Supplementary data to the study:
Rapid eutrophication of a clearwater lake: Trends and potential causes inferred from phosphorus mass balance analyses

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Data origin
All data were collected from Lake Stechlin, Germany (53°09'5.6''N 13°01'34.2''E), by IGB staff. The dataset complements the study "Rapid eutrophication of a clearwater lake: Trends and potential causes inferred from phosphorus mass balance analyses" published in the journal *Global Change Biology*.

Sediment cores
Two sediment cores were taken at the deepest point of the lake in July 2020 and sliced into 1 cm layers to a depth of 40 cm. The samples were freeze-dried and homogenized in an agate-mortar to determine the sediment elemental composition as described in Heinrich et al. (2023). The elemental contents of Al, Ca, Fe, Mg, P, S, K, Na, Ti, Zn and Cu were determined by inductively coupled plasma optical emission spectrometry (ICP-OES, iCAP 7000series, Thermo Fisher Scientific, Waltham, MA, USA) after aqua regia digestion (36% HCl, 65% HNO_3, volumetric ratio of 1:3) of the ground samples in a high-pressure microwave oven (µPrep-A, MLS GmbH, Leutkirch im Allgäu, Germany). Hg contents were measured by M. Moros (Leibniz Institute for Baltic Sea Research, Warnemünde, Germany) with a DMA-80 analyser (MLS Company, Sorisole, Italy).

Sedimentation rates
Sedimentation rates were determined from 2009 to 2012 and from 2016 to 2020 by using four cylindrical traps (100 cm height, 9 cm diameter) deployed in 20 and 60 m depth at the main sampling point. The trap collection bottles were retrieved approximately every 6 weeks.
The TP content of the dried material was determined spectrophotometrically after digestion of 5–10 mg dry sediment in a solution of 2 mL 5 M H_2SO_4, 2 mL 30% H_2O_2, and 20 mL distilled water at 150 °C for 8 h. Total contents of Ca, Fe, and Mn were determined by inductively coupled plasma optical emission spectrometry (ICP-OES, iCAP 6300, Thermo Fisher Scientific, Waltham, MA, USA) after wet digestion (36% HCl, 65% HNO_3, volumetric

ratio of 1:3) in a high-pressure microwave oven (model µPrep-A, MLS GmbH, Leutkirch, Germany).

Macrophytes

Submerged macrophytes were mapped by scuba divers along the same 13 transects in 2008, 2014, 2015, 2016 and 2020 (Van de Weyer et al., 2015). The depth distribution and length of uniform vegetation zones were determined along each transect. All macrophytes were surveyed within each vegetation zone using the Londo (1976) scale from the shoreline down to the lower vegetation limit. Coverage was determined for each macrophyte species by first multiplying width (10 m) and length of the vegetation zones and their respective coverage, then summing values over all 13 transects.

Phytoplankton

Water samples for phytoplankton analyses were taken at the deepest point of Lake Stechlin (69.5 m) situated in the main basin. Samples were taken in 5 m depth increments (0, 5, 10, 15, 20, 25 m) and pooled to obtain an integrated mixed sample (0-25 m) of the euphotic depth (Kröger et al. 2023).

Parameters

Sediment

Core ID – Number of the sediment core
Sediment horizon – Sediment depth
DM (%) – Dry mass
LOI (%) – Loss on ignition
Al (mg g^{-1}) – Aluminum
Ca (mg g^{-1}) – Calcium
Fe (mg g^{-1}) – Iron
Mg (mg g^{-1}) – Magnesium
Mn (mg g^{-1}) – Manganese
P (mg g^{-1}) – Phosphorus
S (mg g^{-1}) – Sulfur
S:Fe (mol mol^{-1}) – Sulfur/iron-ratio
Ti (mg g^{-1}) – Titanium
K (mg g^{-1}) – Potassium
Na (mg g^{-1}) – Sodium
Zn (mg kg^{-1}) – Zinc
Cu (mg kg^{-1}) – Copper
Hg (µg kg^{-1}) – Mercury

Sedimentation rates

Trap deployment – Date of deployment of the traps
Trap retrieval – Date of replacement of the traps
Water depth (m) – Water depth where traps were deployed

Sedimentation (g m^{-2} d^{-1}) – Sedimentation rate of dry mass
Calcium (mg m^{-2} d^{-1}) – Calcium sedimentation rate
Iron (mg m^{-2} d^{-1}) – Iron sedimentation rate
Manganese (mg m^{-2} d^{-1}) – Manganese sedimentation rate
Phosphorus (mg m^{-2} d^{-1}) – Phosphorus sedimentation rate
Comment – Comment

Macrophytes
Year of investigation – Year of investigation
Nitellopsis obtusa – Areal coverage of *Nitellopsis obtusa* (m^2)
Ceratophyllum demersum – Areal coverage of *Ceratophyllum demersum* (m^2)

Phytoplankton
Year – Year of investigation
Phytoplankton biomass (mg wet mass L^{-1}) – Phytoplankton biomass
Cyanobacteria biomass (mg wet mass L^{-1}) – Cyanobacteria biomass

References
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