Rates of bacterial protein production at Lake Feldberger Haussee 2010-2020

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Data origin Data were collected by IGB from 2010-05-03 onwards (Elke Mach).

Data

Sampling site

Lake Feldberger Haussee is a dimictic eutrophic hard-water lake located in the urban area of Feldberg in the Feldberg Lake District Nature Park (Naturpark Feldberger Seenlandschaft), Mecklenburg-Vorpommern, Germany (53°20‘30“N, 13°26‘55“E). The lake has a maximum depth of 12.5 m, a mean depth of 5.83 m, a surface area of 1.32 km^2 and a volume of 7.69 x 10^6 m^3. The catchment area has a size of 5.8 km^2 (Morphometric and catchment size data from Umweltministerium M-V, calculation base 2015). Due to excessive loads of sewage discharge from municipalities and agriculture in the 1960s and 1970s, the originally mesotrophic or slightly eutrophic clear-water lake underwent a eutrophication process with high nutrient loads, massive algal blooms and high oxygen depletion. The lake has been subject to restoration activities through biomanipulation from 1985-2002 (Nixdorf et al. 2004) and a treatment with poly-alumninium chloride (PAC) as precipitant in April 2011 (Kasprzak 2018).

Time span 2010-2020

Sampling method

Samples were taken monthly in the mixed upper layer in a mixed water sample taken in depths between 0 m and 5 m depending on epilimnion depth. From May to September fortnightly samples have sometimes been taken.

Rates of bacterial protein production (BPP) were determined by incorporation of 14[C]-leucine (14C-Leu, Simon and Azam, 1989). Triplicates and a formalin-killed control were incubated with 14C-Leu (1.15×10^{10} Bq $mmol^{-1}$, Amersham, England) at a final concentration of 50 nmol l^{-1}, which ensured saturation of uptake systems of both free and particle-associated bacteria. Incubation was performed in the dark at in situ temperature (4-25°C) for 1 h. After fixation with 2% formalin, samples were filtered onto 5.0 µm (attached) and 0.2 µm (total isotope incorporation) nitrocellulose filters (Sartorius, Germany) and extracted with ice-cold 5% trichloroacetic acid (TCA) for 5 min. Thereafter, filters were rinsed twice with ice-cold 5% TCA, once with ethanol (96% v/v), and dissolved with ethylacetate for measurement by liquid scintillation counting. Standard deviation of triplicate measurements was usually <15%. BPP of free bacteria was calculated by subtraction of attached BPP from total BPP. The amount of incorporated 14C-Leu was converted into BPP by using an intracellular isotope dilution factor of 2. A conversion factor of 0.86 was used to convert the protein produced into carbon (Simon and Azam, 1989). The protocol was modified after Allgaier et al. 2008 including the separation between free-living and particle-associated bacteria (see above).

Parameters

- `date` – date of measurement [`YYYY-MM-DD`]
- `depth` – depth of measurement [m]
- `leucine` – type of leucine that was used when processing the samples
- `light/dark` – indication whether measurements were performed at light or dark conditions
- `BPP-C_particle_hour` – particle-associated bacterial production [µg $l^{-1}h^{-1}$]
- `BPP-C_particle_day` – particle-associated bacterial production [µg $l^{-1}d^{-1}$]
- `BPP-C_water_hour` – free water bacterial production [µg $l^{-1}h^{-1}$]
- `BPP-C_water_day` – free water bacterial production [µg $l^{-1}d^{-1}$]
- `BPP-C_total_hour` – total bacterial production [µg $l^{-1}h^{-1}$]
- `BPP-C_total_day` – total bacterial production [µg $l^{-1}d^{-1}$]
- `comment_raw` – comments in the raw data by technician
- `comment_dm` – comments by the data manager

References

Allgaier M, Riebesell U, Vogt M, Thyrhaug R, Grossart, HP. 2008. Coupling of heterotrophic bacteria to phytoplankton bloom development at different pCO_2 levels: a mesocosm study. Biogeosciences 5: 1007-1022. 10.5194/bg-5-1007-2008.

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Nixdorf B, Hemm M, Hoffmann A, Richter P. 2004. "Feldberger Haussee", Dokumentation von Zustand und Entwicklung der wichtigsten Seen Deutschlands. Teil 2 Mecklenburg-Vorpommern. Umweltbundesamt. UBA-Bericht Forschungsbericht 29924274, UBA-FB 000511, p. 77.

Simon M, Azam F. 1989. Protein content and protein synthesis rates of planktonic marine bacteria. Marine Ecology Progress Series 51: 201-213.

Umweltministerium M-V, calculation base 2015, Abteilung Integrierter Umweltschutz und Nachhaltige Entwicklung - Seenprojekt, 2002: Mathes, J. & Korczynski, I. Pampower Str. 66/68, 19061 Schwerin.

Change log

- 2020/2021 Silke R. Schmidt: Data were compiled from raw data files from single measurement dates. Values from beginning until end of 2010 were corrected with factor 0.86, which was not included in the raw data. Negative values were deleted.