



FRESHWATER RESEARCH AND ENVIRONMENTAL DATABASE

Laacher See

LAA temperature and oxygen chain

FRED Package 586

In recent years, numerous lakes throughout Germany have been included in a climate impact measurement program. Long-term climate monitoring that provides continuous series of measurements with high temporal resolution over many years is an essential basis for better understanding the interrelationships in lakes, carrying out trend analyses and developing adaptation strategies from them. In addition to measuring changes, they provide a basis for model-based management scenarios.

Measuring chain

The measuring chain consists of a rope that is kept in tension by a weight on the bottom and a pressure-resistant buoy located 1-1.5 m below the water surface. The loggers are attached to the rope at fixed intervals.

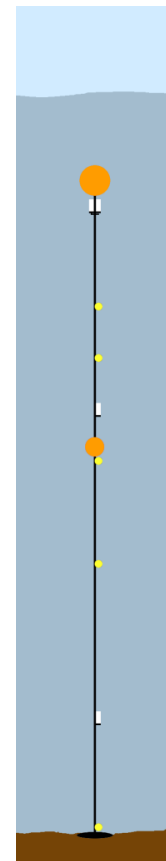
Information about the depth values of the loggers

The logger depths given indicate the depth below the water surface. Due to the anchoring on the bottom, the distances of the loggers from the bottom are always the same, but not when viewed from the surface. This can cause problems when the water level fluctuates, because this changes the distance of the loggers from the water surface.

Autonomous datalogger




Tinytag Aquatic 2 TG-4100 underwater data loggers from Gemini Data Loggers, UK, are used for the temperature measurements.

MiniDOT data loggers from PME (Precision Measurement Engineering, Inc.) are used for the oxygen measurements. To prevent mussel settlement, the 1 m O₂ logger is covered with copper tape and equipped with a miniWIPER, an autonomous antifouling system, since 2021.



From Feb. 2018 to May 2020, d-opto loggers from zebra-Tech Ltd, NZ, were used for the oxygen measurements. Especially the measurements in the epilimnion are strongly influenced by biofouling.

Logger specifications

Parameter	name	accuracy	resolution	max. operating depth	
temperature	Tinytag Aquatic 2 TG-4100, Gemini Data Loggers	± 0.5°C according to manufacturer) ± 0.1°C (own experience)	0.01 °C	500 m	
oxygen and temperature	miniDOT, Precision Measurement Engineering (PME)	according to manufacturer ± 5% ± 0.3 mg/l ± 0.1°C	0.01 mg/L 0.01 °C	100 m	
oxygen and temperature 2018-2020	D-Opto Logger, Zebra-Tech, LTD, NZ	according to manufacturer ± 1% ± 0.02 mg/l ± 0.1°C	0.001 mg/L 0.01 °C	30 m	

Logger depth distribution 2016 to 2023



Data

Time span 2015-08-24 ongoing (gap 24.03. to 13.04.2016)

Intervall first 60 min., then 30 min.

The data are stored as individual txt and csv files in the IGB Cloud Nimbus.

