Primary production
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 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).

Sampling methods

At the deepest site (147 m) of the north-western part of Lake Constance ("Überlinger See"), primary production was measured weekly during the growing season and approximately bi-weekly to monthly in winter between 1980-1997 (Häse *et al.* 1996). There is a gap in the measurements from 1984-1985. Water samples were collected from 15 depths levels covering the euphotic zone. Primary production was estimated using a modified radiocarbon method (^{14}C). Duplicate light bottles and one dark bottle were incubated in situ at the respective sampling depths for 4 hours around local noon time. The samples were subsequently filtered onto membrane filters after withdrawing another sample for measuring the added activity of ^{14}C. Particular care was taken to minimize light exposure of the samples during handling. During the incubation period, a concomitant profile of the photosynthetically available radiation was recorded by an underwater scalar irradiance meter. From this profile, the euphotic depth was determined by the depth at which 1% of the surface irradiance penetrated (for details see Häse et al. 1998, Tilzer 1983, and Tilzer & Beese 1988). Chlorophyll *a* was analysed spectrophotometrically after extraction in hot ethanol and was corrected for phaeopigments by acidification. Daily photosynthetic rates were extrapolated from vertical integrals of the 4-hour incubations using Talling's light division hours as described in detail by Tilzer and Beese (1988).

Primary production datasets

We provide two datasets 1 and 2 with approximately (bi-)weekly measurements comprising the long-term primary production data for each sampling date (1980-1997). Dataset 1 provides the primary production resolved by different depth layers (n = 8795). Derived from this dataset, we provide a depth-integrated Dataset 2 (Fig. 1) which contains the primary production for each sampling date integrated across the upper 0-20m depth representing the euphotic depth (n = 579).

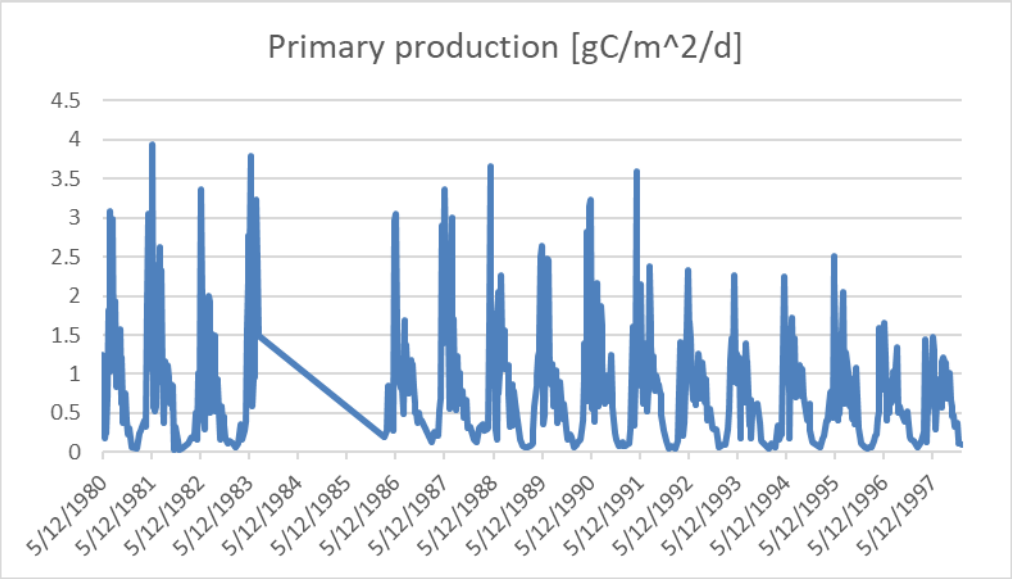

Fig. 1: Depth-integrated primary production in gC/m2 per day as provided by Dataset 2. Note the data gap between 1984-1985.

Dataset 1: Depth-resolved primary production

Filename: "Dataset_1_Lake_Constance_Primary_Production_Depth_Resolved"
This dataset is the depth-resolved primary production at each sampling date (in mg C/m^3/h) from 1980-1997. The depth levels from 0-30m are not consistent throughout the individual samples as the incubation depth was always adjusted to the euphotic depth (see above).

Column headers

A. Date
B. Depth [m]
C. Production [mg C/m^3/h]

Dataset 2: Depth-integrated primary production

Filename: "Dataset_2_Lake_Constance_ Primary_Production _Depth_Integrated"
This dataset provides the primary production integrated across the upper 0-20 m depth at each sampling date from 1980-1997.

Column headers

D. Date
E. Production [mg C/m^2/d]

References

General references on Lake Constance

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

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Specific references for this data package

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