

Autotrophic picoplankton biomass Lake Constance data documentation

Updated 05 July 2018

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Lake name: Lake Constance

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Sampling site

Lake Constance (LC) is a temperate, large (476 km²), 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 and 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 2007, Tirok & Gaedke 2007) and by abiotic forcing during winter.

Sampling methods

Autotrophic picoplankton (APP) was measured *in situ* as described by Weisse (1991). Samples were taken at the deepest site (147 m) of the north-western part of Lake Constance ("Überlinger See"). During the growing season when the lake is more or less stratified, the routine sampling interval was once per week. In winter time, one sample was taken every 2-3 weeks. Samples were taken in 10 subsequent hauls using a 2 m long (4l volume) water sampler covering the entire water column from surface to 20 m depth. Samples were fixed immediately with formalin (final concentration 1.5% by volume) and later concentrated onto 0.2 µm Nuclepore filters under gentle vacuum. The filters were analyzed using epifluorescence microscopy as described in Weisse (1988, 1990). APP cell counts were converted to biomass using the seasonally variable cell volume of APP in Lake Constance and a conversion factor for carbon content (see below).

APP biomass datasets

We provide two datasets 1-2 with approximately (bi-)weekly measurements comprising the long-term APP biomass data for each sampling date from 1987-1995 or 1996).

Dataset 1 is depth-resolved in two water layers from 0-8m and 8-20m, whereas Dataset 2 is depth-integrated over 0-20m (Weisse 1991). Dataset 1 maps onto Dataset 2 by depth integration (Fig. 1 shows the depth-integrated time series as a reference).

The cell volume of APP in Lake Constance varies over the course of the year between about $0.3 \mu\text{m}^3$ - $1.2 \mu\text{m}^3$ (Weisse and Kentner 1991). The conversion from cell volume to carbon content was done using a linear relationship of $0.19 * (\text{cell volume in } \mu\text{m}^3)$ (Gaedke 1992) based on own measurements.

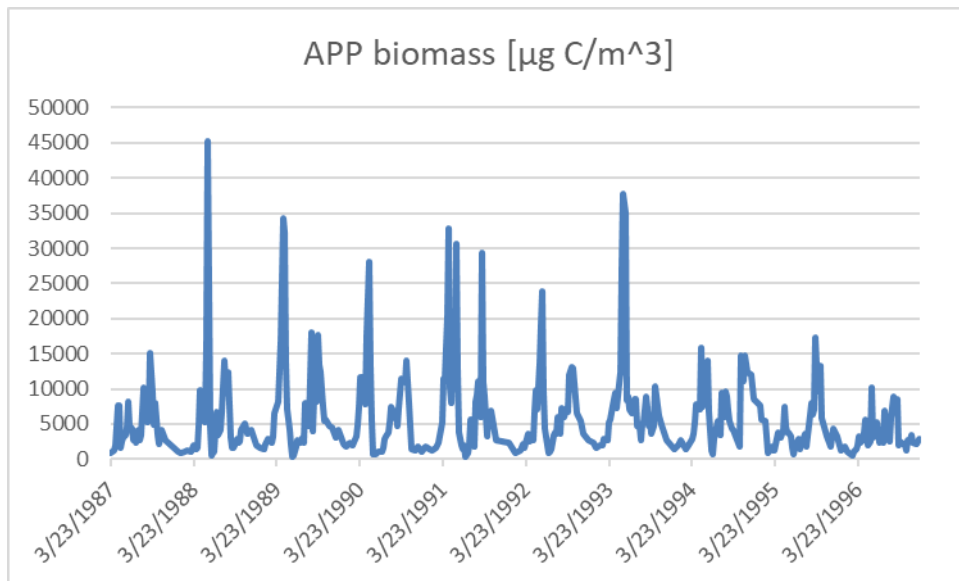


Fig. 1: Total, depth-integrated APP biomass in $\mu\text{gC/m}^3$ as provided by Dataset 2.

Dataset 1: Depth-resolved APP biomass

Filename: "Dataset_1_Lake_Constance_AutotrophicPicoplankton_Biomass_Depth_Resolved"

This dataset contains the APP biomass from 1987-1995 in $\mu\text{g C/m}^3$ resolved by two depth layers (0-8m and 8-20m, $n = 686$). In addition to biomass, we also report the APP abundances in 10^3 cells/ml for comprehensiveness so that alternative conversion factors from cell volume to biomass can be applied. The seasonal development of the APP biomass in this dataset is very similar to the Fig. 6 in the original publication by Weisse (1991). Differences are due to different conversion factors from cell volume to biomass. Note that the original publications (Kentner and Weisse (1991), Gaedke and Weisse (1998)) show APP abundances in 10^4 cells/ml.

Column headers

- A. Date
- B. Depth [m]
- C. Abundance [10^3 cells/ml]
- D. Biomass [$\mu\text{g C/m}^3$]

Dataset 2: Depth-integrated APP biomass

Filename: "Dataset_2_Lake_Constance_AutotrophicPicoplankton_Biomass_Depth_Integrated_a"

This dataset is based on Dataset 1 and contains the APP biomass in $\mu\text{g C/m}^3$ from 1987-1996 integrated over 0-20m depth. ($n = 384$).

Column headers

- A. Date

B. Abundance [10^3 cells/ml]

C. Biomass [$\mu\text{g C/m}^3$]

References

General references on Lake Constance

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Specific references for this data package

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