In situ dissolved oxygen of experimental chambers and ambient sensors acquired in the shallow subtidal shore-accessible site in Bon Secour Bay, Mobile Bay, Alabama, USA between August 7-12, 2021

Website: https://www.bco-dmo.org/dataset/941205
Data Type: Other Field Results
Version: 1
Version Date: 2025-04-23

Project
» CAREER: Mechanisms of bioturbation and ecosystem engineering by benthic infauna (Bioturbation and Ecosystem Engineering)

Contributors	Affiliation	Role
Gadeken, Kara	University of South Alabama; and Dauphin Island Sea Lab (USA-DISL)	Student, Contact
Soenen, Karen	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
This dataset is part of a field study examining the effect of diel oxygen cycling on faunal activity, and in turn sediment oxygen demand. The field experiment used in situ flow-through benthic chambers to measure oxygen consumption, as described in the methods paper Gadeken et al 2023. The chambers were deployed and retrieved in three ~24 hour deployments in a shallow subtidal area of Bon Secour Bay in Mobile Bay, AL, in August 2021. This dataset contains streamlined data from the HOBO dissolved oxygen (DO) loggers and the log time of when the chamber system flushes the overlying water in the chamber and starts a new incubation.

Table of Contents

Coverage

Location: Shallow subtidal shore-accessible site in Bon Secour Bay, Mobile Bay, AL, USA
Spatial Extent: **Lat**:30.239478 **Lon**:-87.894094
Temporal Extent: 2021-08-05 - 2021-08-12

Methods & Sampling

This dataset is part of a field study examining the effect of diel oxygen cycling on faunal activity, and in turn sediment oxygen demand. The field experiment used in situ flow-through benthic chambers to measure oxygen consumption, as described in the methods paper Gadeken et al 2023.

The chambers were deployed and retrieved in three ~24 hour deployments in a shallow subtidal area of Bon Secour Bay in Mobile Bay, AL, in August 2021.

These data are streamlined data from the HOBO dissolved oxygen (DO) loggers combined with the log the time of each occasion when the chamber system flushes the overlying water in the chamber and starts a new incubation.

Upon completion of the 24 hour deployment, the chambers were extracted and oxygen data offloaded from the chamber loggers.

BCO-DMO Processing Description

* Merged all files based on DateTime without seconds. Added deployment and Chamber_Ambient parameters to dataset.
* Added sampling location to merged file
* Added separate files to dataset to be able to use in MatLab Code (see related dataset 940735)

Problem Description

The flush mechanism for chamber 1 malfunctioned during all three deployments of the system. This is evident by the lack of the expected sawtooth pattern in the data but worth noting here.

[table of contents | back to top]

Data Files

File
941205_v1_oxygen.csv (Comma Separated Values (.csv), 323.53 KB) MD5:9666de2e95c075364e8df651cdde600a Primary data file for dataset ID 941205, version 1

[table of contents | back to top]

Supplemental Files

File
Deployment1_Ambient.csv filename: RawData/Deployment1_Ambient.csv (Comma Separated Values (.csv), 26.72 KB) MD5:369cd9b466091f91fce15c40ea8d419d Raw dissolved oxygen data from DO HOBOs, and LOG files generated when the chamber system flushed the chambers.
Deployment1_FTC_LOG.CSV filename: RawData/Deployment1_FTC_LOG.CSV (Comma Separated Values (.csv), 1.19 KB) MD5:b0d9c25132ea6491bd0911a968239324 Raw dissolved oxygen data from DO HOBOs, and LOG files generated when the chamber system flushed the chambers.
Raw Data filename: RawData/Deployment2_Chamber1.csv (Comma Separated Values (.csv), 19.30 KB) MD5:17e6c6be23ffb696ca1c3d380e8ddd46 Raw dissolved oxygen data from DO HOBOs, and LOG files generated when the chamber system flushed the chambers.
Raw Data filename: RawData/Deployment3_Chamber3.csv (Comma Separated Values (.csv), 19.97 KB) MD5:1f894866e83a61c2d8144cac300cbb9f Raw dissolved oxygen data from DO HOBOs, and LOG files generated when the chamber system flushed the chambers.