Laacher See (LAA)							
Ordner:	20160622_LAA_data						
nur miniDot ausgelesen, Tinytag weiter bis 10.04.2017 24.03.2016- 13.04.2016: Kette an Land							
Datei	Logger	Parameter	Logger-Nr.	Tiefe (m)	Messintervall	Messzeitraum	Bemerkungen
LAA2015_01m_miniDot1185.TXT	miniDot RS232	O2 + T	6881-1185	1		60 24.08.2015 - 22.06.2016	
LAA2015_40m_miniDot1101.TXT	miniDot RS232	O2 + T	6881-1101	40		60 24.08.2015 - 22.06.2016	
Ordner	20170410_LAA_data						
Datei	Logger	Parameter	Logger-Nr.	Tiefe (m)	Messintervall	Messzeitraum	Bemerkungen
LAA2016_01m_miniDot1311.TXT	miniDot RS232	O2 + T	6881-1311	1		60 22.06.2016 - 10.04.2017	
LAA2016_40m_miniDot1325.TXT	miniDot RS232	O2 + T	6881-1325	40		60 24.08.2016 - 10.04.2017	40m erst nachträglich zugefügt
LAA2016_45m_miniDot1322.TXT	miniDot RS232	O2 + T	6881-1322	45		60 22.06.2016 - 10.04.2017	neu in 45m
LAA2015_05m_Tinytag664469.txt	Tinytag	T	664469	5		60 25.08.2015 - 10.04.2017	
LAA2015_10m_Tinytag656711.txt	Tinytag	T	656711	10		60 25.08.2015 - 10.04.2017	16.-24.08.2016: Kette verdriftet?
LAA2015_49m_Tinytag632355.txt	Tinytag	T	632355	49		60 25.08.2015 - 10.04.2017	
20170410_LAA_alle	alle						Zusammenstellung
Ordner	20180228_LAA_data						
Datei	Logger	Parameter	Logger-Nr.	Tiefe (m)	Messintervall	Messzeitraum	Bemerkungen
LAA2017_01m_miniDot186076.TXT	miniDot USB	O2 + T	7392-186076	1		60 10.04.2017 - 28.02.2018	
LAA2017_40m_miniDot214312.TXT	miniDot USB	O2 + T	7392-214312	40		60 10.04.2017 - 28.02.2018	
LAA2017_45m_miniDot218690.TXT	miniDot USB	O2 + T	7392-218690	45		60 10.04.2017 - 28.02.2018	
LAA2017_05m_Tinytag664469.txt	Tinytag	T	664469	5		30 10.04.2017 - 28.02.2018	
LAA2017_10m_Tinytag656711.txt	Tinytag	T	656711	10		30 10.04.2017 - 28.02.2018	
LAA2017_49m_Tinytag632355.txt	Tinytag	T	632355	49		30 10.04.2017 - 28.02.2018	
20180228_LAA_alle	alle						Zusammenstellung
Ordner	20190415_LAA_data						
Datei	Logger	Parameter	Logger-Nr.	Tiefe (m)	Messintervall	Messzeitraum	Bemerkungen
LAA2019_01m_d-opto#2897.txt	d-opto Logger	O2 + T	2897	1		28.02.2018 - 15.04.2019	O2 nicht zugebrauchen
LAA2019_40m_d-opto#2880.txt	d-opto Logger	O2 + T	2880	40		28.02.2018 - 15.04.2019	
LAA2019_45m_d-opto#2881.txt	d-opto Logger	O2 + T	2881	45		28.02.2018 - 15.04.2019	
LAA2019_05m_Tinytag580520.txt	Tinytag	T	580520	5		30 28.02.2018 - 15.04.2019	
LAA2019_10m_Tinytag632359.txt	Tinytag	T	632359	10		30 28.02.2018 - 15.04.2019	
LAA2019_49m_Tinytag580521.txt	Tinytag	T	580521	49		30 28.02.2018 - 15.04.2019	
Ordner	20200528_LAA_data						
Datei	Logger	Parameter	Logger-Nr.	Tiefe (m)	Messintervall	Messzeitraum	Bemerkungen
