



Northeastern German Lowland Observatory: Beggerow

The data will be made available as part of the TERENO data via the TERENO data portal on : <http://www.tereno.net/overview-de> and by GFZ dataservices under the following urls: <http://dataservices.gfz-potsdam.de/portal/> and <ftp://datapub.gfz-potsdam.de/download/10.5880.TERENO.DLR.2018.003>

This metadata report was automatically derived from available measured data and stored metadata using the rmarkdown package. In case of inconsistencies or recommended improvements please contact the responsible author of this dataset.

Version history

Current processing tool versions

Data processing is based on the inhouse developed R-packages DMRP for data processing and DMETA for metadata handling and generation. Current package versions are DMRP version: 1.8.4 and DMETA version: 1.2.0 .

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2023 February Release 6

- add new contributors in meta data files

2022 April Release 5

- Testcase should not be publicated <- this can be taken out by Peter prior to final publication

2022 April Release 4

- Updates in Processing chains
- Switched from having a single zip-file in previous versions to achieving a zip-file from every release
- Minor formatting changes in pdf
- Extension of time series until end of 2021

2021 August Release 3

- Bugfix for missing columns in exported data
- Extension of time series to mid 2021
- Minor fixes and typos in tools
- Change to new xml metadata format

2020 Release 2

- Processing tools have changed and are (from this release on) contained in two internal R-packages DMRP and DMETA
- This and future releases will contain the version number of processing tools used
- Variable names were change, to allow variable and sensor identification. A table with old and new variable names is at the end of this document.
- PDF metadata files creation was revised
- Abstracts revised
- keyword scheme “TERENO” with variable names was added
- Added related identifier to enveloping DOI as ‘IsPartOf’
- PDF metadata files were revised
- Added version history and more detailed processing information
- Added abstract about TERENO
- Complemented sensor and variable tables
- Added related identifier to enveloping DOI
- For Plotting maps the “OpenStreetMap” R package was included.

2018 Release 1

- Initial version

Citation

Cite as: Borg, Erik; Maass, Holger; Renke, Frank; Jahncke, Dirk; Schmidt, Klemens; Wegener, Max; Stender, Vivien; Hohmann, Christian; Künzel, Alice; Budach, Christian; Brinckmann, Nils; Berg, Matthias; Itzerott Sibylle; Spengler, Daniel and Conrad, Christopher (2018): TERENO (Northeast), Climate station Beggerow, Germany. V1.5. GFZ Data Services. <http://doi.org/10.5880/TERENO.DLR.2018.003>

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TERENO Observatory

The DEMMIN (Durable Environmental Multidisciplinary Monitoring Information Network; upper left corner: 54°20N, 12°520E, lower right corner: 53°450N, 13°270E) test area was designed and established by the DLR in cooperation with farmers in the Demmin region in 2000. The site was used as a calibration and validation test site for national and international remote sensing missions. In 2011, the test site was integrated into the TERENO initiative.

The DEMMIN test site is located within the central monitoring sites of the TERENO Northeastern German Lowland Observatory. It covers 900 km² and exhibits mostly glacial formed lowlands with terminal moraines in the southern part, containing the highest elevation of 83m a.s.l.

The region between the rivers Tollense and Peene consists of flat ground moraines, whereas undulation ground moraines determine the landscape character north of the river Peene. The lowest elevation is located near the town Loitz with 0.5m a.s.l. The region is characterized by intense agricultural use and the three rivers Tollense and Trebel which confluence into the Peene River at the Hanseatic city Demmin. The present climate is characterized by a long-term (1981–2010) mean temperature of 8.7 °C and mean precipitation of 584 mm/year, measured at the Teterow weather station by Deutscher Wetterdienst (DWD).

The Northeastern German Lowland Observatory is situated in a region shaped by recurring glacial and periglacial processes since at least half a million years. Within this period, three major glaciations covered the

entire region, the last time this happened approximately 25 15 k ago (Weichselian glaciation). Since that time, a young morainic landscape developed characterized by many lakes and river systems that are connected to the shallow ground water table.

