

ESMAPBD BDFE2
Data Report WINDCUBEv2 S/N WLS7-598
at the site Feni,
Chittagong District, Bangladesh
for the period from
2019-05-01 to 2019-05-31

2019-06-07


Summary report: SG17010KB28

ESMAPBD BDFE2

Data Report WINDCUBEv2 S/N WLS7-598

at the site Feni, Chittagong District, Bangladesh

Summary report: SG17010KB28

Location or measuring site:	E 91.358190, N 22.800290, Feni, Chittagong District / Bangladesh		
Client:	Suntrace GmbH	Große Elbstraße 145c D-22767 Hamburg	
	On behalf of Worldbank Group	1818 H Street, NW Washington, DC 20433	
Contractor:	windtest grevenbroich gmbh Frimmersdorfer Str. 73a D-41517 Grevenbroich		
Date of order:	2017-09-12	Contract number:	17 0091 09
Auditor:	Editor:		

Dipl.-Ing. Frank Albers
Division manager energy assessment

Dipl.-Ing. Florian Schmidt
Project manager site assessment

Grevenbroich, 2019-06-07

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It comprises 13 pages in total, incl. appendices.



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1 Introduction

windtest grevenbroich gmbh (wtg) was instructed by Suntrace GmbH to evaluate the data of the LiDAR wind measurement system at the location Feni. This report only contains the data measured by the LiDAR device ranging from 2019-05-01 until 2019-05-31 at the present site. In parallel an environmental measurement including a small meteorological mast (10 m) is being performed by the customer. The results of these measurements can be taken from a separate report provided by the customer.

2 Measurement statistics

Table 1: Mean measurement values during the evaluation period

Mean Values	Wind speed [m/s]	Wind speed max [m/s]	Wind speed min [m/s]	Wind direction [°]	Weibull A [m/s]	Weibull k []	Availability [%]
40 m	5.37	21.26	0.42	194.5	5.92	2.140	98.6
60 m	6.07	23.43	0.48	195.5	6.73	2.262	97.7
80 m	6.47	24.57	0.52	196.4	7.22	2.380	96.9
100 m	6.75	25.40	0.56	197.3	7.57	2.496	96.5
110 m	6.87	25.74	0.44	197.8	7.73	2.568	96.3
120 m	6.98	26.02	0.37	198.3	7.88	2.631	96.2
130 m	7.08	26.29	0.36	198.9	8.01	2.669	96.1
140 m	7.16	26.56	0.31	199.5	8.10	2.750	95.9
150 m	7.23	26.79	0.26	200.0	8.19	2.777	95.9
160 m	7.30	26.95	0.28	200.6	8.29	2.819	95.9
180 m	7.45	27.21	0.48	201.7	8.47	2.890	95.8
200 m	7.55	27.45	0.46	202.8	8.56	2.882	95.6

Table 2: Availability during the evaluation period

Availability per day [%]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
40 m	100	99	99	83	100	100	100	100	100	100	100	100	99	100	100	97	98	100	99	100	100	94	99	93	99	100	99	100	100	100	100
60 m	100	99	94	83	100	100	100	100	100	100	100	100	98	99	99	97	95	100	97	100	100	85	98	87	95	100	99	100	100	100	100
80 m	100	97	92	83	100	100	100	100	100	100	100	100	95	98	99	95	95	100	97	100	100	83	96	86	91	99	99	100	100	100	100
100 m	100	94	92	83	100	100	100	100	100	100	100	100	92	98	96	95	94	100	97	100	100	82	94	85	90	99	99	100	100	100	100
110 m	100	93	90	83	100	100	100	100	100	100	100	100	92	98	96	94	94	100	97	100	100	82	95	85	89	99	99	100	100	100	100
120 m	100	93	89	83	100	100	100	100	100	100	100	100	92	98	96	94	94	100	97	100	100	82	94	85	88	99	99	100	100	100	100
130 m	100	93	88	83	100	100	100	100	100	100	100	100	92	98	96	93	94	99	97	100	100	82	94	85	88	99	99	100	100	100	100
140 m	100	93	85	81	100	100	100	100	100	100	100	100	92	98	95	92	93	99	97	100	100	82	94	85	88	99	99	100	100	100	100
150 m	100	93	85	82	100	100	100	100	100	100	100	100	92	98	95	92	93	99	97	100	100	82	94	85	88	99	99	100	100	100	100
160 m	100	93	85	82	100	100	100	100	100	100	100	100	92	98	95	92	94	99	97	100	100	82	93	85	88	99	99	100	100	100	100
180 m	100	93	84	81	100	100	100	100	100	100	100	100	92	98	94	92	92	99	97	100	100	82	92	87	88	99	98	100	100	100	100
200 m	100	93	83	80	100	100	100	100	100	100	100	100	90	98	94	92	92	99	97	100	100	83	92	86	88	99	98	100	100	100	100