d-opto#2871_LAA_1m	d-opto Logger	O2 + T	2871	1		60 15.04.2019 - 21.09.2019	
d-opto#2880_LAA_40m	d-opto Logger	O2 + T	2880	40		60 15.04.2019 - 26.02.2020	
d-opto#2876_LAA_45m	d-opto Logger	O2 + T	2876	45		60 15.04.2019 - 28.05.2020	
Tinytag589398_LAA_5m	Tinytag	T	589398	5		30 15.04.2019 - 28.05.2020	
Tinytag658045_LAA_10m	Tinytag	T	658045	10		30 15.04.2019 - 28.05.2020	
Tinytag656712_LAA_20m	Tinytag	T	656712	20		30 15.04.2019 - 28.05.2020	
Tinytag590526_LAA_30m	Tinytag	T	590526	30		30 15.04.2019 - 28.05.2020	
Tinytag658038_LAA_49m	Tinytag	T	658038	49		30 15.04.2019 - 28.05.2020	
20200528_LAA_alle	alle						Zusammenstellung
Ordner	20210414_LAA_data_miniDot						
Datei	Logger	Parameter	Logger-Nr.	Tiefe (m)	Messintervall	Messzeitraum	Bemerkungen
Cat368086_LAA_2m.TXT	miniDot USB	O2 + T	7450-368086	2		30 28.05.2020 - 14.04.2021	
Cat246451_LAA_40m.TXT	miniDot USB	O2 + T	7450-246451	40		30 28.05.2020 - 14.04.2021	
Cat273186_LAA_45m.TXT	miniDot USB	O2 + T	7450-273186	45		30 28.05.2020 - 14.04.2021	
20210414_LAA_alle	alle						Zusammenstellung
Ordner	20210615_LAA_data_Tinytag						
Datei	Logger	Parameter	Logger-Nr.	Tiefe (m)	Messintervall	Messzeitraum	Bemerkungen
Tinytag851093_LAA_01m_LFU.csv	Tinytag	T	851093	1		60 28.05.2020 - 15.06.2021	LFU
Tinytag891342_LAA_05m_IGB.csv	Tinytag	T	891342	5		30 28.05.2020 - 15.06.2021	IGB
Tinytag851101_LAA_06m_LFU.csv	Tinytag	T	851101	6		60 28.05.2020 - 15.06.2021	LFU
Tinytag850236_LAA_07m_LFU.csv	Tinytag	T	850236	7		60 28.05.2020 - 15.06.2021	LFU
Tinytag843289_LAA_08m_LFU.csv	Tinytag	T	843289	8		60 28.05.2020 - 15.06.2021	LFU
Tinytag850244_LAA_09m_LFU.csv	Tinytag	T	850244	9		60 28.05.2020 - 15.06.2021	LFU
Tinytag664489_LAA_10m_IGB.csv	Tinytag	T	664489	10		30 28.05.2020 - 15.06.2021	IGB
Tinytag851067_LAA_15m_LFU.csv	Tinytag	T	851067	15		60 28.05.2020 - 15.06.2021	LFU
Tinytag590528_LAA_20m_IGB.csv	Tinytag	T	590528	20		30 28.05.2020 - 15.06.2021	IGB
Tinytag890904_LAA_25m_LFU.csv	Tinytag	T	890904	25		60 28.05.2020 - 15.06.2021	LFU
Tinytag656718_LAA_30m_IGB.csv	Tinytag	T	656718	30		30 28.05.2020 - 15.06.2021	IGB
Tinytag590527_LAA_49m_IGB.csv	Tinytag	T	590527	49		30 28.05.2020 - 15.06.2021	IGB
Ordner	20220512 LAA data						
Datei	Logger	Parameter	Logger-Nr.	Tiefe (m)	Messintervall	Messzeitraum	Bemerkungen
miniDot115918_LAA_2m.TXT	miniDot USB	O2 + T	7450-115918	2		30 14.04.2021 - 12.05.2022	mit Wischer
miniDot250601_LAA_40m.TXT	miniDot USB	O2 + T	7450-250601	40		30 14.04.2021 - 12.05.2022	
miniDot251053_LAA_45m.TXT	miniDot USB	O2 + T	7450-251053	45		30 14.04.2021 - 12.05.2022	
Tinytag851093_LAA_01m_LFU.csv	Tinytag	T	851093	1		60 15.06.2021 - 12.05.2022	LFU