The test site is instrumented with more than 40 environmental measurement stations (DLR, GFZ). Additionally, 63 soil moisture stations were installed by GFZ, a lysimeter-hexagon (DLR, FZJ) near to the village Rustow and is part of the SOILCan project. A crane completes the measurement technique currently available in the test site installed by GFZ/DLR in 2011.

Data is automatically collected via a telemetry network by DLR. The quality control of all environmental data transferred via Telemetry network of DLR is carried out by DLR by visual control and, since 2012, by automatic processing by GFZ. The delivered dataset contains the measured data and quality flags indicating the validity of each measured value and detected reasons for exclusion.

The TERENO (TERrestrial ENvironmental Observatories) is an initiative of the Helmholtz Centers (Forschungszentrum Jülich – FZJ, Helmholtz Centre for Environmental Research – UFZ, Karlsruhe Institute of Technology – KIT, Helmholtz Zentrum München - German Center for Environmental Health – HMGU, German Research Centre for Geosciences - GFZ, and German Aerospace Center – DLR) (<http://www.tereno.net/overview-de>).

TERENO Northeastern German Lowland Observatory. TERENO (TERrestrial ENvironmental Observatories) spans an Earth observation network across Germany that extends from the North German lowlands to the Bavarian Alps. This unique large-scale project aims to catalogue the longterm ecological, social and economic impact of global change at regional level.

Further specific goals of the TERENO remote sensing research group at GFZ are (1) supplying environmental data for algorithm development in remote sensing and environmental modelling, with a focus on soil moisture and evapotranspiration, and (2) practical tests of remote sensing data integration in agricultural land management practices.

Station Information Beggerow :

Name: Beggerow

Type: Climate station

Owner: German Aerospace Center (DLR)

DOI: 10.5880/TERENO.DLR.2018.003

Status: active

Location WGS84: E: 13.0219 °, N: 53.8367 °, Alt: 42.5 [m] a.s.l.

Start of operation: 2012-11-20

End of operation: -

The station is located on a small wind farm on grassland, surrounded by agricultural used fields.



Variable list (alphabetical):

AdconRTU_BatteryVoltage AdconRTU_ChargingRegulator AdconRTU_Datadelay AdconRTU_InternalTemperature
 AdconRTU_PowerOutput AdconRTU_RFIN AdconRTU_RFOUT AdconRTU_RSSI AdconRTU_Radioerrortatelong
 AdconRTU_Radioerrortateshort AdconRTU_TimestampUTC AdconRainGauge_Precipitation Ad-
 conSM1_Soilmoisture010cm AdconSM1_Soilmoisture020cm AdconSM1_Soilmoisture030cm Ad-
 conSM1_Soilmoisture040cm AdconSM1_Soilmoisture050cm AdconSM1_Soilmoisture060cm Ad-
 conSM1_Soilmoisture070cm AdconSM1_Soilmoisture080cm AdconSM1_Soilmoisture090cm Ad-
 conSM1_Soiltemperature015cm AdconSM1_Soiltemperature045cm AdconSM1_Soiltemperature075cm
 AdconTR1_RelativeHumidity AdconTR1_Temperature AdconWET_LeafWetness AdconWind-
 direction_Winddirection AdconWindspeed_Windspeed KuZCMP3_PyranometerIncoming UM-
 STH3_Soiltemperature005cm UMSTH3_Soiltemperature010cm UMSTH3_Soiltemperature020cm
 UMSTH3_Soiltemperature030cm UMSTH3_Soiltemperature050cm UMSTH3_Soiltemperature100cm

Sensor and variable information:

AdconRTU

Sensor specifications:

Table 1: Beggerow Remote Transmission Unit

name	type	manufacturer	installation_date	removed_on	serial	height
AdconRTU	Remote Transmission Unit	Adcon Telemetry	2012-11-20 01:15:00	2023-02-22 17:11:46		2.5

