Anoxic chlorophyll maximum enhances local organic matter remineralization and nitrogen loss in Lake Tanganyika

JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

ID 4637295
Author(s) Callbeck, Cameron M.; Ehrenfels, Benedikt; Baumann, Kathrin B. L.; Wehrli, Bernhard; Schubert, Carsten J.
Author(s) at UniBasel Callbeck, Cameron ;
Year 2021
Title Anoxic chlorophyll maximum enhances local organic matter remineralization and nitrogen loss in Lake Tanganyika
Journal Nature Communications
Volume 12
Number 1
Pages / **Article-Number** 830
Mesh terms Ammonium Compounds, chemistry, metabolism; Anaerobiosis, physiology; Autotrophic Processes; Carbon, chemistry, metabolism; Carbon Cycle, physiology; Chlorobi, chemistry, metabolism; Chlorophyll, chemistry, metabolism; Democratic Republic of the Congo; Ecosystem; Isotope Labeling; Lakes, chemistry, microbiology; Nitrification, physiology; Nitrogen, chemistry, metabolism; Nitrogen Cycle, physiology; Oxidation-Reduction; Synechococcus, chemistry, metabolism; Tanzania
In marine and freshwater oxygen-deficient zones, the remineralization of sinking organic matter from the photic zone is central to driving nitrogen loss. Deep blooms of photosynthetic bacteria, which form the suboxic/anoxic chlorophyll maximum (ACM), widespread in aquatic ecosystems, may also contribute to the local input of organic matter. Yet, the influence of the ACM on nitrogen and carbon cycling remains poorly understood. Using a suite of stable isotope tracer experiments, we examined the transformation of nitrogen and carbon under an ACM (comprising of Chlorobiaceae and Synechococcales) and a non-ACM scenario in the anoxic zone of Lake Tanganyika. We find that the ACM hosts a tight coupling of photo/litho-autotrophic and heterotrophic processes. In particular, the ACM was a hotspot of organic matter remineralization that controlled an important supply of ammonium driving a nitrification-anammox coupling, and thereby played a key role in regulating nitrogen loss in the oxygen-deficient zone.
Publisher Nature Research
ISSN/ISBN 2041-1723
edoc-URL https://edoc.unibas.ch/86514/
Full Text on edoc Available;
Digital Object Identifier DOI 10.1038/s41467-021-21115-5
PubMed ID http://www.ncbi.nlm.nih.gov/pubmed/33547297
ISI-Number WOS:000617500200003
Document type (ISI) Journal Article