File
Raw Data filename: RawData/Deployment2_Chamber3.csv (Comma Separated Values (.csv), 19.47 KB) MD5:11f0263bb213612b5b7a663287062598 Raw dissolved oxygen data from DO HOBOs, and LOG files generated when the chamber system flushed the chambers.
Raw Data filename: RawData/Deployment3_Chamber5.csv (Comma Separated Values (.csv), 19.97 KB) MD5:c63ce031f27b9fbbf293f2ab83e928bd Raw dissolved oxygen data from DO HOBOs, and LOG files generated when the chamber system flushed the chambers.
Raw Data filename: RawData/Deployment1_Chamber3.csv (Comma Separated Values (.csv), 19.17 KB) MD5:e5bad80f9fbd7d79642602fbc3c1ea83 Raw dissolved oxygen data from DO HOBOs, and LOG files generated when the chamber system flushed the chambers.
Raw Data filename: RawData/Deployment3_FTC_LOG.CSV (Comma Separated Values (.csv), 1.26 KB) MD5:38453f23e1cc9397fd341449fa47a1c5 Raw dissolved oxygen data from DO HOBOs, and LOG files generated when the chamber system flushed the chambers.
Raw Data filename: RawData/Deployment2_Ambient.csv (Comma Separated Values (.csv), 19.64 KB) MD5:838bef753336d88af7fb139bd2c950f8 Raw dissolved oxygen data from DO HOBOs, and LOG files generated when the chamber system flushed the chambers.
Raw Data filename: RawData/Deployment2_Chamber5.csv (Comma Separated Values (.csv), 19.55 KB) MD5:77b2c36503b44eacf8c629e3eef421ba Raw dissolved oxygen data from DO HOBOs, and LOG files generated when the chamber system flushed the chambers.
Raw Data filename: RawData/Deployment3_Chamber4.csv (Comma Separated Values (.csv), 19.96 KB) MD5:1c65eaa5de3d6107c562be1a4f307435 Raw dissolved oxygen data from DO HOBOs, and LOG files generated when the chamber system flushed the chambers.
Raw Data filename: RawData/Deployment3_Chamber1.csv (Comma Separated Values (.csv), 20.01 KB) MD5:5a18ff379edd13a95ab92de2bb46ff8e Raw dissolved oxygen data from DO HOBOs, and LOG files generated when the chamber system flushed the chambers.
Raw Data filename: RawData/Deployment2_Chamber2.csv (Comma Separated Values (.csv), 19.51 KB) MD5:006b171c077e815a0f706cacffcd201a Raw dissolved oxygen data from DO HOBOs, and LOG files generated when the chamber system flushed the chambers.
Raw Data filename: RawData/Deployment1_Chamber5.csv (Comma Separated Values (.csv), 19.22 KB) MD5:6f6dbed9add48469f7f54bab43c7c64d Raw dissolved oxygen data from DO HOBOs, and LOG files generated when the chamber system flushed the chambers.
Raw Data filename: RawData/Deployment1_Chamber1.csv (Comma Separated Values (.csv), 19.01 KB) MD5:ab15fc303945ac9eb3d1ea5f3ef896c6 Raw dissolved oxygen data from DO HOBOs, and LOG files generated when the chamber system flushed the chambers.
Raw Data filename: RawData/Deployment2_Chamber4.csv (Comma Separated Values (.csv), 19.50 KB) MD5:3b74f0572bb1c222127e9112ede19b5d Raw dissolved oxygen data from DO HOBOs, and LOG files generated when the chamber system flushed the chambers.
Raw Data filename: RawData/Deployment3_Chamber2.csv (Comma Separated Values (.csv), 19.96 KB) MD5:e7e3a0d662d45e49ca1cbe8a749ce456 Raw dissolved oxygen data from DO HOBOs, and LOG files generated when the chamber system flushed the chambers.

File	
Raw Data filename: RawData/Deployment1_Chamber2.csv Raw dissolved oxygen data from DO HOBOs, and LOG files generated when the chamber system flushed the chambers.	(Comma Separated Values (.csv), 19.18 KB) MD5:1fdcd468c9fc268bd071a6c3338fac2e
Raw Data filename: RawData/Deployment2_FTC_LOG.CSV Raw dissolved oxygen data from DO HOBOs, and LOG files generated when the chamber system flushed the chambers.	(Comma Separated Values (.csv), 1.26 KB) MD5:f7738deef047ab830d1c60acfb964e8b
Raw Data filename: RawData/Deployment1_Chamber4.csv Raw dissolved oxygen data from DO HOBOs, and LOG files generated when the chamber system flushed the chambers.	(Comma Separated Values (.csv), 19.36 KB) MD5:49e408df12b249db21a8516a04431c5b
Raw Data filename: RawData/Deployment3_Ambient.csv Raw dissolved oxygen data from DO HOBOs, and LOG files generated when the chamber system flushed the chambers.	(Comma Separated Values (.csv), 19.95 KB) MD5:3895232e898c168e4f96543d4f790c97

[table of contents | back to top]

Related Publications

Gadeken, K. J., Lockridge, G., & Dorgan, K. M. (2023). An in situ benthic chamber system for improved temporal and spatial resolution measurement of sediment oxygen demand. Limnology and Oceanography: Methods, 21(11), 645–655. Portico. https://doi.org/10.1002/lom3.10571
Results