3 Time series

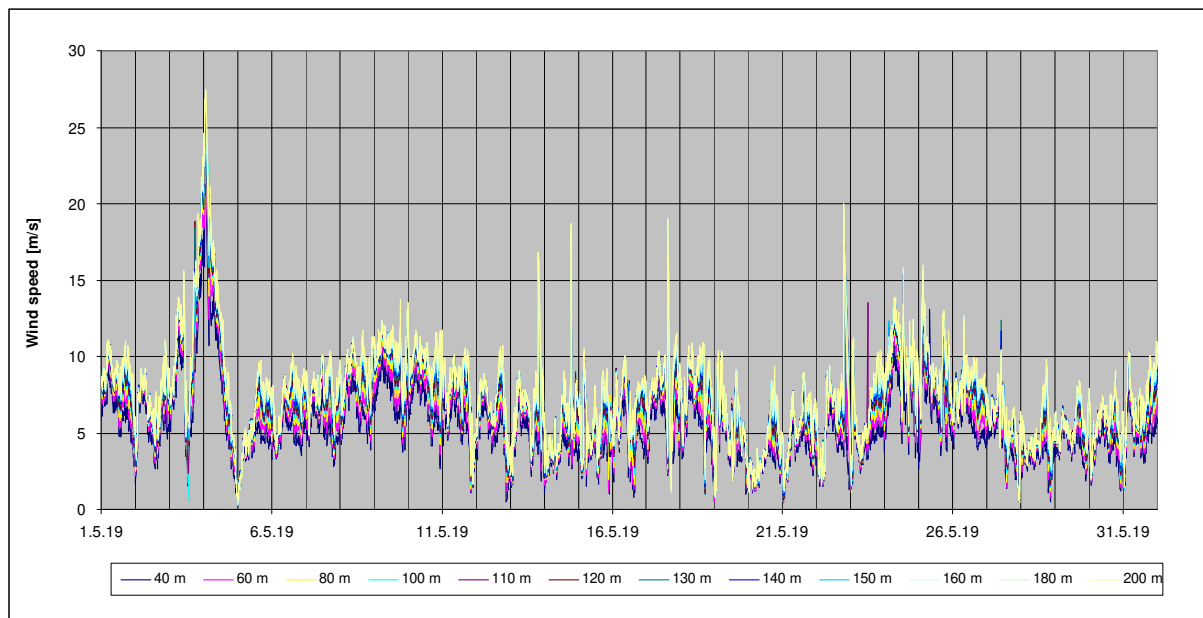


Figure 1: Time series of wind speed during the evaluation period

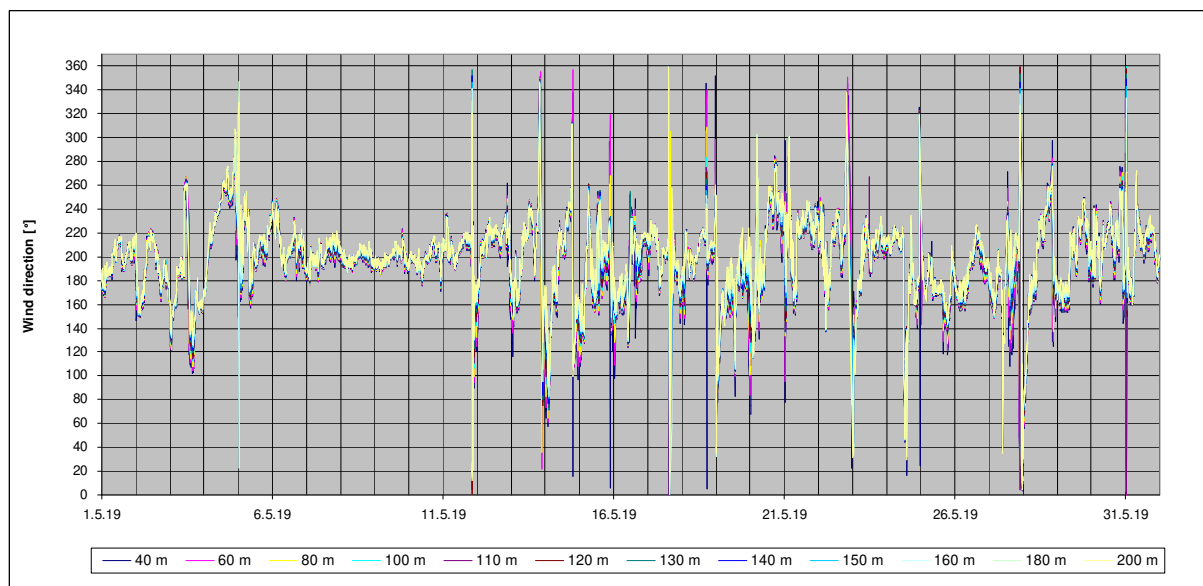


Figure 2: Time series of wind direction during the evaluation period



4 Daily profile

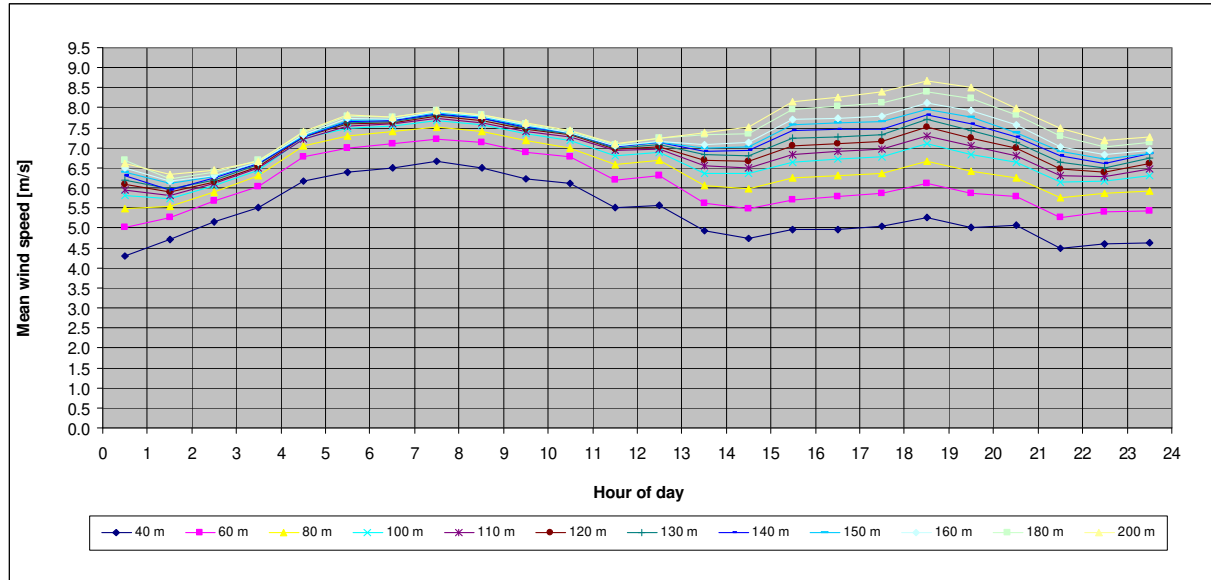


Figure 3: Daily profile of wind speed during the evaluation period

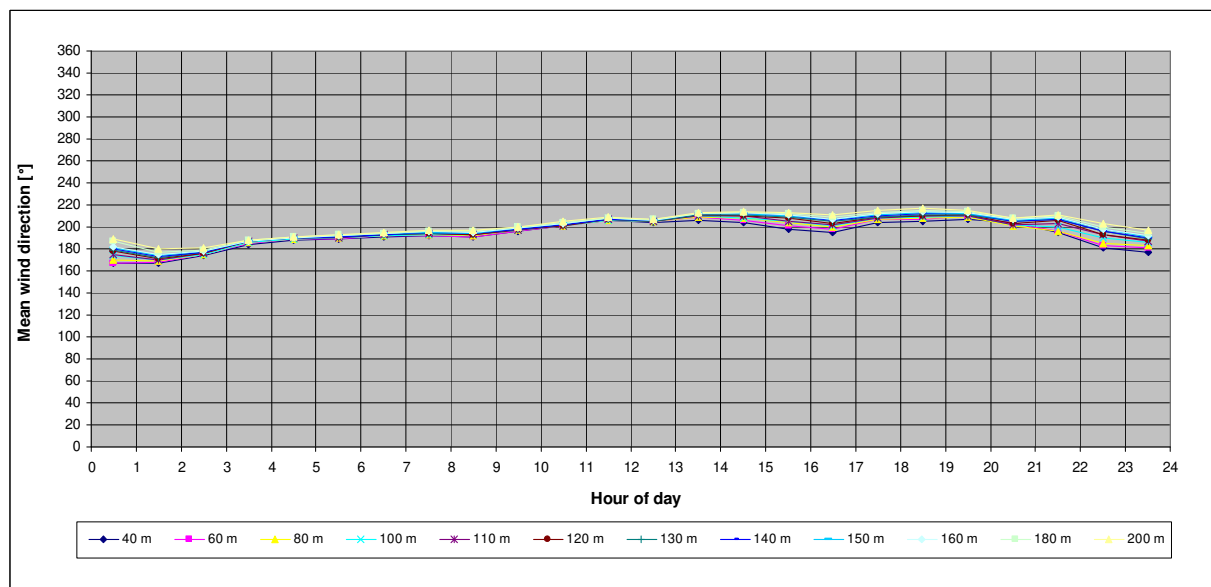


Figure 4: Daily profile of wind direction during the evaluation period



5 Wind direction distribution

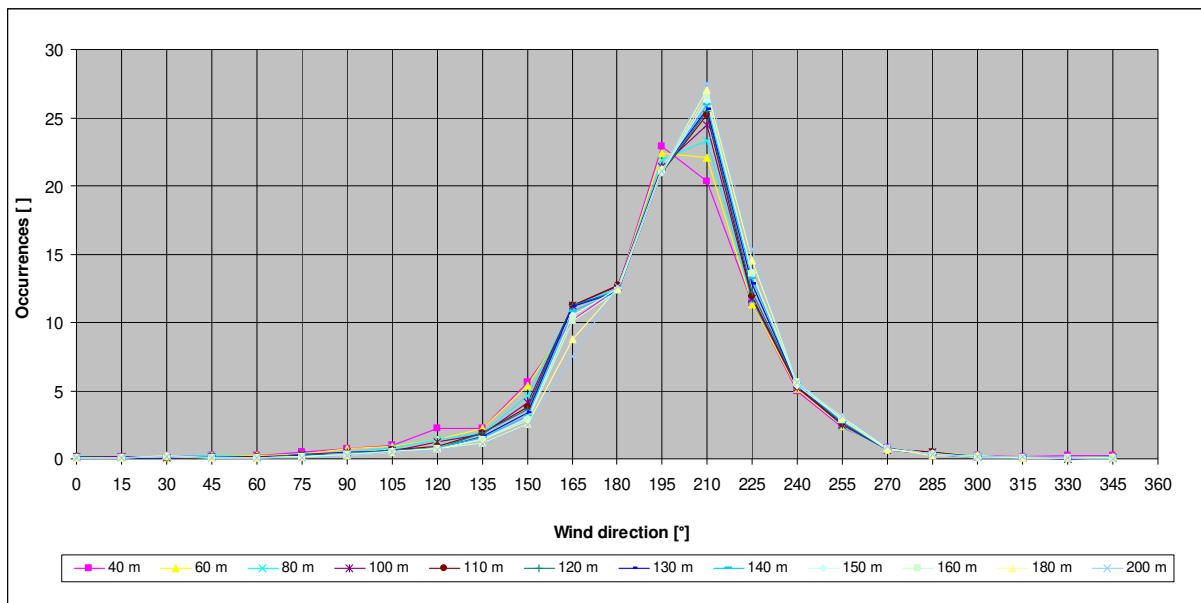


Figure 5: Frequency distribution of wind direction during the evaluation period

6 Natural turbulence

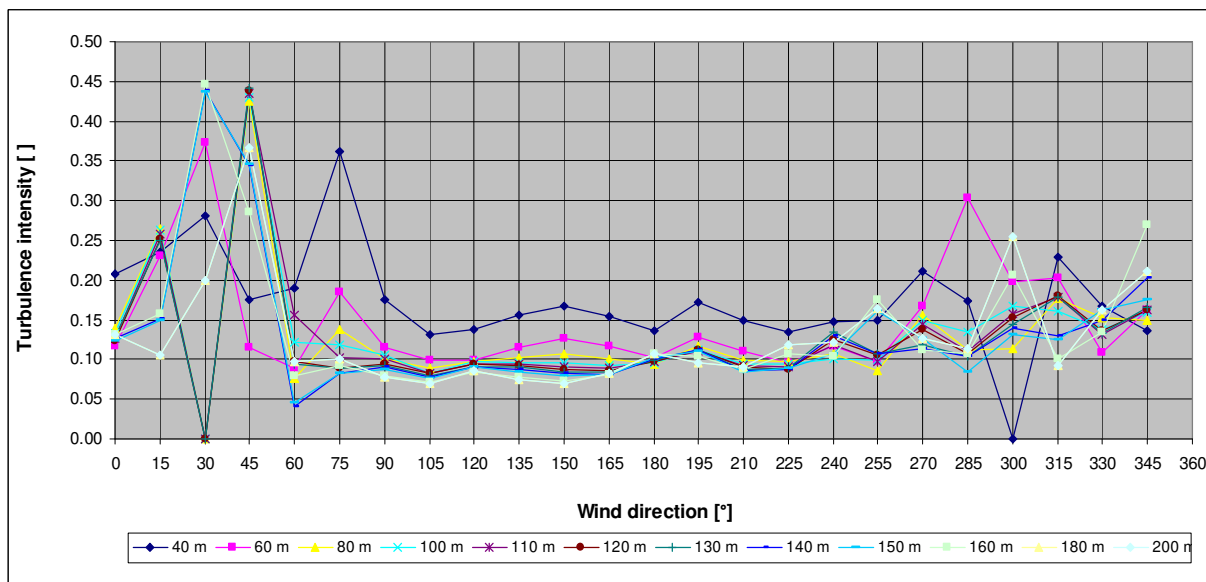


Figure 6: Directional mean turbulence during the evaluation period



7 Wind profile

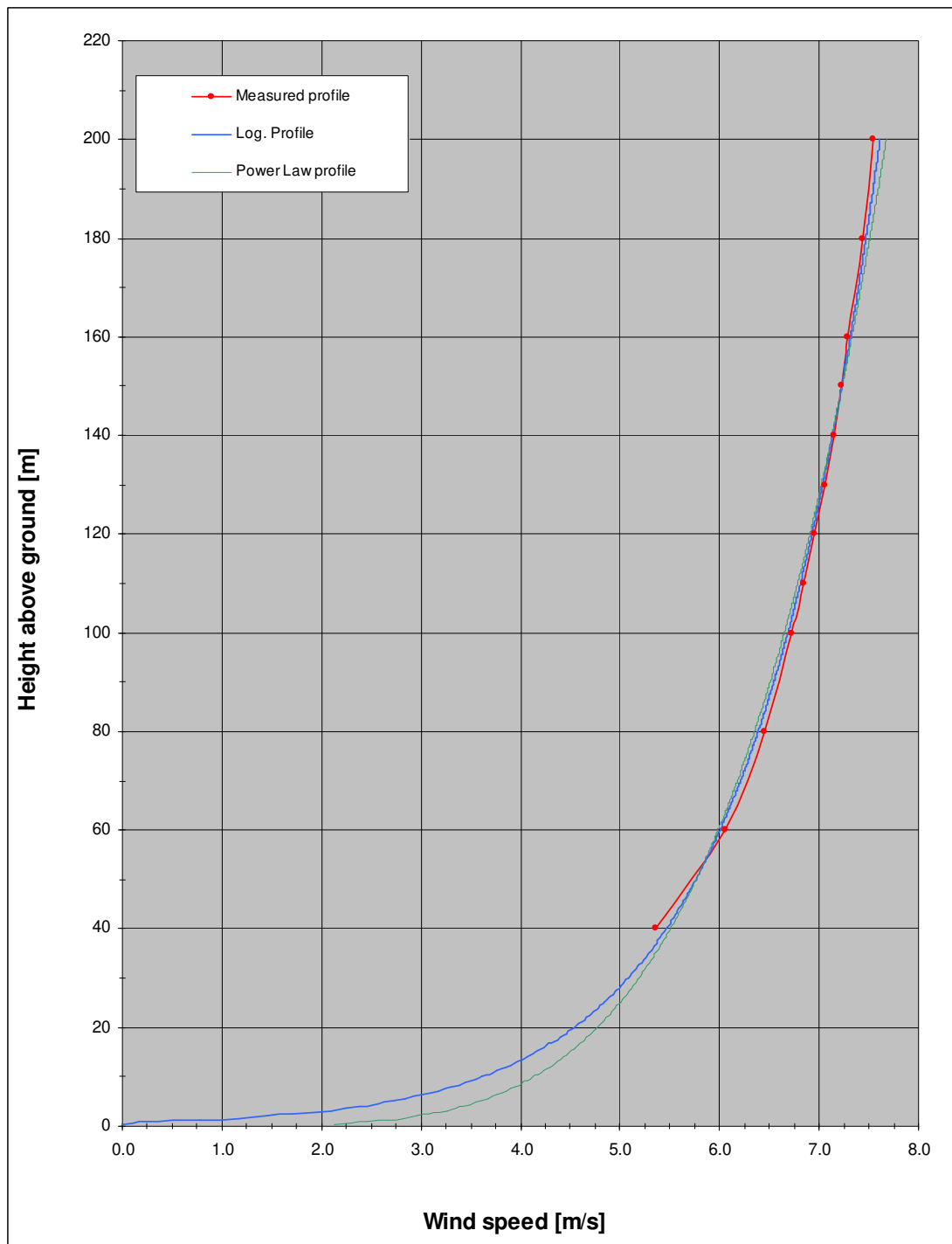


Figure 7: Wind profile during the evaluation period



