Metagenome accession numbers for samples collected in the eastern tropical North Pacific Ocean in 2017 on R/V Oceanus cruise 1704A

Website: https://www.bco-dmo.org/dataset/986605
Data Type: Cruise Results
Version: 1
Version Date: 2025-10-27

Project
» CAREER: Oxygen sensitivity of aerobic respiration and nitrification in oxygen minimum zones and biogeochemical feedbacks to deoxygenation (RANDOM)

Contributors	Affiliation	Role
Beman, John Michael	University of California-Merced (UC Merced)	Principal Investigator
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Abstract
Water samples were collected for DNA extraction using sampling bottles deployed on the CTD rosette. At each depth, 2L samples were filtered through 0.22 µm filters (Millipore, Darmstadt, Germany) using a peristaltic pump and frozen until extraction. DNA was extracted following Beman et al. (2012) and sent for metagenome sequencing in the Vincent J. Coates Genome Sequencing Laboratory (GSL) at the University of California, Berkeley. For each sample, 250 ng of genomic DNA was sheared and libraries were prepared using the KAPA HyperPrep Kit (Kapa Biosystems, Wilmington, MA, USA). Samples were pooled into a single lane and sequenced via 150- cycle paired-end sequencing on the Illumina HiSeq 4000 platform (Illumina, Inc., San Diego, CA, USA).

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Coverage

Location: Eastern Tropical North Pacific Ocean
Spatial Extent: **N**:20.5 **E**:-106.5 **S**:16 **W**:-110
Temporal Extent: 2017-04-20 - 2017-04-27

Methods & Sampling

Water samples were collected for DNA extraction using sampling bottles deployed on the CTD rosette. At each depth, 2-liter (L) samples were filtered through 0.22-micrometer (µm) filters (Millipore, Darmstadt, Germany) using a peristaltic pump and frozen until extraction. DNA was extracted following Beman et al. (2012) and sent for metagenome sequencing in the Vincent J. Coates Genome Sequencing Laboratory (GSL) at the University of California, Berkeley. For each sample, 250 ng of genomic DNA was sheared and libraries were prepared using the KAPA HyperPrep Kit (Kapa Biosystems, Wilmington, MA, USA). Samples were pooled into a single lane and sequenced via 150- cycle paired-end sequencing on the Illumina HiSeq 4000 platform (Illumina, Inc., San Diego, CA, USA).

BCO-DMO Processing Description

- Imported original file "BCODMO_BEMAN_ETNP17_Metagenomes.xlsx" into the BCO-DMO system.
- Converted date format to YYYY-MM-DD.
- Renamed fields to comply with BCO-DMO naming conventions.
- Saved the final file as "986605_v1_oc1704a_metagenome_accession_numbers.csv".

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Related Publications

Beman, J. M., Vargas, S. M., Wilson, J. M., Perez-Coronel, E., Karolewski, J. S., Vazquez, S., Yu, A., Cairo, A. E., White, M. E., Koester, I., Aluwihare, L. I., & Wankel, S. D. (2021). Substantial oxygen consumption by aerobic nitrite oxidation in oceanic oxygen minimum zones. Nature Communications, 12(1). https://doi.org/10.1038/s41467-021-27381-7
Results

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Related Datasets

IsRelatedTo

University of California, Merced. marine metagenome, ETNP OMZ Metagenomes. 2020/05. In: BioProject [Internet]. Bethesda, MD: National Library of Medicine (US), National Center for Biotechnology Information; 2011-. Available from: http://www.ncbi.nlm.nih.gov/bioproject/PRJNA634212. NCBI:BioProject: PRJNA634212.

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Parameters

Parameter	Description	Units
Latitude	Sampling latitude	degrees North
Longitude	Sampling longitude	degrees East
Date	Sampling date	unitless
Station	Station number	unitless
Depth	Sample depth	meters (m)
Repository	Database name that contains the metagenome sequences	unitless
Biosample_accession	NCBI BioSample accession	unitless
Sequencing_technology	Instrument model	unitless

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Instruments

Dataset-specific Instrument Name	Illumina HiSeq 4000
Generic Instrument Name	Automated DNA Sequencer
Generic Instrument Description	A DNA sequencer is an instrument that determines the order of deoxynucleotides in deoxyribonucleic acid sequences.

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Deployments

OC1704A

Website	https://www.bco-dmo.org/deployment/970009
Platform	R/V Oceanus
Start Date	2017-04-01
End Date	2017-04-29
Description	See more information at R2R: https://www.rvdata.us/search/cruise/OC1704A

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Project Information

CAREER: Oxygen sensitivity of aerobic respiration and nitrification in oxygen minimum zones and biogeochemical feedbacks to deoxygenation (RANDOM)

Website: https://bemanlab.org/about/research/research-etnp-and-goc/

Coverage: Eastern Tropical North Pacific Ocean

NSF Award Abstract:
Aerobic microorganisms in the ocean help regulate biogeochemical nutrient cycles through the linked production and consumption of dissolved oxygen (DO) and organic matter. Concentrations of DO have been shown to be steadily decreasing in deeper ocean waters and the resulting areas of critically low DO content, known as oxygen minimum zones (OMZs), are expanding. While this phenomenon is recognized as having potentially serious impacts on biogeochemical cycles where OMZs are growing, surprisingly little research has been done to identify the mechanisms and quantify the specific processes that will affect these changes. This project will study the connection between changing DO concentrations and nutrient cycling in the interior of the ocean. The oxidation of nitrogen compounds (ammonia and nitrite in particular) is strongly influenced by DO concentrations. Because of the complex and connected nature of marine biogeochemical reactions that involve DO, each one potentially altered by concentration changes, this research is critical for a complete understanding of how ocean chemistry will change in the near future. The project will incorporate education into the research by developing materials to teach high school students about the nitrogen cycle, by developing a marine chemistry based course for undergraduates that will give them both field and computational experience, and by building on past efforts to include traditionally underrepresented groups in science. One of the graduate students funded by this project will translate lectures into Spanish and make these available on the internet for increased accessibility for minority students.

The world's largest oxygen minimum zone (OMZ), located in the Eastern Tropical North Pacific (ETNP), is an ideal study site for research into the effects of varying dissolved oxygen (DO) concentrations on nutrient cycling in the interior ocean. Throughout this OMZ, the extent of anoxia exhibits a range that allows for study of the effect of changing DO content on the rates and mechanisms that control consumption of DO and organic matter by aerobic microorganisms in a 'real world' setting. In particular, ammonia and nitrite oxidation, reactions that play a critical role in the nitrogen cycle, are likely to be significantly affected by varying DO concentration. This project will evaluate aerobic respiration, ammonia, and nitrite oxidation rates at various stations in the ETNP, examine carefully controlled incubations, and develop primers to target active microorganisms in the OMZ; all to quantify the connections between DO and these biogeochemical nutrient cycles. The research will also examine the hypothesis that more organic carbon is respired in waters with low DO and a shallow OMZ than previously thought and evaluate the possibility that nitrogen cycling in low DO regions could push OMZs to anoxia due to nitrite oxidation coupled with nitrate reduction, which could potentially accelerate DO consumption. With the expansion of OMZ's in a changing ocean, it is crucial to more fully understand the connections between these various, complex, components.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1555375

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