HS- and NH4+ porewater data from Little Lagoon, Alabama collected from 2012-2013.

Website: https://www.bco-dmo.org/dataset/723975
Data Type: Other Field Results
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Project
» Groundwater Discharge, Benthic Coupling and Microalgal Community Structure in a Shallow Coastal Lagoon (LittleLagoonGroundwater)

Contributors	Affiliation	Role
Mortazavi, Behzad	National Science Foundation (NSF-DEB)	Principal Investigator, Contact
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Abstract
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Coverage

Spatial Extent: **Lat**:30.241929 **Lon**:-87.773756
Temporal Extent: 2012 - 2013

Dataset Description

HS- and NH4+ porewater data.

Methods & Sampling

Little Lagoon is a shallow coastal lagoon that is tidally connected to the Gulf of Mexico but has no riverine inputs. The water in the lagoon is replenished solely from precipitation and groundwater inputs primarily on the East end (Su et al. 2012). Because of the rapid development in Baldwin County, a large amount of NO3- enters the Little Lagoon system through SGD (Murgulet & Tick 2008). In this region, there can be rapid changes in the depth to groundwater (Fig. 4.1 inset) and episodic SGD inputs to the lagoon (Su et al.2013). Within the lagoon, three sites were selected (East, Mouth, and West) to represent the gradient that exists across the lagoon from the input of groundwater. Sites were sampled on a near-monthly basis from February 2012 to February 2013.

Porewater Samples

At each site, point measurements of temperature, salinity, pH, and dissolved oxygen (DO) were recorded with a YSI 556 Multiparameter Meter. Triplicate sediment porewater samples were collected with a modified coring device (2.7 cm ID), sectioned at 10 mm intervals to 60 mm, and extracted in 10 mL of 1 M NaCl (Smith & Caffrey 2009) prior to filtering and freezing. The filtered (GF/F, 0.7 micron) supernatant was analyzed for DIN (NO2 -, NO3 -, NH4 +) and phosphate (PO4 3-), and represents total extractable porewater nutrients. Standard wet chemical techniques modified for the Skalar SAN+ Autoanalyzer (Pennock & Cowan 2001) were performed for all nutrient concentration analysis. Water column and sediment chlorophyll-α content were determined fluorometrically (Welschmeyer 1994) after cold extraction in 90% acetone from filters and in triplicate, respectively.

Additional methodology can be found in:

Bernard, Rebecca & Mortazavi, Behzad & A. Kleinhuizen, Alice. (2015). Dissimilatory nitrate reduction to ammonium (DNRA) seasonally dominates NO3− reduction pathways in an anthropogenically impacted sub-tropical coastal lagoon. Biogeochemistry. 125. 47-64. 10.1007/s10533-015-0111-6.

Data Processing Description

Data were flagged as below detection limits if no measurable rates were returned after calculations. See equations in methodology section of:

Bernard, Rebecca & Mortazavi, Behzad & A. Kleinhuizen, Alice. (2015). Dissimilatory nitrate reduction to ammonium (DNRA) seasonally dominates NO3− reduction pathways in an anthropogenically impacted sub-tropical coastal lagoon. Biogeochemistry. 125. 47-64. 10.1007/s10533-015-0111-6.

Statistical Analysis

To test the seasonal flux variability between sites in Little Lagoon, two-way ANOVAs with site and date as independent variables were performed. When data could not be transformed to meet ANOVA assumptions, Wilcoxon/Kruskal-Wallis nonparametric tests were used. When significant differences occurred, Tukey HSD or Steel-Dwass post hoc tests were used to determine significant interactions. A Principal component analysis (PCA) was conducted on all biogeochemical parameters to identify underlying multivariate components that may be influencing N fluxes. Spearman's rho correlation analysis was used to examine the relationship between the principal components and fluxes. Statistical significance of the data set was determined at $\alpha=0.05$ and error is reported as standard error. All statistical analyses were performed in SAS JMP 10 (SAS Institute Inc.).