8 Station Log

Date	Note	Issues
2017-06-04	Installation of LiDAR (Florian Schmidt, wtg) Connection to utility grid due to charger problems with 24 V	frequent restarts
2017-06-15	Manufacturer recommends to turn off LiDAR due to frequent restarts	frequent restarts
2017-06-16	LiDAR disconnected from Grid (Najmul Hossain, EQMS)	LiDAR disconnected
2017-07-27	Installation of DC-AC converter to supply LiDAR (Najmul Hossain, EQMS) LiDAR connected to power supply Performance check via remote connection (Florian Schmidt, wtg)	-
2017-07-28	Performance check via remote connection (Florian Schmidt, wtg)	-
2017-07-31	Data and performance check (Florian Schmidt, wtg) No connection to LiDAR	According to sent data, most likely no present LiDAR issues
2017-08-08	Data connection restored Data and performance check (Florian Schmidt, wtg)	-
2017-09-05	No connection to LiDAR	According to sent data, most likely no present LiDAR issues
2017-09-09	Data connection restored Data and performance check (Florian Schmidt, wtg)	-
2017-12-04	No connection to LiDAR	According to sent data, most likely no present LiDAR issues
2017-12-05	Data connection restored Data and performance check (Florian Schmidt, wtg)	-
2018-01-02	No connection to LiDAR	According to sent data, most likely no present LiDAR issues
2018-01-03	Data connection restored Data and performance check (Florian Schmidt, wtg)	-
2018-01-30	No connection to LiDAR	According to sent data, most likely no present LiDAR issues
2018-02-06	Data connection restored Data and performance check (Florian Schmidt, wtg)	-
2018-05-01	LiDAR shut down (02:20 - 02:30) LiDAR shut down (04:30 - 06:10)	No power supply / Low solar radiation due to heavy rain