Variables

Table 2: Beggerow Remote Transmission Unit variables

Variable	Unit	Starts	Ends	Available	Valid
AdconRTU_TimestampUTC		2012-11-20	2022-12-31	99.7 %	99.7 %
AdconRTU_BatteryVoltage	V	2012-11-20	2022-12-31	99.4 %	99.1 %
AdconRTU_Datadelay		2012-11-20	2022-12-31	99.1 %	99.1 %
AdconRTU_InternalTemperature		2012-11-20	2022-12-31	99.4 %	99.4 %
AdconRTU_ChargingRegulator		2012-11-20	2022-12-31	99.4 %	99.4 %
AdconRTU_PowerOutput		2012-11-20	2022-12-31	96.1 %	96.1 %
AdconRTU_Radioerrorratelong		2012-11-20	2022-12-31	99.1 %	99.1 %
AdconRTU_Radioerrorrateshort	percent	2012-11-20	2022-12-31	99.1 %	99.1 %
AdconRTU_RFIN		2012-11-20	2022-12-31	99 %	99 %
AdconRTU_RFOUT		2012-11-20	2022-12-31	99 %	99 %
AdconRTU_RSSI		2012-11-20	2022-12-31	96.1 %	96.1 %

AdconRainGauge

Sensor specifications:

Table 3: Beggerow RG Pro Rain Gauge

name	type	manufacturer	installation_date	removed_on	serial	height
AdconRainGauge	RG Pro Rain Gauge	Adcon Telemetry	2012-11-20 01:15:00	2023-02-22 17:11:46	NA	1

Variables

Table 4: Beggerow RG Pro Rain Gauge variables

Variable	Unit	Starts	Ends	Available	Valid
AdconRainGauge_Precipitation	mm	2012-11-20	2022-12-31	NA %	NA %

AdconSM1

Sensor specifications:

Table 5: Beggerow SM1 Soil Moisture Sensor

name	type	manufacturer	installation_date	removed_on	serial	height
AdconSM1	SM1 Soil Moisture Sensor	Adcon Telemetry	2013-08-25 02:15:00	2023-02-22 17:11:46	NA	

Table 6: Beggerow SM1 Soil Moisture Sensor variables

Variable	Unit	Starts	Ends	Available	Valid
AdconSM1_Soiltemperature015cm	degree_Celsius	2013-08-24	2022-12-31	75 %	72.5 %
AdconSM1_Soiltemperature045cm	degree_Celsius	2013-08-24	2022-12-31	75 %	74.6 %
AdconSM1_Soiltemperature075cm	degree_Celsius	2013-08-24	2022-12-31	75 %	74.1 %
AdconSM1_Soilmoisture010cm	percent	2013-08-24	2022-12-31	74.1 %	74 %
AdconSM1_Soilmoisture020cm	percent	2013-08-24	2022-12-31	74.1 %	74 %
AdconSM1_Soilmoisture030cm	percent	2013-08-24	2022-12-31	74.1 %	73 %
AdconSM1_Soilmoisture040cm	percent	2013-08-24	2022-12-31	74.1 %	74 %
AdconSM1_Soilmoisture050cm	percent	2013-08-24	2022-12-31	74.1 %	73.7 %
AdconSM1_Soilmoisture060cm	percent	2013-08-24	2022-12-31	74.1 %	74.1 %
AdconSM1_Soilmoisture070cm	percent	2013-08-24	2022-12-31	74.1 %	74.1 %
AdconSM1_Soilmoisture080cm	percent	2013-08-24	2022-12-31	74.1 %	74.1 %
AdconSM1_Soilmoisture090cm		2013-08-24	2022-12-31	74.1 %	74.1 %

Variables

AdconTR1

Sensor specifications:

Table 7: Beggerow TR1 Combisensor Temp. Humid

name	type	manufacturer	installation_date	removed_on	serial	height
AdconTR1	TR1 Combisensor Temp. Humid	Adcon Telemetry	2012-11-20 01:15:00	2023-02-22 17:11:46	NA	1.7

