Bulk sediment organic matter composition of three marsh ponds in PIE-LTER (Rowley, MA) from 2014.

Website: https://www.bco-dmo.org/dataset/738169

Data Type: Other Field Results

Version: 1

Version Date: 2018-06-05

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
Spivak, Amanda	Woods Hole Oceanographic Institution (WHOI)	Principal Investigator
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Abstract

Bulk sediment organic matter composition of three high marsh ponds within PIE-LTER. Data were collected over 11 weeks in the summer and fall of 2014.

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Coverage

Spatial Extent: **Lat**:42.738349 **Lon**:-70.809432

Temporal Extent: 2014 - 2014

Dataset Description

Bulk sediment organic matter composition of three high marsh ponds within PIE-LTER. Data were collected over 11 weeks in the summer and fall of 2014.

Acquisition Description

The three ponds are located in the high marsh (1.43-1.46 m above North American Vertical Datum of 1988) of the Plum Island Ecosystems – Long Term Ecological Research (PIE-LTER) site. Surface sediments were collected weekly for TOC, TN, $\delta^{13}C$, and $\delta^{15}N$ (June 25-August 13 and November 11-25, 2014). Cores (5 cm diameter x 2 cm deep) were collected from three 1 m^2 quadrats placed at random locations along two crisscrossing transects in each pond. Sediments were combined in combusted glass vials to form composite samples and stored (-80 °C) until analysis. sediment samples were prepared for elemental and isotopic analyses by drying to constant mass (60 °C), homogenizing with a Retsch Mixer Mill 200 (plants and sediments), and fuming with hydrochloric (HCl) acid to remove carbonates (Hedges and Stern 1984). Analyses were performed by the Stable Isotope Laboratory at the Marine Biological Laboratory (Woods Hole, MA). Isotopic data are reported in the conventional δ-notation in units of per mil (‰).

Processing Description

BCO-DMO Data Processing Notes:

-reformatted column names to comply with BCO-DMO standards
-filled in blank cells with "nd"

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Related Publications

Spivak, A. C., Gosselin, K. M., & Sylva, S. P. (2018). Shallow ponds are biogeochemically distinct habitats in salt marsh ecosystems. Limnology and Oceanography. doi:10.1002/lno.10797

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Parameters

Parameter	Description	Units
season	Season at time of sampling	unitless
Tide	Tide type	unitless
Week	Week number	unitless
Pond	Site number	unitless
Type	Type of sample; sediment	unitless
TOC	Percent total organic carbon	percent
d13C	d13C in per mil	per mil
TN	Percent total nitrogen	percent
d15N	d15N in units of per mil	per mill

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Instruments

Dataset-specific Instrument Name	Isotope mass spectrometer
Generic Instrument Name	Isotope-ratio Mass Spectrometer
Dataset-specific Description	Extracted and analyzed concentrations
Generic Instrument Description	The Isotope-ratio Mass Spectrometer is a particular type of mass spectrometer used to measure the relative abundance of isotopes in a given sample (e.g. VG Prism II Isotope Ratio Mass-Spectrometer).

Dataset-specific Instrument Name	Corer
Generic Instrument Name	Push Corer
Dataset-specific Description	Used to collect sediment 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

Plum_Island

Website	https://www.bco-dmo.org/deployment/669365
Platform	shoreside Massachusetts
Start Date	2012-07-27
End Date	2012-08-15
Description	Plum Island, MA; LTER sites

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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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