055B	PM <sub>10</sub>	All		2014	2013	2012	2011	2010	2009					
11	Leipzig-West	DE0068B	PM <sub>10</sub>	All		2014	2013	2012	2011	2010						
12	Melpitz	DE0044R	PM <sub>10</sub>	All		2014	2013	2012	2011	2010	2009	2008	2007			
14	Neuglobsow	DE0007R	PM <sub>10</sub>	All												
15	Schaunsland	DE0003R	PM <sub>10</sub>	All		2014	2013		2011	2010	2009					
16	Waldfhof	DE0002R	PM <sub>10</sub>	All		2014			2011							
17	Zugspitze (Schneefernerhaus)	DE0054R	TSP	All			2013	2012	2011	2010	2009					

<sup>1</sup>Matrix indicates the regime (cut-off diameter) of the inlet used for the eBC measurement at a particular site.

### Reference for these data sets

Birmili, W., Weinhold, K., Merkel, M., Rasch, F., Sonntag, A., Wiedensohler, A., Bastian, S., Schladitz, A., Löschnau, G., Cyrys, J., Pitz, M., Gu, J., Kusch, T., Flentje, H., Quass, U., Kaminski, H., Kuhlbousch, T.A.J., Meinhardt, F., Schwerin, A., Bath, O., Ries, L., Gerwig, H., Wirtz, K., Fiebig, M.: Long-term observations of tropospheric particle number size distributions and equivalent black carbon mass concentrations in the German Ultrafine Aerosol Network (GUAN). Earth System Science Data (ESSD), submitted 2015/10/23.

### Technical references

Parameter	Instrument	Main technical references
Particle number size distribution	Mobility particle size spectrometer	Wiedensohler et al. (2012) <sup>2</sup> ; Pfeifer et al. (2014) <sup>3</sup>
Non-volatile particle number size distribution	Mobility particle size spectrometer-Thermodenuder	Wehner et al. (2002); Birmili et al. (2010) <sup>4</sup> ; Poulain et al. (2014) <sup>5</sup>
Aerosol absorption coefficient	MAAP	Petzold and Schönlinner (2004)

- Petzold, A. and Schönlinner, M.: Multi-Angle Absorption Photometry - a new method for the measurement of aerosol light absorption and atmospheric black carbon. *J. Aerosol Sci.*, 35, 421-441, 2002.
- Wehner, B., S. Philippin, and A. Wiedensohler, Design and calibration of an improved thermodenuder to study the volatility fraction of aerosol particles. *J. Aerosol Sci.*, 33, 1087-1093, 2002.

### Digital Object Identifier (DOI)

This landing page can be accessed by the digital object identifier <https://doi.org/10.5072/guan>.

### Revision date

Last update: 2015-10-22. © 2015 TROPOS<sup>6</sup>. All rights reserved.

### Contact

Wolfram Birmili (TROPOS)<sup>6</sup>, on behalf of the GUAN consortium.

### Navigation

[Click here to return to the German Ultrafine Aerosol Network Main Page.](#)

S2: View of the user interface at EBAS (World Data Center for Aerosols), <http://ebas.nilu.no>. Note that the German Ultrafine Aerosol Network (GUAN) appears in the upper left selection box as one of the 44 “framework” projects associated with EBAS.

**emeep** Hosting the Global Atmosphere Watch World Data Centre for Aerosol

**ACTRIS**

**inGOS GUAN**

**CREATE EUAARU**  
GEOMON - Global Earth Observation Monitoring  
IMPACTS - Impacts over Europe  
IMPACTS - Integrated Monitoring Programme on Acidification of Chinese Terrestrial Systems  
SOGE - System for Observing Halogenated Greenhouse Gases in Europe

**NILU**

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**Framework [44]** [GAW-WDCGG-node](#)  
[GEOMON](#)  
**GUAN**  
[HELCOM](#)  
[HELCOM\\_preliminary](#)  
[IMPACTS](#)  
[IMPROVE](#)  
[InGOS](#)

**Country [1]** [>>All](#) [Germany](#)

**Station [14]** [>>All](#)  
[Annaberg-Buchholz](#)  
[Bösel](#)  
[Dresden-Nord](#)  
[Dresden-Winkelmannstrasse](#)  
[Hohenpeissenberg](#)  
[Leipzig](#)  
[Loizius-Friedrichsstrasse](#)

**Matrix [5]** [>>All](#)  
[aerosol](#)  
[instrument](#)  
[pm1](#)  
[pm10](#)  
[pm10\\_non\\_volatile](#)

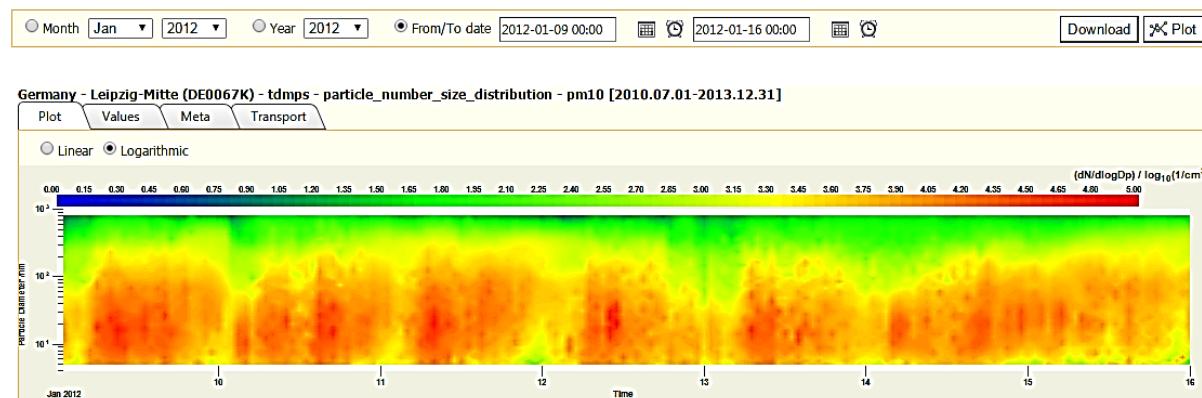
**Instrument type [7]** [>>All](#)  
[filter\\_absorption\\_photometer](#)  
[nephelometer](#)  
[smps](#)  
[tdmps](#)  
[tsmps](#)  
[v-smzs](#)  
[u-tdmps](#)