2018-05-04	LiDAR shut down (10:50 - 12:10)	No power supply / Low solar radiation due to heavy rain
2018-05-07	LiDAR shut down (02:10 - 03:20) LiDAR shut down (11:20 - 12:30)	No power supply / Low solar radiation due to heavy rain
2018-05-15	LiDAR shut down (10:30 - 12:40)	No power supply / Low solar radiation due to heavy rain
2018-06-05	LiDAR shut down (10:50 - 12:10)	No power supply / Low solar radiation due to heavy rain
2018-07-11	LiDAR shut down (10:10 - 13:20)	No power supply / Low solar radiation due to cloudy conditions
2018-07-13	LiDAR shut down (09:50 - 13:00)	No power supply / Low solar radiation due to cloudy conditions



Date	Note	Issues
2018-07-15	LiDAR shut down (10:40 - 13:20)	No power supply / Low solar radiation due to cloudy conditions
2018-08-02	LiDAR shut down (10:40 - 10:50)	No power supply / Low solar radiation due to cloudy conditions
2018-08-06	LiDAR shut down (12:50 - 14:10)	No power supply / Low solar radiation due to cloudy conditions
2018-09-11	LiDAR shut down (11:20 - 12:40)	No power supply / Low solar radiation due to cloudy conditions
2018-09-16	LiDAR shut down (10:10 - 12:20)	No power supply / Low solar radiation due to cloudy conditions
2018-09-29	LiDAR shut down (9:50 - 10:20)	No power supply / Low solar radiation due to cloudy conditions
2018-10-25	No connection to LiDAR	According to sent data, most likely no present LiDAR issues
2018-10-26	Data connection restored Data and performance check (Florian Schmidt, wtg)	-
2018-11-01	Wiper nozzle is blocked Station keeper is manually cleaning the window with a special cleaning cloth until repair	Low data availability
2018-11-21	No connection to LiDAR	According to sent data, most likely no present LiDAR issues
2018-11-26	Data connection restored Data and performance check (Florian Schmidt, wtg)	-
2018-12-21	No connection to LiDAR	According to sent data, most likely no present LiDAR issues
2018-12-22	Data connection restored Data and performance check (Florian Schmidt, wtg)	-
2019-01-28	No connection to LiDAR	According to sent data, most likely no present LiDAR issues
2019-01-28	LiDAR shut down (0:00 - 24:00)	No power supply / Low solar radiation due to cloudy conditions
2019-01-29	LiDAR shut down (17:50 - 18:40)	No power supply / Low solar radiation due to cloudy conditions
2019-02-05	Data connection restored Data and performance check (Florian Schmidt, wtg)	-
2019-02-27	LiDAR shut down (3:10 - 5:10)	No power supply / Low solar radiation due to cloudy conditions
2019-03-09	LiDAR shut down (10:20 - 12:20)	No power supply / Low solar radiation due to cloudy conditions



