Raw benthic chlorophyll and phaeophytin data from cores collected in Massachusetts from 2012-2015.

Website: https://www.bco-dmo.org/dataset/669652

Data Type: Other Field Results

Version: 1

Version Date: 2016-12-08

Project

» Eutrophication Effects on Sediment Metabolism and Benthic Algal-bacterial Coupling: An Application of Novel Techniques in a LTER Estuary (benthic_PP_at_TIDE)

Contributors	Affiliation	Role
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Abstract

Raw benthic chlorophyll and phaeophytin data from cores collected in Massachusetts from 2012-2015.

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Coverage

Temporal Extent: 2012 - 2015

Dataset Description

Raw benthic chlorophyll and phaeophytin data from each experimental time point in June, August, and October 2013.

Acquisition Description

Sediment samples for organic matter composition were collected by placing a hard plastic sleeve around a polyvinyl chloride (PVC) corer (5 cm diameter x 15 cm deep) and then removing the corer. The plastic sleeve remained in place to maintain the integrity of the sediment column and mark the core location (Spivak 2015). The top 0.5 cm of each core was collected into pre-combusted vials and frozen (-80 deg C) until analysis for total organic carbon and nitrogen content and stable isotopes (d13C, d15N) and lipid biomarker composition. Adjacent samples for benthic chlorophyll were collected with smaller cores (1.5 cm diameter x 1 cm deep) into glass vials and frozen (-20 deg C) until analysis. Additional sediment cores for organic matter composition and benthic chlorophyll were collected 4, 8, 24, and 48 h after the 13C-labeled $NaHCO_3$ was applied in June, August, and October and 4, 8, 24, and 144h after the 13C-labeled S. alterniflora was applied in August. Benthic chlorophyll was determined per methods described by Neubauer et al. (2000).

References:

Spivak, AC and J Ossolinski. 2016. Limited effects of nutrient enrichment on bacterial carbon sources in salt marsh tidal creek sediments. Marine Ecology Progress Series. 544:107-130.10.3354/meps11587

Processing Description

The file includes raw and log10-transformed benthic chlorophyll and phaeophytin data.

BCO-DMO Data Processing Notes:

-reformatted column names to comply with BCO-DMO standards.
-displayed months numerically

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Related Publications

Spivak, A., & Ossolinski, J. (2016). Limited effects of nutrient enrichment on bacterial carbon sources in salt marsh tidal creek sediments. Marine Ecology Progress Series, 544, 107–130. doi:10.3354/meps11587

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Parameters

Parameter	Description	Units
month	Samping month; mm	unitless
plot	Plot ID	unitless
estuary	Estuary where sampling occurred	unitless
timepoint	Timepoint refers to when the sample was collected before (PL) or after the 13C-isotope label was added	unitless
experiment	Experiment refers to whether the 13C label was applied as benthic microalgae (BMA) or Spartina alterniflora (salt) detritus.	unitless
sampleID	Sample ID number	unitless
chla	Benthic chlorophyll concentration	ug cm-2
phaeo	Phaeophytin concentration	ug cm-2
logchla	Log 10 benthic chlorophyll concentration	log
logphaeo	Log 10 phaeophytin concentration	log
chla_phaeo	Ratio of chlorphyll to phaeophytin concentrations	ug cm-2

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Instruments

Dataset-specific Instrument Name	Core
Generic Instrument Name	Push Corer
Dataset-specific Description	Used to collect core samples
Generic Instrument Description	Capable of being performed in numerous environments, push coring is just as it sounds. Push coring is simply pushing the core barrel (often an aluminum or polycarbonate tube) into the sediment by hand. A push core is useful in that it causes very little disturbance to the more delicate upper layers of a sub-aqueous sediment. Description obtained from: http://web.whoi.edu/coastal-group/about/how-we-work/field-methods/coring/

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Deployments

Spivak_2012

Website	https://www.bco-dmo.org/deployment/668449
Platform	shoreside Massachusetts
Start Date	2012-09-01
End Date	2015-08-15

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Project Information

Eutrophication Effects on Sediment Metabolism and Benthic Algal-bacterial Coupling: An Application of Novel Techniques in a LTER Estuary (benthic_PP_at_TIDE)

Coverage: Plum Island Estuary, Rowley Massachusetts

Extracted from the NSF award abstract: This project will address how rates of benthic microalgal production respond to eutrophication and geomorphological changes in human-impacted tidal creeks. Excess nutrient loading increases benthic algal biomass and likely stimulates production rates but the magnitude of nutrient and geomorphological effects on rates of production is unknown. Will changes in benthic algal productivity affect algal-bacterial coupling? Furthermore, how is algal-bacterial coupling affected by geomorphological changes, which may be exacerbated by excess nutrient loading but can also occur in pristine marshes? This project will take advantage of the infrastructure of the TIDE project, a long-term saltmarsh eutrophication experiment at the Plum Island Ecosystem - Long Term Ecological Research site in Northeastern Massachusetts. Specifically, the PIs will measure benthic metabolism and examine algal- bacterial coupling in fertilized and ambient nutrient tidal creeks in the first field season. The following field season, they will compare sediment metabolism and carbon dynamics on slumped tidal creek walls (i.e. areas where low marsh has collapsed into the tidal creek) to that on the bottom of tidal creeks. In both years, gross and net production will be determined using an innovative triple oxygen isotope technique and traditional dissolved oxygen and inorganic carbon flux measurements. Comparisons between these methods will be useful in informing studies of sediment metabolism. Lipid biomarkers will be used to characterize the sources of organic matter to creek sediments, and stable isotope analysis of bacterial specific biomarkers to identify the sources of organic carbon utilized by sediment bacteria. The biomarkers will reveal whether sediment bacteria use organic matter substrates, such as benthic microalgal carbon, selectively or in proportion to availability. Overall, results from the proposed study will provide important information about how sediment carbon dynamics in shallow tidal creeks respond to long term eutrophication. Furthermore, findings will enhance understanding of the role of tidal creeks in coastal biogeochemistry.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1233678

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