

Rates of bacterial protein production at Lake Breiter Luzin 2003-2020

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Data origin Data were collected by IGB from 2003-04-01 onwards (Elke Mach).

Rights of usage Access to the data can be requested from the contact person.

Data

Sampling site

Lake Breiter Luzin is a mesotrophic hard-water lake located in the Feldberg Lake District Nature Park (Naturpark Feldberger Seenlandschaft), Mecklenburg-Vorpommern, Germany (53°21'19"N, 13°27'55"E). The lake has a maximum depth of 58.3 m, a mean depth of 22.8 m, a surface area of 3.37 km² and a volume of 76.89 × 10⁶ m³. The catchment area has a size of 22.6 km² (Morphometric and catchment size data from Umweltministerium M-V, calculation base 2015). Lake Breiter Luzin is divided into two basins. The Northwestern shore is relatively steep and mainly populated with beech, the opposite shore exhibits a well developed reed bed (Nixdorf et al. 2004).

Time span 2003-2020

Sampling method

Samples were taken monthly in the mixed upper layer in a mixed water sample taken in depths between 0 m and 10 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 (1.15×10¹⁰ 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 [$\mu\text{g l}^{-1}\text{h}^{-1}$]
- BPP-C_particle_day – particle-associated bacterial production [$\mu\text{g l}^{-1}\text{d}^{-1}$]
- BPP-C_water_hour – free water bacterial production [$\mu\text{g l}^{-1}\text{h}^{-1}$]
- BPP-C_water_day – free water bacterial production [$\mu\text{g l}^{-1}\text{d}^{-1}$]
- BPP-C_total_hour – total bacterial production [$\mu\text{g l}^{-1}\text{h}^{-1}$]
- BPP-C_total_day – total bacterial production [$\mu\text{g l}^{-1}\text{d}^{-1}$]
- 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 pCO₂ levels: a mesocosm study. *Biogeosciences* 5: 1007-1022. 10.5194/bg-5-1007-2008.

Nixdorf B, Hemm M, Hoffmann A, Richter P. 2004. "Breiter Luzin", Dokumentation von Zustand und Entwicklung der wichtigsten Seen Deutschlands. Teil 2 Mecklenburg-Vorpommern. Umweltbundesamt. UBA-Bericht Forschungsbericht 29924274, UBA-FB 000511, p. 26.

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.