[table of contents | back to top]

Related Datasets

IsSourceOf

Gadeken, K. (2025) **Processed dissolved oxygen and infauna of experimental chambers and ambient sensors acquired in the shallow subtidal shore-accessible site in Bon Secour Bay, Mobile Bay, Alabama, USA between August 7-12, 2021.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2025-04-21 doi:10.26008/1912/bco-dmo.940735.1 [view at BCO-DMO]
Relationship Description: Combined processed dissolved oxygen and infauna data from sediment chamber experiment

[table of contents | back to top]

Parameters

Parameter	Description	Units
Latitude	Sampling latitude	decimal degrees
Longitude	Sampling longitude	decimal degrees
date_time	Sampling datetime to the minute in Central Standard (CST) timezone and ISO format	unitless
DO	In situ dissolved oxygen	mg L-1
temperature	In situ temperature	Degrees Fahrenheit
Deployment	Deployment ID (1,2 or 3)	unitless
Chamber_Ambient	Chamber number or ambiernt measurement	unitless

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	benthic incubation chamber
Dataset-specific Description	This project used a custom built field deployable benthic chamber system. Construction and functioning of the system are outlined in Gadeken et al 2023 L&O:Methods.
Generic Instrument Description	A device that isolates a portion of seabed plus overlying water from its surroundings. Either returns the entire system to the surface or incorporates sampling devices and/or in-situ sensors.

Dataset-specific Instrument Name	Onset HOBO DO loggers (U26-001)
Generic Instrument Name	Onset HOBO U26-001 Dissolved Oxygen Data Logger
Generic Instrument Description	A dissolved oxygen sensor, temperature sensor, and integrated data logger. The HOBO U26-001 can be used in freshwater and saltwater conditions, and outputs dissolved oxygen (mg/L) and temperature (degC) measurements.

[table of contents | back to top]

Project Information

CAREER: Mechanisms of bioturbation and ecosystem engineering by benthic infauna (Bioturbation and Ecosystem Engineering)

Coverage: Dauphin Island Sea Lab, Dauphin Island, AL

NSF Award Abstract:
Marine sediments are important habitats for abundant and diverse communities of organisms that are important as food sources for higher trophic levels, including commercially important species. Through burrowing, constructing tubes, and feeding on sediments, these animals modify their physical and chemical environments to such an extent that they are considered ecosystem engineers. Bioturbation, the mixing of sediments by animals, is important in regenerating nutrients and transporting pollutants and carbon bound to mineral grains. Despite its importance, our ability to predict bioturbation rates and patterns from the community structure is poor, largely due to a lack of understanding of the mechanisms by which animals mix sediments. This project builds on earlier work showing that animals extend burrows through muddy sediments by fracture to test the hypothesis that the mechanical properties of sediments that affect burrowing mechanics also affect sediment mixing. More broadly, this project examines the relative contributions of (i) the functional roles of the organisms in the community, (ii) the mechanical properties of sediments, and (iii) factors that might increase or decrease animal activity such as temperature and food availability to bioturbation rates. Burrowing animals modify the physical properties of sediments, and this project quantifies these changes and tests the hypothesis that these changes are ecologically important and affect community succession following a disturbance. In addition to this scientific broader impact, this project involves development of instrumentation to measure sediment properties and includes a substantial education plan to introduce graduate, undergraduate, and middle school students to the important role that technology plays in marine science.

Through burrowing and feeding activities, benthic infauna mix sediments and modify their physical environments. Bioturbation gates the burial of organic matter, enhances nutrient regeneration, and smears the paleontological and stratigraphic record. However, current understanding of the mechanisms by which infaunal activities mix sediments is insufficient to predict the impacts of changes in infaunal community structure on important sediment ecosystem functions driven by bioturbation. This project tests specific hypotheses relating infaunal communities, bioturbation, and geotechnical properties with the ultimate goal of understanding the dynamic changes and potential feedbacks between infauna and their physical environments. This project integrates field and lab experiments to assess the relative importance of infaunal community structure and activities to bioturbation rates. Additionally, this project builds on recent work showing that muddy sediments are elastic gels through which worms extend burrows by fracture to propose that geotechnical properties of sediments mediate bioturbation by governing the release of particles from the sediment matrix during burrow extension. Finite element modeling determines how the release of particles by fracture during burrowing depends on the fracture toughness (cohesion) and stiffness (compaction) of sediments and complements laboratory experiments characterizing the impact of geotechnical properties on burrowing behaviors. The proposed research also aims to determine whether impacts of infauna on geotechnical properties are ecologically important. Changes in infaunal communities and geotechnical properties following an experimental physical disturbance address the hypothesis that ecosystem engineering of bulk sediment properties facilitates succession.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1844910

[table of contents | back to top]