

Methods for Sampling and Analyses at Schlachtensee

Ingrid Chorus, Jutta Fastner, June 2020

Sampling

Sampling was at monthly to weekly intervals (depending on years and additional research programmes) at depth intervals of 0.5 – 1 m with an underwater pump and a plastic tube into a cuvette made of Plexiglas which held the probes for temperature, oxygen, pH and redox. From this cuvette the water gently flowed into the sample bottles: 1 L brown glass bottles for Chlorophyll-a, 250 ml glass bottles for phosphorus (permanently labelled for each depth to avoid cross-contamination of samples), 250 ml glass bottles for nitrogen and 100 ml brown glass bottles pre-stocked with Lugol's iodine solution for phytoplankton.

Depth-integrated phytoplankton samples for phytoplankton biovolume determination were integrated *in situ* and 100 ml filled into a brown glass bottle pre-stocked with Lugol's solution. For species determination and qualitative assessment, 1 L was filtered through a 10 µm mesh plankton net and the concentrate stored in a 10 ml tube pre-stocked with formaldehyde.

Depth for integration was determined from the temperature profile or samples were only taken at 2 m and this used as representative for the epilimnion. From 1995 – 2006 integration was standardized down to 5 m. Exceptions are marked in italics and blue in the phytoplankton file.

Secchi Disc Transparency

This was measured by lowering a white disc of 20 cm diameter to the point where it is just barely no longer visible, taking care not to wear sunglasses and to take the reading in the shade of the boat to avoid reflection.

Temperature, oxygen, pH:

depth profiles were registered at depth intervals of 1 m (sometimes 0.5 m) with an oximeter Oxi 96 (WTW, Germany).

Oxygen for primary production profiles was determined with the Winkler titration method.

Chlorophyll-a

ISO 10260 (1992; also DIN 38 412, part 16, 1985) by filtering 1 L of water (less if phytoplankton was very dense) on glass-fibre filters, stored frozen, extracted with simmering ethanol, extracted in the dark for 24 hours and centrifuged at 4000 rpm for 20 minutes.

Extinction was determined with an Elko II, Filter J 67.0 at 667 nm, Carl Zeiss, Germany. (successful participation in ring test 1997). Because of occasional negative values for phaeophytin we gave up this step and give the data only without differentiation between chl.a and phae.a; thus we multiplied with 12.2 instead of 29.6 (following Nusch 1975) without correction for phaeophytin.

Nitrate:

DIN EN ISO 10304-1 Water quality - Determination of dissolved anions by liquid chromatography of ions - Part 1: Determination of bromide, chloride, fluoride, nitrate, nitrite, phosphate and sulfate (ISO 10304-1:2007); limit of quantification is 0.5 mg/l NO₃-N

For selected samples, we also used commercial test kits (Dr. Lange, Germany) with pre-stocked cuvettes and a Lasa® plus pocket photometer with a reaction based on indophenol blue formation for ammonium (LoQ of 0.015 mg/L) and on 4-nitro-2-6-dimethylphenol formation for nitrate (LoQ 0.23 mg/L).

Ammonia:

Analysis performed by the Berlin Waterworks following the German standard methods for the examination of water, waste water and sludge; cations (group E); determination of ammonia-nitrogen DIN 38406 E 05; Photometer CADAS 100, Dr. Lange; limit of quantification is 0.015 mg/l NH₄-N.

Phosphorus (total and soluble reactive fractions)

P was first determined with molybdene blue (after hydrolysis of TP with potassium peroxodisulfate solution and 30 min. of digestion under pressure at > 100 °C) following the method by Koroleff (1983) which later became the ISO 6878 (which in turn is the basis for the DIN EN 1189). Analysis in a 5 cm cuvette and tightly correlating calibration curves enabled a limit of quantification of 1 µg/L P.

Some months in 2003 (marked in the respective data files) were an exception: these analyses were with malachite green, following Motomizu. This limit of Quantification of 5-10 µg/L was, however, insufficient in face of declining concentrations of TP and very low SRP.

Silicate

(only 1994-1999): we followed the IGB's adaptation of the DIN EN 1484 (DEV, H3)

UV-extinction

measured in a photometer at 254 nm

References

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