Variables

Table 8: Beggerow TR1 Combisensor Temp. Humid variables

Variable	Unit	Starts	Ends	Available	Valid
AdconTR1_Temperature	degree_Celsius	2012-11-20	2022-12-31	99.5 %	99.4 %
AdconTR1_RelativeHumidity	percent	2012-11-20	2022-12-31	99.5 %	92.9 %

AdconWET

Sensor specifications:

Table 9: Beggerow WET Leaf Wetness Sensor

name	type	manufacturer	installation_date	removed_on	serial	height
AdconWET	WET Leaf Wetness Sensor	Adcon Telemetry	2013-08-17 02:15:00	2019-05-09 14:00:00	NA	1.7
AdconWET	WET Leaf Wetness Sensor	Adcon Telemetry	2019-05-09 14:00:00	2023-02-22 17:11:46	450153	1.7

Variables

Table 10: Beggerow WET Leaf Wetness Sensor variables

Variable	Unit	Starts	Ends	Available	Valid
AdconWET_LeafWetness	1	2013-08-16	2022-12-31	99.5 %	99.5 %

AdconWinddirection

Sensor specifications:

Table 11: Beggerow Wind Direction Pro10

name	type	manufacturer	installation_date	removed_on	serial	height
AdconWinddirection	Wind Direction Pro10	Adcon Telemetry	2012-11-20 01:15:00	2019-05-09 14:00:00	NA	2.5
AdconWinddirection	Wind Direction Pro10	Adcon Telemetry	2019-05-09 14:00:00	2023-02-22 17:11:46	1066	2.5

Variables

Table 12: Beggerow Wind Direction Pro10 variables

Variable	Unit	Starts	Ends	Available	Valid
AdconWinddirection_Winddirection	degree	2012-11-20	2022-12-31	99.5 %	99.4 %

AdconWindspeed

Sensor specifications:

Table 13: Beggerow Windspeed Pro10

name	type	manufacturer	installation_date	removed_on	serial	height
AdconWindspeed	Windspeed Pro10	Adcon Telemetry	2012-11-20 01:15:00	2019-05-09 14:00:00	NA	2.5
AdconWindspeed	Windspeed Pro10	Adcon Telemetry	2019-05-09 14:00:00	2022-02-23 13:00:00	1842	2.5
AdconWindspeed	Windspeed Pro10	Adcon Telemetry	2022-02-23 13:00:00	2023-02-22 17:11:46	NA	2.5

Variables

Table 14: Beggerow Windspeed Pro10 variables

Variable	Unit	Starts	Ends	Available	Valid
AdconWindspeed_Windspeed	m/s	2012-11-20	2022-12-31	99.5 %	94.9 %

KuZCMP3

Sensor specifications:

Table 15: Beggerow Pyranometer CMP3

name	type	manufacturer	installation_date	removed_on	serial	height
KuZCMP3	Pyranometer CMP3	Kipp & Zonen	2013-08-17 02:15:00	2023-02-22 17:11:46	NA	1.7

Variables

Table 16: Beggerow Pyranometer CMP3 variables

Variable	Unit	Starts	Ends	Available	Valid
KuZCMP3_PyranometerIncoming	W/m ²	2013-08-16	2022-12-31	99.5 %	99.4 %

UMSTH3

Sensor specifications:

Variables

Table 17: Beggerow UMS-TH3

name	type	manufacturer	installation_date	removed_on	serial	height
UMSTH3	UMS-TH3	METER Group AG	2013-09-17 14:00:00	2019-01-10 13:00:00	181	
UMSTH3	UMS-TH3	METER Group AG	2019-01-10 13:00:00	2023-02-22 17:11:46	NA	

Table 18: Beggerow UMS-TH3 variables

Variable	Unit	Starts	Ends	Available	Valid
UMSTH3_Soiltemperature005cm	degree_Celsius	2013-09-17	2022-12-31	83 %	82 %
UMSTH3_Soiltemperature010cm	degree_Celsius	2013-09-17	2022-12-31	83 %	81.2 %
UMSTH3_Soiltemperature020cm	degree_Celsius	2013-09-17	2022-12-31	83 %	81.7 %
UMSTH3_Soiltemperature030cm	degree_Celsius	2013-09-17	2022-12-31	83 %	82.1 %
UMSTH3_Soiltemperature050cm	degree_Celsius	2013-09-17	2022-12-31	83 %	82.5 %
UMSTH3_Soiltemperature100cm	degree_Celsius	2013-09-17	2022-12-31	83 %	83 %

Flag value information:

Data quality is provided using the flagging system applied to all TERENO data, flag values und descriptions are provided in the table below.