BCO-DMO Data Processing Notes:

- Data reorganized into one table under one set of column names from both original files
- Units removed from column names
- Column names reformatted to meet BCO-DMO standards
- Created column Year to describe to capture the metadata in the file name

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Data Files

File
porewater.csv (Comma Separated Values (.csv), 8.99 KB) MD5:99144b18dc6565ac4245451d9ae4be97 Primary data file for dataset ID 723975

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Related Publications

Bernard, R. J., Mortazavi, B., & Kleinhuizen, A. A. (2015). Dissimilatory nitrate reduction to ammonium (DNRA)

seasonally dominates NO3 − reduction pathways in an anthropogenically impacted sub-tropical coastal lagoon. Biogeochemistry, 125(1), 47–64. doi:10.1007/s10533-015-0111-6
Methods

Murgulet, D., & Tick, G. R. (2008). Assessing the extent and sources of nitrate contamination in the aquifer system of southern Baldwin County, Alabama. Environmental Geology, 58(5), 1051–1065. doi:10.1007/s00254-008-1585-5
Methods

Su, N., Burnett, W.C., Eller, K.T., MacIntyre, H.L., Mortazavi, B., Leifer, J., Novoveska, L. (2012). Radon and radium isotopes, groundwater discharge and harmful algal blooms in Little Lagoon, Alabama. Interdisciplinary Studies on Environmental Chemistry, 6, 329–337.
Methods

Su, N., Burnett, W.C., MacIntyre, H.L., Liefer, J.D., Peterson, R.N., Viso, R. (2013). Natural radon and radium isotopes for assessing groundwater discharge into Little Lagoon, AL: implications for harmful algal blooms. Estuaries Coasts, 1–18
Methods

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Parameters

Parameter	Description	Units
Year	Year ID that samples were taken	unitless
Date	Month and day that samples were taken; MMM-DD	unitless
Julian_Date	Julian date of sampling	unitless
Depth	Depth of sampling	meters
Mouth_HS	Hydrogen sulfide porewater values taken at the site Mouth; location of site is 30.243683, -87.738407	micromoles
East_HS	Hydrogen sulfide porewater values taken at the site East; location of site is 30.253347, -87.724729	micromoles
West_HS	Hydrogen sulfide porewater values taken at the site West; location of site is 30.247181, -87.767856	micromoles
East_NH4	Ammonium porewater values taken at the site East; location of site is 30.253347, -87.724729	micromoles
Mouth_NH4	Ammonium porewater values taken at the site Mouth; location of site is 30.243683, -87.738407	micromoles
West_NH4	West porewater values taken at the site West; location of site is 30.247181, -87.767856	micromoles

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Instruments

Dataset-specific Instrument Name	Fluorometer
Generic Instrument Name	Fluorometer
Dataset-specific Description	Used to collected water column and sediment chlorophyll-a content
Generic Instrument Description	A fluorometer or fluorimeter is a device used to measure parameters of fluorescence: its intensity and wavelength distribution of emission spectrum after excitation by a certain spectrum of light. The instrument is designed to measure the amount of stimulated electromagnetic radiation produced by pulses of electromagnetic radiation emitted into a water sample or in situ.

Dataset-specific Instrument Name	Modified coring device
Generic Instrument Name	Multi Corer
Dataset-specific Description	Used to collected porewater samples
Generic Instrument Description	The Multi Corer is a benthic coring device used to collect multiple, simultaneous, undisturbed sediment/water samples from the seafloor. Multiple coring tubes with varying sampling capacity depending on tube dimensions are mounted in a frame designed to sample the deep ocean seafloor. For more information, see Barnett et al. (1984) in Oceanologica Acta, 7, pp. 399-408.

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Deployments

LittleLagoon

Website	https://www.bco-dmo.org/deployment/528089
Platform	SmallBoat_FSU
Start Date	2010-04-05
End Date	2013-08-17
Description	The sampling sites were all accessed from small boats, here amalgamated to one deployment called LittleLagoon.

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Project Information

Groundwater Discharge, Benthic Coupling and Microalgal Community Structure in a Shallow Coastal Lagoon (LittleLagoonGroundwater)

Coverage: southern Alabama, east of Mobile

This project investigated the link between submarine groundwater discharge (SGD) and microalgal dynamics in Little Lagoon, Alabama. In contrast to most near-shore environments, it is fully accessible; has no riverine inputs; and is large enough to display ecological diversity (c. 14x 0.75 km) yet small enough to be comprehensively sampled on appropriate temporal and spatial scales. The PIs have previously demonstrated that the lagoon is a hot-spot for toxic blooms of the diatom *Pseudo-nitzchia spp.* that are correlated with discharge from the surficial aquifer. This project assessed variability in SGD, the dependence of benthic nutrient fluxes on microphytobenthos (MPB) abundance and productivity, and the response of the phytoplankton to nutrient enrichment and dilution. The work integrated multiple temporal and spatial scales and demonstrated both the relative importance of SGD vs. benthic recycling as a source of nutrients, and the role of SGD in structuring the microalgal community. (*paraphrased from Award abstract*)

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0962008

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