

# Bacterial 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<sup>2</sup>), 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

Bacterioplankton production (BP) was measured at the deepest site (147 m) of the north-western part of Lake Constance ("Überlinger See") in the years 1990, 1991 and 1993-1997 by the leucine method in 5 depths between 1m and 20m, 25m, 50m or 120m at *in situ* temperature in the dark around noon (Simon & Azam 1989). For 1992 and partly the winters of 1993/1994 and 1994/1995, data are not available. Hourly rates measured at individual depths were summed vertically to a depth of 20 m. This depth corresponds to the annual maximum of the euphotic zone (Tilzer *et al.* 1991). Daily rates were computed from the hourly values by multiplication with a factor of 24. For further details, see below and Simon *et al.* (1998), Simon and Tilzer (1987), and Hanisch *et al.* (1996).

### Bacterial production datasets

We provide two datasets 1 and 2 with approximately (bi-) weekly measurements comprising the long-term bacterial production data for each sampling date (1990-1991 and 1993-1997). Dataset 1 provides the bacterial production resolved by different depth layers (n = 1166). Derived from this dataset, we provide a depth-integrated Dataset 2 (cf. Fig. 1 as a reference) which contains the bacterial production for each sampling date integrated across the upper 0-20m depth (n = 200).

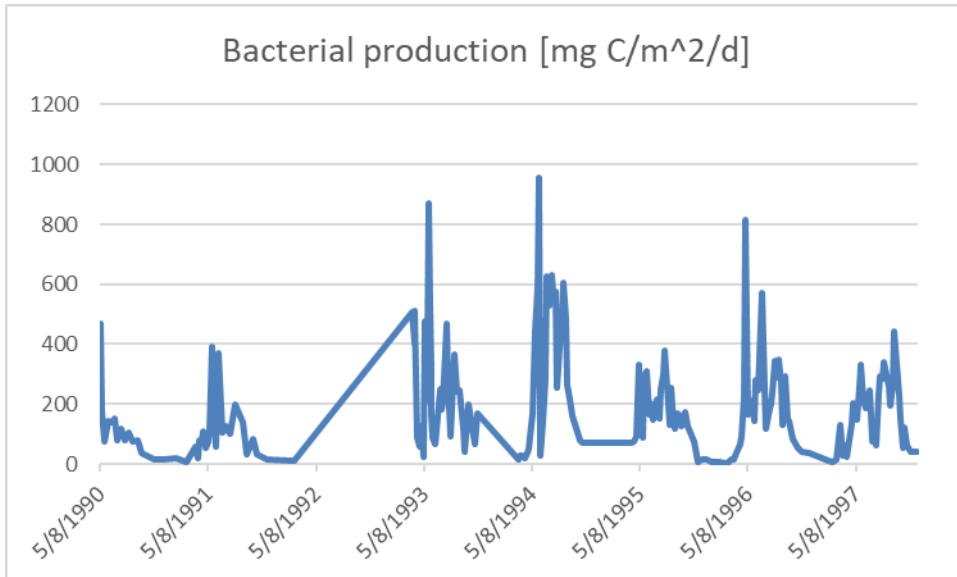


Fig. 1: Depth-integrated, bacterial production in mgC/m<sup>2</sup> per day as provided by Dataset 2. Note the data gaps in 1992 and in the winters of 1993/1994 and 1994/1995.

### Depth integration

The bacterial production was depth-integrated by calculating the weighted sum over several depth layers. The “depth” in column B of dataset 1 represents depth layers and their associated weighting factors are as follows:

- 1 m: 0-2m with weighting factor 2.
- 3 m: 2-4.5 m with weighting factor 2.5.
- 6 m: 4.5-8 m with weighting factor 3.5.
- 10 m: 8-12.5 m with weighting factor 4.5.
- 15 m: 12.5-17.5 m with weighting factor 5.
- 20 m: 17.5-20 m with weighting factor 2.5.

Note on the unit conversion between the depth-resolved and the depth-integrated files:

Summing up the weighted production values in [μg C/l/h] over 20m depth results in a value referring to a water column of 20m. Factor 24 is then applied to convert from hourly values to daily values in [mgC/m<sup>3</sup>]\*20m which is equivalent to the unit [mgC/m<sup>2</sup>], i.e. the bacterial production under a m<sup>2</sup> in the uppermost 0-20 m of the water column.

### Dataset 1: Depth-resolved bacterial production

**Filename: “Dataset\_1\_Lake\_Constance\_Bacterial\_Production\_Depth\_Resolved”**

This dataset contains the depth-resolved hourly bacterial production from 1990-1991 and 1993-1997. Measurements were taken at different depths, e.g. 1, 3, 6, 10, 15, 20, 30 and/or 50, and 120 meters.

#### Column headers

- A. Date
- B. Depth [m]
- C. Production [μg C/l/h]

## **Dataset 2: Depth-integrated bacterial production**

**Filename: "Dataset\_2\_Lake\_Constance\_Bacterial\_Production\_Depth\_Integrated"**

This dataset provides the daily bacterial production integrated across the upper 0-20 m depth at each sampling date from 1990-1991 and 1993-1997.

### **Column headers**

- A. Date
- B. Production [mg C/m<sup>2</sup>/d]

## References

### General references on Lake Constance

- Bäuerle E, Gaedke U (1998) Lake Constance: characterization of an ecosystem in transition. Stuttgart, Germany: Schweizerbart'sche Verlagsbuchhandlung.
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### Specific references for this data package

- Hanisch K, Schweitzer B, Simon M (1996) Utilization of dissolved carbohydrates by planktonic bacteria in a mesotrophic lake. *Microb. Ecol.* 31: 41-55.
- Simon M, Bunte C, Schulz M, Weiss M, Wünsch C (1998) Bacterioplankton dynamics in lake Constance (Bodensee): Substrate utilization, growth control, and long-term trends. *Arch. Hydrobiol. Spec. Issues Advanc. Limnol.* 53:195-221.
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