Date	Note	Issues
2019-04-10	LiDAR shut down (3:50 - 5:30)	No power supply / Low solar radiation due to cloudy conditions
2019-05-04	LiDAR shut down (1:30 - 4:00)	No power supply / Low solar radiation due to cloudy conditions
2019-05-04	LiDAR shut down (10:50 - 12:40)	No power supply / Low solar radiation due to cloudy conditions

Note: Weekly and other frequently performed checks as well as data backup will not be listed in the station log.

We hereby affirm that the evaluation was performed in accordance with the latest state of the art, impartially and to the best of our knowledge and belief.

Grevenbroich. 2019-06-07

Dipl.-Ing. Florian Schmidt
Project Manager



9 Appendix

9.1 Processing

Version	Date	Content
SG17010B1	2017-04-25	Verification of the remote sensing device type Leosphere WINDCUBE v2 S/N WLS7-598 performed at the verification station Grevenbroich
SG17010B2	2017-06-22	Installation of the Remote Sensing Device Type Leosphere WINDCUBE v2 S/N WLS7-598 at the site Feni
SG17010KB1	2017-08-31	ESMAPBD BDFE2 Cumulative Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni
SG17010KB2	2017-09-11	ESMAPBD BDFE2 Cumulative Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni
SG17010KB3	2017-10-06	ESMAPBD BDFE2 Cumulative Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni
SG17010KB4	2017-11-08	ESMAPBD BDFE2 Cumulative Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni
SG17010KB5	2017-12-18	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2017-11-01 to 2017-11-30
SG17010KB6	2018-01-17	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2017-12-01 to 2017-12-31
SG17010KB7	2018-03-02	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-01-01 to 2018-01-31
SG17010KB8	2018-03-02	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-02-01 to 2018-02-30
SG17010KB9	2018-04-13	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2017-06-01 to 2017-06-30
SG17010KB10	2018-04-13	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2017-07-01 to 2017-07-31
SG17010KB11	2018-04-13	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-03-01 to 2018-03-31
SG17010KB12	2018-05-24	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2017-08-01 to 2017-08-31
SG17010KB13	2018-05-24	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2017-09-01 to 2017-09-30
SG17010KB14	2018-05-24	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2017-10-01 to 2017-09-31
SG17010KB15	2018-05-24	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-04-01 to 2018-04-30
SG17010KB16	2018-06-06	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-05-01 to 2018-05-31
SG17010KB17	2018-07-03	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-06-01 to 2018-06-30
SG17010KB18	2018-08-10	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-07-01 to 2018-07-30
SG17010KB19	2018-09-03	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-08-01 to 2018-08-31



Version	Date	Content
SG17010KB20	2018-10-01	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-09-01 to 2018-09-30
SG17010KB21	2018-11-02	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-10-01 to 2018-10-31
SG17010KB22	2018-12-03	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-11-01 to 2018-11-30
SG17010KB23	2019-01-08	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-12-01 to 2018-12-31
SG17010KB24	2019-02-19	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2019-01-01 to 2019-01-31
SG17010KB25	2019-03-26	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2019-02-01 to 2019-02-28
SG17010KB26	2019-04-01	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2019-03-01 to 2019-03-31
SG17010KB27	2019-05-13	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2019-04-01 to 2019-04-30
SG17010KB28	2019-06-07	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2019-05-01 to 2019-05-31

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