Tinytag891342_LAA_05m_IGB.csv	Tinytag	T	891342	5		30 15.06.2021 - 24.03.2022	IGB
Tinytag851101_LAA_06m_LFU.csv	Tinytag	T	851101	6		60 15.06.2021 - 12.05.2022	LFU
Tinytag850236_LAA_07m_LFU.csv	Tinytag	T	850236	7		60 15.06.2021 - 12.05.2022	LFU
Tinytag843289_LAA_08m_LFU.csv	Tinytag	T	843289	8		60 15.06.2021 - 12.05.2022	LFU
Tinytag850244_LAA_09m_LFU.csv	Tinytag	T	850244	9		60 15.06.2021 - 12.05.2022	LFU
Tinytag664489_LAA_10m_IGB.csv	Tinytag	T	664489	10		30 15.06.2021 - 24.03.2022	IGB
Tinytag851067_LAA_15m_LFU.csv	Tinytag	T	851067	15		60 15.06.2021 - 12.05.2022	LFU
Tinytag590528_LAA_20m_IGB.csv	Tinytag	T	590528	20		30 15.06.2021 - 24.03.2022	IGB
Tinytag890904_LAA_25m_LFU.csv	Tinytag	T	890904	25		60 15.06.2021 - 12.05.2022	LFU
Tinytag656718_LAA_30m_IGB.csv	Tinytag	T	656718	30		30 15.06.2021 - 24.03.2022	IGB
Tinytag590527_LAA_49m_IGB.csv	Tinytag	T	590527	49		30 15.06.2021 - 24.03.2022	IGB
Ordner	20230516 LAA data						
Datei	Logger	Parameter	Logger-Nr.	Tiefe (m)	Messintervall	Messzeitraum	Bemerkungen
LAA2022_02m_miniDot507817.TXT	miniDot USB	O2 + T	7450-507817	2		30 12.05.2022 - 16.05.2023	mit Wischer
LAA2022_40m_miniDot218690.TXT	miniDot USB	O2 + T	7392-218690	40		30 12.05.2022 - 16.05.2023	
LAA2022_45m_miniDot609525.TXT	miniDot USB	O2 + T	7450-609525	45		30 12.05.2022 - 16.05.2023	
LAA2022_01m_Tinytag851093_LFU.txt	Tinytag	T	851093	1		60 28.05.2020 - 16.05.2023	LFU
LAA2022_05m_Tinytag632354_IGB.txt	Tinytag	T	632354	5		30 12.05.2022 - 16.05.2023	IGB
LAA2022_06m_Tinytag851101_LFU.txt	Tinytag	T	851101	6		60 28.05.2020 - 16.05.2023	LFU
LAA2022_07m_Tinytag850236_LFU.txt	Tinytag	T	850236	7		60 28.05.2020 - 16.05.2023	LFU
LAA2022_08m_Tinytag843289_LFU.txt	Tinytag	T	843289	8		60 28.05.2020 - 16.05.2023	LFU
LAA2022_09m_Tinytag850244_LFU.txt	Tinytag	T	850244	9		60 28.05.2020 - 16.05.2023	LFU
LAA2022_10m_Tinytag658049_IGB.txt	Tinytag	T	658049	10		30 12.05.2022 - 16.05.2023	IGB
LAA2022_15m_Tinytag851067_LFU.txt	Tinytag	T	851067	15		60 28.05.2020 - 16.05.2023	LFU
LAA2022_20m_Tinytag632356_IGB.txt	Tinytag	T	632356	20		30 12.05.2022 - 16.05.2023	IGB
LAA2022_25m_Tinytag890904_LFU.txt	Tinytag	T	890904	25		60 28.05.2020 - 16.05.2023	LFU
LAA2022_30m_Tinytag891341_IGB.txt	Tinytag	T	891341	30		30 12.05.2022 - 16.05.2023	IGB
LAA2022_49m_Tinytag632360_IGB.txt	Tinytag	T	632360	49		30 12.05.2022 - 16.05.2023	IGB
LAA2022_30m_Hobo20936111.csv	Hobo	Druck + T	20936111	30		60 06.08.2021 - 16.05.2023	

Contact

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Data collection: IGB und LfU (Landesamt für Umwelt Rheinland-Pfalz)

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