Table 19: Flag value table

Qualifierid	Code	Definition
1001	unevaluated_unevaluated	quality not evaluated or reported
1010	unevaluated_autosampler	autosampler data
1028	unevaluated_change sensor MPS	change sensor MPS
2002	ok_ok	good or acceptable data
2010	ok_autosampler	autosampler data
2025	ok_goodquality	goodquality
2026	ok_moderatequality	moderatequality
2027	ok_qualityunknown	Passed auto checks but quality is not evaluated explicitly
3010	suspicious_autosampler	autosampler data
3011	suspicious_min	data value below low filter value
3012	suspicious_max	data value above high filter value
3017	suspicious_missing	missing value (e.g. during temporal integration)
3020	suspicious_unplausiblevariation	value jump or drop is too high
3023	suspicious_frozen	temperature below zero
3028	suspicious_change sensor MPS	change sensor MPS
3033	suspicious_noisydata	data displaying a high amount of noise
3035	suspicious_changeflow/positionsensor	change flow or position sensor
3036	suspicious_technicaldisturbance	sensor is disturbed due to technical reasons
3037	suspicious_maintenancedisturbance	sensor is disturbed due to maintenance
3043	suspicious_backwater	water held back by a dam or other obstruction
3044	suspicious_nodatachange	data have not been changed within a certain period of time
3045	suspicious_leaking tank	tank outlet valve leaking
3046	suspicious_check for sensor drift	check for sensor drift
3048	suspicious_inconsistent time period	data are sampled within an inconsistent time period
3049	suspicious_tillage	soil prpoerties are infllunced by tillage
3053	suspicious_sensor reports malfunction	The internal diagnostic test of the sensor reports a malfunction.
4010	baddata_autosampler	autosampler data
4011	baddata_min	data value below low filter value
4012	baddata_max	data value above high filter value
4013	baddata_irregular	irregular data (NaN)
4017	baddata_missing	missing value (e.g. during temporal integration)
4018	baddata_outoforder	sensor is out of order or delivers unplausable or meaningless data
4019	baddata_isolatedspike	isolated spike
4020	baddata_unplausiblevariation	value jump or drop is too high
4020	baddata_unplausiblevariation	value jump or drop is too high
4021	baddata_data transfer disturbed	data transfer from sensor is disturbed
4022	baddata_data not plausible	data are outside of a plausible range
4023	baddata_frozen	temperature below zero

Table 19: Flag value table (*continued*)

