Temperature and dissolved oxygen recorded two PME Mindot O2 loggers in the Florida Keys from 11-17 July 2017

Website: https://www.bco-dmo.org/dataset/849915
Data Type: Other Field Results
Version: 1
Version Date: 2021-04-21

Project
» Collaborative Research: Robust optode-based eddy correlation systems for oxygen flux measurements in aquatic environments (Robust optode-based eddy correlation systems)

Contributors	Affiliation	Role
Huettel, Markus	Florida State University (FSU - EOAS)	Principal Investigator, Contact
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Abstract
This dataset presents the temperature and oxygen data recorded by the two PME Minidot loggers. The loggers were deployed July 11-17, 2017 in a subtropical inner shelf environment (Salinity: 35-36, temperature: 28-31°C) approximately 9 km south of Long Key in the Florida Keys (24° 43.52'N, 80° 49.85'W). The site was located at 9 ± 1 m water depth near the center of a large flat carbonate platform covered with coral sand. The instruments were installed on the 3OEC instrument at ~35 cm above the sediment-water interface.

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Coverage

Spatial Extent: **Lat**:24.7253 **Lon**:-80.83083
Temporal Extent: 2017-07-11 - 2017-07-17

Methods & Sampling

Two PME Minidot loggers were deployed July 11-17, 2017 in a subtropical inner shelf environment (Salinity: 35-36, temperature: 28-31°C) approximately 9 km south of Long Key in the Florida Keys (24° 43.52'N, 80° 49.85'W). The site was located at 9 ± 1 m water depth near the center of a large flat carbonate platform covered with coral sand. The instruments were installed on the 3OEC instrument at ~35 cm above the sediment-water interface.

The temperature and oxygen data are the data recorded by factory-calibrated loggers:
Sampling rate is 1 /min
Oxygen range is 0 to 150%
Oxygen Resolution 0.01 mg/L
Oxygen Accuracy of +/- 1 mg/L

Response Time Approximately 30 seconds for oxygen

Temperature Range 0 to 35 degrees C
Temperature Resolution 10 millidigrees
Temperature Accuracy +/- 0.1 degrees C

The method of data analysis is reported in Huettel et al. (2020).

Data Processing Description

BCO-DMO Processing:
- renamed fields to comply with BCO-DMO naming conventions;
- added ISO8601 date/time field in UTC.

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Data Files

File
3OEC_temp_O2.csv (Comma Separated Values (.csv), 751.26 KB) MD5:8a7f6b25dcedb496101cc085256eb705 Primary data file for dataset ID 849915

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Related Publications

Huettel, M., Berg, P., & Merikhi, A. (2020). Technical note: Measurements and data analysis of sediment–water oxygen flux using a new dual-optode eddy covariance instrument. Biogeosciences, 17(17), 4459–4476. doi:10.5194/bg-17-4459-2020
Methods

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Parameters

Parameter	Description	Units
ISO_DateTime_EST	Date and time, Eastern Standard Time Zone; format follows ISO8601 standard: YYYY-MM-DDThh:mm:ss	unitless
Temperature_1	Temperature	degrees Celsius
Dissolved_Oxygen_Saturation_1	Percent dissolved oxygen saturation	percent (%)
Temperature_2	Temperature	degrees Celsius
Dissolved_Oxygen_Saturation_2	Percent dissolved oxygen saturation	percent (%)
ISO_DateTime_UTC	Date and time, UTC; format follows ISO8601 standard: YYYY-MM-DDThh:mm:ssZ	unitless

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Instruments

Dataset-specific Instrument Name	PME Minidot O2 logger
Generic Instrument Name	PME MiniDOT Logger
Dataset-specific Description	PME Minidot O2 logger; Serial number 458147, 482789. Calibrations: factory calibrated.
Generic Instrument Description	The PME miniDOT logger is a submersible sensor designed to measure water temperature and dissolved oxygen concentration. Dissolved oxygen is measured by an optode that measures lifetime-based luminescence quenching of a thin membrane. The sensing foil contains a coating with a variable fluorescence depending on the oxygen concentration of the surrounding water. The miniDOT reports in milligrams per liter (mg/L) and logs all measurements to an internal SD card. Also featured is a temperature sensor and batteries. Data can be offloaded to a computer via USB cable. The logger has an accuracy of +/- 5 percent (+/- 0.3 mg/L) for oxygen, and +/- 0.1 degrees Celsius for temperature. Temperature range is 0 to 35 degrees Celsius, oxygen range is 0 to 150 percent saturation. Depth-rated to 300 meters. Instrument description from the manufacturer: https://www.pme.com/products/minidot

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Deployments

Diodon_2017-07-11-12

Website	https://www.bco-dmo.org/deployment/849997
Platform	R/V Diodon
Start Date	2017-07-11
End Date	2017-07-12

Diodon_2017-07-13-14

Website	https://www.bco-dmo.org/deployment/850002
Platform	R/V Diodon
Start Date	2017-07-13
End Date	2017-07-14

Diodon_2017-07-15-16

Website	https://www.bco-dmo.org/deployment/850003
Platform	R/V Diodon
Start Date	2017-07-15
End Date	2017-07-16

Diodon_2017-07-16-17

Website	https://www.bco-dmo.org/deployment/850006
Platform	R/V Diodon
Start Date	2017-07-16
End Date	2017-07-17

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Project Information

Collaborative Research: Robust optode-based eddy correlation systems for oxygen flux measurements in aquatic environments (Robust optode-based eddy correlation systems)

Website: http://myweb.fsu.edu/mhuettel/Projects/NSF_Instr.html

Coverage: Sand flat at ~10 m water depth in Florida Keys, 9 km south of Long Key (24° 43.52'N, 80° 49.85'W)

NSF Award Abstract:

The PIs request funding to build and test robust eddy correlation instruments for unidirectional and oscillating flow environments based on sturdy fiber- and planar-optical sensors and novel signal-processing electronics. The new hardware will be supported by software development to correct potential flux underestimations caused by inadequate oxygen sensor response time and spatial offsets between oxygen and flow sensors. The fragility of the thin glass microelectrode used in aquatic eddy correlation instruments severely limits the use of this powerful technique for flux measurements in benthic environments. This problem represents the major bottleneck preventing the widespread use of this approach.

Broader Impacts:

The PIs have very strong records both in spreading the use of EC technology through the community and in graduate and undergraduate education. They outline clearly the ways in which they will continue their ongoing endeavors in both areas. In addition, the application of this technology to the geochemistry and ecology of shallow-water regions has broad implications for carbon cycling and ocean acidification studies, both of which have important societal ramifications. Better quantify oxygen fluxes in the aquatic environment is important for society. It can e.g. help predict when and if the health of an aquatic system is being weakened, and when e.g. hypoxia or anoxia is approaching. Anoxia leads to death of all higher life

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1334117
NSF Division of Ocean Sciences (NSF OCE)	OCE-1334848

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