Multiparameter probe data at Lake Tiefwaren 1998-2020

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Data origin Data were collected by IGB (Marén Lentz, Uta Mallok).

Rights of usage Access to the data can be requested from the contact person.

Data

Sampling site

Lake Tiefwaren is a dimictic meso-eutrophic hardwater lake located on the northeastern perimeter of the town of Waren (Müritz) in the district of Mecklenburgische Seenplatte, Mecklenburg Vorpommern, Germany (53°31‘40“N 12°41‘30“E). The lake has a maximum depth of 23.6 m, a mean depth of 9.7 m, a surface area of 1.38 km^2 and a volume of 13.41 x 10^6 m^3 (Morphometric data from Umweltministerium M-V, calculation base 2015). The catchment area has a size of 21.9 km^2 and is dominated by agriculture, forests, and gardens in direct vicinity of the lake (Nixdorf et al. 2004). Due to the discharge of communal, agricultural and and industrial sewage waters into the lake, Lake Tiefwaren became more and more hypertrophic in the 1980s. To enhance water quality, $NaAl(OH)_4$ and $Ca(OH)_2$ were introduced into the hypolimnion in the years 2001-2005 to provoke the precipitation of nutrients. After the restoration measure, the phosphorus release from the sediments was almost completely eliminated for several years and the phosphorus concentrations in the water body drastically decreased, while secchi depth increased (Gonsiorczyk et al. 2015).

Time span 1998-2020

Sampling method

Vertical profiles were collected at a buoy at the center of the lake (53°31’38.3“N, 12°41‘27.8“E) between 1998 and 2020. The temporal resolution varied over time. Samples were taken monthly, although fortnightly samples are occasionally available between May and September. Measurements were made between 0 and 22.5 m at varying resolution. Typically, measurements were made at high resolution (every 1 m) from 0 m to 22 m. Between 2003 and Nov 2012 regular monthly surface layer measurements (0m) were made from the northern inflow channel (Stadtgraben , 53° 32' 25.89"N , 12° 41' 51.33"E, which receives water from the Falkenhäger Bruch forested nature reserve (Wauer et al., 2009), as well as from an eastern inflow channel (Melzer inflow, 53°31'28.6"N 12°42'00.8"E) which receives water from Lake Melzer (Wauer et al., 2009). Regular surface water measurements (0-1m) were made from Lake Melzer since 2001, but are not part of this data package. From 2003-2005, during the deployment of an aeration device, additional measurements were made during stratified periods (Jun-Nov) at another site approximately 200 m north of the P1 buoy (P2, 53°31'48.2"N, 12°41'27.8"E) at 1 m intervals between 0-20m (Wauer et al., 2009). Between May 2010 and Nov 2012 regular monthly surface water measurements were made at an inflow point on the western shore of the lake (Neuer Graben, 53° 31' 38.61”N, 12° 41' 13.97”E) (Wauer et al., 2009).

Field measurements

Multi-parameter probes were used to obtain vertical profiles (0.5 m depth intervals) of temperature, dissolved oxygen, oxygen saturation, pH, and specific conductivity, and, from 2018 onwards, turbidity, chlorophyll a (chl a) and phycocyanin (PC). Hand-held WTW probes (OXI-197, LF-197 and pH-197 Weilheim, Germany) were used until Apr 2012, and YSI multiprobes (YSI 6600, EXO2 Yellow Springs, OH, USA) since May 2012. Sensors were regularly calibrated in the lab according to the user manuals. Due to low pH values in the lake hand-held WTW probes (pH-197 Weilheim, Germany) are still used for measurement of pH and are calibrated for lower pH values (pH, 3-8).

Water transparency was determined as Secchi depth (secchi) on each sampling occasion. A white disc, 20 cm in diameter, was lowered in the water column until it was no longer visible, then raised, and the depth recorded both when the disc disappeared and when it re-appeared. The mean of both values is reported as Secchi depth. Readings were taken with a bathyscope from the platform to reduce light effects.

Parameters

- lake – sampled lake
- date – date of measurement [YYYY-MM-DD]
- depth – depth of measurement [m]
- wtemp – water temperature [°C]
- o2 – dissolved oxygen [mg L-1]
- so2 – oxygen saturation [%]
- ph – pH value
- conductivity – electrical conductivity [µS cm^{-1}]
- turbidity – turbidity [NTU]
- chla – chlorophyll a [µg L^{-1}]
- bga_pc – blue-green algae [cells L^{-1}]
- secchi – secchi depth [m]
- site – measurement site
- probe – type of multiparameter probe
- comment – comments
- comment_eng – English translation of original comment (german)
- std_depth – standardized depth (rounded depth value to the integers digit)

References

Nixdorf B, Hemm M, Hoffmann A, Richter P. 2004. “Breiter Luzin”, Dokumentation von Zustand und Entwicklung der wichtigsten Seen Deutschlands. Teil 2 Mecklenburg-Vorpommern. Umweltbundesamt. UBA-Bericht Forschungsbericht 29924274, UBA-FB 000511, p. 26.

Umweltministerium M-V, calculation base 2015, Abteilung Integrierter Umweltschutz und Nachhaltige Entwicklung - Seenprojekt, 2002: Mathes, J. & Korczynski, I. Pampower Str. 66/68, 19061 Schwerin.

Change log

- 2020/2021 Silke R. Schmidt: These data are not yet quality-controlled. There are known issues in the data, such as values of 0 instead of NA are values beyond physical limits. Less flawed data are available in the raw data files.
- 2022 Sabine Wollrab/ Jason N. Woodhouse: Quality control, checking and correcting for data beyond physical limits. Additional column with rounded depth measurements was added (column “std_depth”) as from 2010 onwards the exact depth measurements, while in previous years the standard discrete depths were entered from which also water samples were taken (column “depth”).
- 2025 Jason N Woodhouse: Final quality control, correction of typos in conductivity data