Qualifierid	Code	Definition
4024	baddata_badquality	badquality
4028	baddata_change sensor MPS	change sensor MPS
4033	baddata_noisydata	data displaying a high amount of noise
4034	baddata_temperature effects	temperature effects
4035	baddata_changeflow/positionsensor	change flow or position sensor
4036	baddata_technicaldisturbance	sensor is disturbed due to technical reasons
4037	baddata_maintenancedisturbance	sensor is disturbed due to maintenance
4038	baddata_pumpfailure	pump fails
4039	baddata_removablenmatter	effects due to plant or soil material that can be removed from soil surface
4040	baddata_liquidapplication	effects due to the application of liquid materials to the soil
4041	baddata_controlaffected	effects of internal control mechanisms
4042	baddata_tankrelease	weight loss due to emergency relase of water due to control mechanisms
4043	baddata_backwater	water held back by a dam or other obstruction
4047	baddata_ppleaking	Special case: The increase of tank weight during times with solely upwad direct water flow from the tank to the lysimeter can be related to a leaking pumpcontroller. Reason: during the control pumps water into the lysimeter tank weight declines
4050	baddata_deadsignal	signal does not change within signal specific interval
4051	baddata_noprecipitation	no area wide precipitation event detected
4052	baddata_noimport	data will not be impeorted
4054	baddata_manual deactivation	data value has been deactivated manually
4055	baddata_max precpitation 6h	precipitation exceeding 6h maximum limit
4056	baddata_max precpitation 12h	precipitation exceeding 12h maximum limit
4057	baddata_max precpitation 24h	precipitation exceeding 24h maximum limit
4058	baddata_max precpitation 2d	precipitation exceeding 2d maximum limit
4059	baddata_max precpitation 5d	precipitation exceeding 5d maximum limit
5015	gapfilled_interpolated	interpolated data
5016	gapfilled_extrapolated	extrapolated data
7022	modified_data not plausible	data are ouside of a plausible range
7060	modified_drift corrected	Drift corrected data
15061	interpolated_linreg other station	Value substituted using linear regression from other station
15062	interpolated_replacedby other station	Value substituted using value from other station
15063	interpolated_linreg DWD station	Value substituted using linear regression from DWD station
15064	interpolated_replacedby DWD station	Value substituted using value from DWD station
15065	interpolated_spline time	Value substituted using spline interpolation in time
15066	interpolated_linreg time	Value substituted using linear interpolation in time

Processing notes

Variable name changes

Table 20: Variable name history

	Variable.name	Variable.name.before.2019.06.18
1	AdconRTU_TimestampUTC	TimestampUTC
2	AdconTR1_Temperature	Temperature
3	AdconTR1_RelativeHumidity	RelativeHumidity
4	AdconRainGauge_Precipitation	Precipitation
5	AdconWindspeed_Windspeed	WindSpeed
6	AdconWinddirection_Winddirection	WindDirection
9	KuZCMP3_PyranometerIncoming	PyranometerCMP3incoming
18	UMSTH3_Soiltemperature005cm	SoiltemperatureTh3-s5cm
19	UMSTH3_Soiltemperature010cm	SoiltemperatureTh3-s10cm
20	UMSTH3_Soiltemperature020cm	SoiltemperatureTh3-s20cm
21	UMSTH3_Soiltemperature030cm	SoiltemperatureTh3-s30cm
23	UMSTH3_Soiltemperature050cm	SoiltemperatureTh3-s50cm
27	UMSTH3_Soiltemperature100cm	SoiltemperatureTh3-s100cm
33	AdconSM1_Soiltemperature015cm	Soiltemperature15cm
35	AdconSM1_Soiltemperature045cm	Soiltemperature45cm
38	AdconSM1_Soiltemperature075cm	Soiltemperature75cm
39	AdconSM1_Soilmoisture010cm	Soilmoisture10cm
40	AdconSM1_Soilmoisture020cm	Soilmoisture20cm
41	AdconSM1_Soilmoisture030cm	Soilmoisture30cm
42	AdconSM1_Soilmoisture040cm	Soilmoisture40cm
43	AdconSM1_Soilmoisture050cm	Soilmoisture50cm
44	AdconSM1_Soilmoisture060cm	Soilmoisture60cm
45	AdconSM1_Soilmoisture070cm	Soilmoisture70cm
46	AdconSM1_Soilmoisture080cm	Soilmoisture80cm
47	AdconSM1_Soilmoisture090cm	Soilmoisture90cm
67	AdconWET_LeafWetness	LeafWetness
72	AdconRTU_BatteryVoltage	BatteryVoltage
73	AdconRTU_Datadelay	Datadelay
74	AdconRTU_InternalTemperature	InternalTemperature
75	AdconRTU_ChargingRegulator	ChargingRegulator
76	AdconRTU_PowerOutput	PowerOutput
77	AdconRTU_Radioerrorratelong	Radioerrorratelong
78	AdconRTU_Radioerrorrateshort	Radioerrorrateshort
79	AdconRTU_RFIN	RFIN
80	AdconRTU_RFOUT	RFOUT
81	AdconRTU_RSSI	RSSI