**Component [7]** [>>All](#)  
[aerosol\\_absorption\\_coefficient](#)  
[aerosol\\_light\\_backscattering\\_coefficient](#)  
[aerosol\\_light\\_scattering\\_coefficient](#)  
[particle\\_number\\_size\\_distribution](#)  
[pressure](#)  
[relative\\_humidity](#)

From [>>All](#) To [>>All](#)

Available datasets: 6230

S3: Data preview tools supplied in EBAS include this viewer of particle number size distributions.



S4: Sample extract of NASA-Ames 1001 format (ASCII text with blanks as a separator)

```
207 1001
Birmili, Wolfram; Wiedensohler, Alfred
DE08L, Leibniz Institute for Tropospheric Research, , , "Permoserstrasse
15, 04318 Leipzig, Germany", , ,
Sonntag, Andre
GUAN
1 1
2012 01 01 2014 08 22
0.041667
days from file reference point
140
1 1 1 [...]
99.999999 999999.999 999999.999 999999.999 999999.999 [...]
end_time of measurement, days from the file reference point
particle_number_size_distribution, 1/cm3, D=5.1 nm, Statistics=arithmetic
mean
particle_number_size_distribution, 1/cm3, D=5.7 nm, Statistics=arithmetic
mean
particle_number_size_distribution, 1/cm3, D=6.4 nm, Statistics=arithmetic
mean
[...]
numflag, no unit
0
53
Data definition: EBAS_1.1
Set type code: TU
Timezone: UTC
Timeref: 00_00
File name:
DE0067K.20120109000000.20140822082535.tdmpls.particle_number_size_distributi
on.pm10.1w.1h.DE08L_TDMPS_TROPOS_LE-Mitte.DE08L_TROPOS_CL_TDMPS.lev2.nas
File creation: 20151023103922
Startdate: 20120109000000
Revision date: 20140822082535
Version: 1
Version description: initial revision, TDMPS_control_lev2 v.0.0.1
Data level: 2
Period code: 1w
Resolution code: 1h
Sample duration: 1h
Orig. time res.: 10mn
Station code: DE0067K
Platform code: DE0067S
Station name: Leipzig-Mitte
Station latitude: 51.344167
Station longitude: 12.377222
Station altitude: 111.0m
Measurement latitude: 51.34
Measurement longitude: 12.38
Measurement altitude: 111.0m
Measurement height: 4.0m
Regime: IMG
Component: particle_number_size_distribution
Unit: 1/cm3
Matrix: pm10
Instrument type: tdmpls
Laboratory code: DE08L
Instrument name: TDMPS_TROPOS_LE-Mitte
Method ref: DE08L_TROPOS_CL_TDMPS
```

This is the header of the file establishing the data originators, and basic information on the measurement site, and parameters reported.

This is the meta data section of the file, providing more detailed parameters on the geographic location of the site, and basic issues like time

Standard method: SOP=Wiedensohler2012  
 Calibration standard ID: (None,)  
 Inlet type: Impactor--direct  
 Inlet description: PM10 at ambient humidity inlet, flow 16.67  
 l/min  
 Humidity/temperature control: Diffusion dryer  
 Humidity/temperature control description: sample dried to below 40% RH with  
 regenerative dryer  
 Volume std. temperature: 273.15  
 Volume std. pressure: 1013.25  
 Detection limit: 0.0 1/cm<sup>3</sup>  
 Detection limit expl.: Determined only by instrument counting  
 statistics, no detection limit flag used  
 Measurement uncertainty: 10.0 %  
 Measurement uncertainty expl.: uncertainty range between instruments in  
 intercomparison by Wiedensohler et al. 2012. (AMT)  
 Zero/negative values code: Zero possible  
 Zero/negative values: Zero values may appear due to statistical  
 variations at very low concentrations  
 Originator: Birmili, Wolfram, , , , , , , ,  
 Originator: Wiedensohler, Alfred, , , , , , ,  
 Submitter: Sonntag, Andre, , , , , , ,  
 Acknowledgement: Request acknowledgement details from data  
 originator  
 Comment: None  
 starttime endtime particle\_number\_size\_distribution  
 particle\_number\_size\_distribution particle\_number\_size\_distribution [...]

8.000000	8.041667	1520.586	2739.482	4331.160	4505.355	4809.187
5635.917	7372.570	7589.336	7402.448	8008.578	7032.986	7109.883
7645.798	5492.820	4401.676	3952.917	3545.183	3119.898	2806.955
2718.868	2753.224	2416.867	1967.370	1427.387	997.781	953.522
956.441	805.032	674.680	593.465	559.216	554.684	526.762
477.470	405.239	293.466	197.536	119.218	67.009	45.413
34.374	27.781	18.656	13.023	10.117	8.931	494.200
						1616.024
[...]						

This is the data section, where numbers, in this case the  
 particle number size distribution, are organised in ASCII code  
 columns of equal width.