

Summary of carbon and nitrogen concentrations and isotope ratios from samples of eelgrass from Virginia Coastal Lagoons and turtlegrass from St George Sound FL

Website: <https://www.bco-dmo.org/dataset/746344>

Data Type: Other Field Results

Version: 1

Version Date: 2018-10-10

Project

» [Toward an Improved Understanding of Blue Carbon: The Role of Seagrasses in Sequestering CO₂](#) (Seagrass Blue Carbon)

Contributors	Affiliation	Role
Zimmerman, Richard C.	Old Dominion University (ODU)	Principal Investigator
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Abstract

This dataset includes a summary of results of carbon and nitrogen analyses on seagrasses collected in the Virginia Coastal Lagoons and from St. George Sound FL. Mean carbon and nitrogen concentrations and their isotope ratios are reported for leaf and root/rhizome samples. Also reported are the standard deviation, standard error, number of samples in the means, and the 95% confidence limits.

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Coverage

Spatial Extent: N:37.343211 E:-75.732307 S:29.853211 W:-84.551509

Temporal Extent: 2017-05 - 2017-07

Dataset Description

This dataset includes a summary of results of carbon and nitrogen analyses on seagrasses collected in the Virginia Coastal Lagoons and from St. George Sound FL. Mean carbon and nitrogen concentrations and their isotope ratios are reported for leaf and root/rhizome samples. Also reported are the standard deviation, standard error, number of samples in the means, and the 95% confidence limits.

Methods & Sampling

Seagrass samples were collected randomly from each site by hand using 6" diameter PVC cores pounded into the sediment. Intact plants, including roots and rhizomes, were separated from the sediment and organic debris. The green shoots were separated from roots & rhizomes, rinsed in fresh water and dried separately at -60° C. Dried samples were ground in a mortar and pestle using liquid nitrogen and re-dried. The dry powder

was analyzed for percent Carbon, percent Nitrogen, delta-13C, and delta-15N by the Stable Isotope Facility, U.C. Davis.

Samples were collected by hand, using hand tools. Chemical and isotope analyses were performed by the Stable Isotope Facility, UC Davis using a PDZ Europa ANCA-GSL elemental analyzer interfaced to a PDZ Europa 20-20 isotope ratio mass spectrometer (Sercon Ltd., Cheshire, UK).

Data were segregated by location, tissue type, and species. Means and errors were calculated from 10 to 90 replicate samples (separate plants).

Data Processing Description

BCO-DMO Processing Notes:

- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions
- reformatted to a flat table (moved lat and lon to separate columns from Location); repeated the Tissue type values to blank cells.
- added the latitude and longitude for Spider Bay, obtained from Samples dataset

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Data Files

File
summary_CN.csv (Comma Separated Values (.csv), 4.04 KB) MD5:d77c69bd3ae4a8d5d35aed21bc074700
Primary data file for dataset ID 746344

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Parameters

Parameter	Description	Units
Location	Location of sample collection	unitless
lat	latitude; north is positive	decimal degrees
lon	longitude; east is postive	decimal degrees
Tissue	type of plant tissue that was analyzed	unitless
value	statistical parameter being reported	unitless
d13C	the ratio of stable isotopes 13C:12C	unitless
d15N	the ratio of stable isotopes 15N:14N	unitless
pcnt_C_g_per_gDW	percent Carbon in sample dry weight	unitless (grams/grams)
pcnt_N_g_per_gDW	percent Nitrogen in sample dry weight	unitless (grams/grams)
C_to_N	Carbon to Nitrogen ratio	unitless
date_collected	date that the samples were collected; formatted as yyyy-mm	unitless

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Instruments

Dataset-specific Instrument Name	PDZ Europa ANCA-GSL elemental analyzer
Generic Instrument Name	Elemental Analyzer
Dataset-specific Description	Used for chemical and isotope analyses.
Generic Instrument Description	Instruments that quantify carbon, nitrogen and sometimes other elements by combusting the sample at very high temperature and assaying the resulting gaseous oxides. Usually used for samples including organic material.

Dataset-specific Instrument Name	PDZ Europa 20-20 isotope ratio mass spectrometer (Sercon Ltd., Cheshire, UK)
Generic Instrument Name	Isotope-ratio Mass Spectrometer
Dataset-specific Description	Used for chemical and isotope analyses.
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).

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Project Information

Toward an Improved Understanding of Blue Carbon: The Role of Seagrasses in Sequestering CO₂ (Seagrass Blue Carbon)

Coverage: Chesapeake Bay, Northern Gulf of Mexico, and Bahamas Banks

NSF abstract:

This research will develop a quantitative understanding of the factors controlling carbon cycling in seagrass meadows that will improve our ability to quantify their potential as blue carbon sinks and predict their future response to climate change, including sea level rise, ocean warming and ocean acidification. This project will advance a new generation of bio-optical-geochemical models and tools (ECHOES) that have the potential to be transform our ability to measure and predict carbon dynamics in shallow water systems.

This study will utilize cutting-edge methods for evaluating oxygen and carbon exchange (Eulerian and eddy covariance techniques) combined with biomass, sedimentary, and water column measurements to develop and test numerical models that can be scaled up to quantify the dynamics of carbon cycling and sequestration in seagrass meadows in temperate and tropical environments of the West Atlantic continental margin that encompass both siliciclastic and carbonate sediments. The comparative analysis across latitudinal and geochemical gradients will address the relative contributions of different species and geochemical processes to better constrain the role of seagrass carbon sequestration to global biogeochemical cycles. Specifically the research will quantify: (i) the relationship between C stocks and standing biomass for different species with different life histories and structural complexity, (ii) the influence of above- and below-ground metabolism on carbon exchange, and (iii) the influence of sediment type (siliciclastic vs. carbonate) on Blue Carbon storage. Seagrass biomass, growth rates, carbon content and isotope composition (above- and below-ground), organic carbon deposition and export will be measured. Sedimentation rates and isotopic composition of PIC, POC, and iron sulfide precipitates, as well as porewater concentrations of dissolved sulfide, CO₂, alkalinity and salinity will be determined in order to develop a bio-optical-geochemical model that will predict the impact of seagrass metabolism on sediment geochemical processes that control carbon cycling in shallow waters. Model predictions will be validated against direct measurements of DIC and O₂ exchange in seagrass meadows, enabling us to scale-up the density-dependent processes to predict the impacts of seagrass distribution and density on carbon cycling and sequestration across the submarine landscape.

Status, as of 09 June 2016: This project has been recommended for funding by NSF's Division of Ocean Sciences.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1635403
NSF Division of Ocean Sciences (NSF OCE)	OCE-1633951

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