Chlorophyll a
Lake Constance data documentation

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Lake name: Lake Constance

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Sampling site

Lake Constance (LC) is a temperate, large (476 km^2), deep (mean depth = 101 m, max. depth 252 m), and warm-monomictic lake north of the European Alps of glacial origin with weak pelagic-benthic coupling, and little allochthonous input into the pelagic zone (Bäuerle & Gaedke 1998). Plankton biomass and the factors regulating growth exhibit strong seasonality (Sommer *et al*. 1986, Boit & Gaedke 2014 and literature therein). The annually repeated, successional cycle in LC is largely driven by autogenic processes during the growing season from March until October/November (Sommer *et al.* 1986, Sommer 1986, Peeters *et al.* 2007, Tirok & Gaedke 2007) and by abiotic forcing during winter.

Sampling methods

At the deepest site (147 m) of the north-western part of Lake Constance ("Überlinger See"), chlorophyll-a was measured weekly to bi-weekly during the growing season and approximately bi-weekly to monthly in winter between 1980-2000 (Häse *et al.* 1998). There is a gap in the measurements from 1984-1985. Water samples were collected from 15 depths levels covering the euphotic zone. The samples were subsequently filtered onto glass-fiber filters (a product by Schleicher & Schuell Filters, No. 6). Particular care was taken to minimize light exposure of the samples during handling. Chlorophyll-a was analysed spectrophotometrically after extraction in hot ethanol and was corrected for phaeopigments by acidification (for details, see Tilzer 1983).

Chlorophyll-a datasets

We provide two datasets 1 and 2 with approximately (bi-) weekly measurements comprising the long-term chlorophyll-a data for each sampling date (1980-2000). Dataset 1 provides the chlorophyll-a concentration (in µg/l) resolved by different depth layers (n = 13974). Derived from this dataset, we provide a depth-averaged Dataset 2 (Fig. 1) which contains the chlorophyll-a concentration (in µg/l) for each sampling date averaged across the upper 0-20m depth (n = 788).

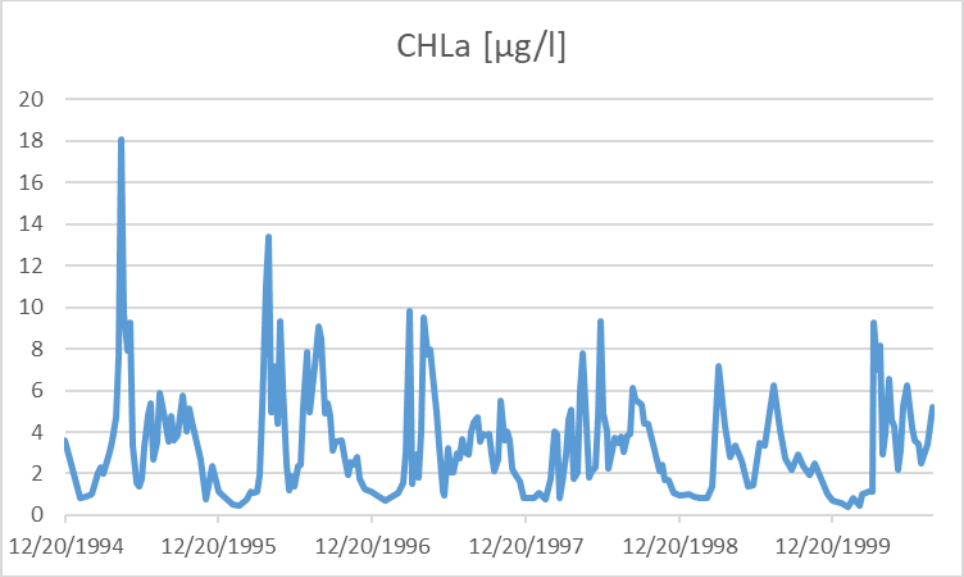

Fig. 1: The time series of the depth-integrated Chlorophyll-a in µg/l as provided by Dataset 2.

Dataset 1: Depth-resolved chlorophyll-a

Filename: "Dataset_1_Lake_Constance_Chlorophyll_a_Depth_Resolved"
This dataset contains the depth-resolved chlorophyll-a concentration from 1980-2000. Measurements were taken at different depths from 1 to 140 meters.

Column headers

A. Date

B. Depth [m]

C. CHLa [µg /l]

Dataset 2: Depth-averaged chlorophyll-a

Filename: "Dataset_2_Lake_Constance_ Chlorophyll_a_Depth_Averaged"
This dataset provides the chlorophyll-a concentration averaged across the upper 0-20 m depth at each sampling date from 1980-2000. Note that this dataset has the same unit as the depth-resolved dataset (µg Chl a/l).

Column headers

D. Date

E. CHLa [µg /l]

References

General references on Lake Constance

Bäuerle E, Gaedke U (1998) Lake Constance: characterization of an ecosystem in transition. Stuttgart, Germany: Schweizerbartsche Verlagsbuchhandlung.

Boit A, Gaedke U (2014) Benchmarking Successional Progress in a Quantitative Food Web. PLoS One 9(2): e90404

Peeters F, Straile D, Lorke A, Ollinger D (2007) Turbulent mixing and phytoplankton spring bloom development in a deep lake. Limnology and Oceanography 52: 286–298.

Sommer U, Gliwicz ZM, Lampert W, Duncan A (1986) The PEG-Model of Seasonal Succession of Planktonic Events in Fresh Waters. Archiv für Hydrobiologie 106: 433–471.

Sommer U (1986) The periodicity of phytoplankton in Lake Constance (Bodensee) in comparison to other deep lakes of central Europe. Hydrobiologia 138: 1–7.

Tirok K, Gaedke U (2007) The effect of irradiance, vertical mixing and temperature on spring phytoplankton dynamics under climate change – long-term observations and models. Oecologia 150: 625-642.

Specific references for this data package

Häse C, Gaedke U, Seifried A, Bärbel B, Tilzer MM (1998) Phytoplankton response to re-oligotrophication in large and deep Lake onstance: Photosynthetic rates and chlorophyll concentrations. Arch. Hydrobiol. Spec. Issues Advanc. Limnol. 53: 195-178.

Tilzer MM (1983) The importance of fractional light absorption by photosynthetic pigments for phytoplankton productivity in Lake Constance. Limnology and Oceanography 28(5): 833-846.