Discrete data on hydrography (from CTD casts) and chemical analyses of dissolved nutrients and organic carbon on the Louisiana-Texas shelf in the Gulf of Mexico from R/V Pelican cruise 28 September – 11 October 2017

Website: https://www.bco-dmo.org/dataset/844721
Data Type: Cruise Results
Version: 1
Version Date: 2021-03-17

Project
» Collaborative Research: A RAPID response to Hurricane Harvey's impacts on coastal carbon cycle, metabolic balance and ocean acidification (HarveyCarbonCycle)

Contributors	Affiliation	Role
Roberts, Brian	Louisiana Universities Marine Consortium (LUMCON)	Principal Investigator
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Abstract
Discrete data on hydrography (from CTD casts) and chemical analyses of dissolved nutrients and organic carbon on the Louisiana-Texas shelf in the Gulf of Mexico from R/V Pelican cruise 28 September – 11 October 2017.

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Coverage

Spatial Extent: **N**:29.641 **E**:-88.901 **S**:27.496 **W**:-95.309
Temporal Extent: 2017-09-28 - 2017-10-11

Dataset Description

Usage note: Time zone information was not received by BCO-DMO so it is unknown if the dates and times in this dataset are local or UTC. Please contact the dataset PI if you have questions about this.

Acquisition Description

Conductivity, Temperature and Depth (CTD) data and water samples were collected at various depths across 102 stations (total n = 471) in the Gulf of Mexico on the *R/V Pelican* between September 28, 2017 and September 19, 2017. At all stations, a vertical profile of salinity, dissolved oxygen concentration and temperature was collected using a Seabird SBE 911 CTD instrument package mounted onto a rosette containing 12, 5L Niskin bottles for collecting aqueous samples at specific depths. Water samples were

collected using a single Niskin bottle per depth and were analyzed across various analytical instruments for nutrient concentrations.

Water samples were collected using a single Niskin bottle per depth on the CTD rosette. Samples for dissolved inorganic nutrients and dissolved organic carbon / total nitrogen were analyzed following the methods detailed in Roberts and Doty (2015) and Mason et al. (2016). Specifically, one niskin bottle, water samples for dissolved inorganic nutrients ($NO_3^- + NO_2^-$, NO_2^-, PO_4^{3-}, SiO_2, and NH_4^+) were analyzed in duplicate using a Lachat Instruments QuikChem FIA+ 8000 Series Automated Ion Analyzer with an ASX-400 Series XYZ autosampler after being filtered through acid-cleaned (10% HCl), 47 mm diameter, 0.2 µm pore size, membrane filters (Pall SuporR-200) under low vacuum pressure. Samples were analyzed for dissolved $NO_3^- + NO_2^-$ (by Cu-Cd reduction followed by azo dye colorimetry), PO_4^{3-} (by the automated ascorbic acid reduction method), SiO_2^-, and dissolved NH_4^+ (by phenate colorimetry) (APHA, 1992). Dissolved NO_2^- was determined separately by azo dye colorimetry (without Cu−Cd reduction). Standard curves were prepared using certified standard stock solutions (Hach, Loveland CO) and yielded r^2 values of ≥ 0.999. NO_3^- concentration was determined by difference between $NO_3^- + NO_2^-$ and NO_2^-.

Dissolved organic carbon (DOC) and total dissolved nitrogen (TDN) concentrations were measured at least in triplicate on a Shimadzu TOC-VCSH Analyzer with TNM-1 Module (MDL 1.5 µmol C L−1, 0.3 µmol N L−1; Shimadzu Scientific Instruments, Columbia, MD) after being filtered through combusted (450°C), 47mm diameter Whatman GF/F filters under low vacuum pressure. Concentrations of dissolved organic nitrogen (DON) were determined by difference [DON=TDN−DIN].

All water chemistry data went through quality control checks. CTD instrument probes were calibrated prior to cruise departure.

Processing Description

CTD data were processed on Seabird's SBEDataProcessing-Win32.

BCO-DMO Processing:
- renamed fields to conform with BCO-DMO naming conventions.

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Related Publications

APHA. 1992. Standard Methods for the Examination of Water and Wastewater, 18th Edn. Washington, DC : American Public Health Association.
Methods

Mason, O. U., Canter, E. J., Gillies, L. E., Paisie, T. K., & Roberts, B. J. (2016). Mississippi River Plume Enriches Microbial Diversity in the Northern Gulf of Mexico. Frontiers in Microbiology, 7. doi:10.3389/fmicb.2016.01048
Methods

Roberts, B. J., & Doty, S. M. (2015). Spatial and Temporal Patterns of Benthic Respiration and Net Nutrient Fluxes in the Atchafalaya River Delta Estuary. Estuaries and Coasts, 38(6), 1918–1936. doi:10.1007/s12237-015-9965-z
Methods

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Related Datasets

IsRelatedTo

Roberts, B. (2021) **Discrete data on hydrography (from CTD casts) and chemical analyses of dissolved nutrients and organic carbon on the Louisiana-Texas shelf in the Gulf of Mexico from R/V Acadiana cruise 18-21 September 2017.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2021-03-10 http://lod.bco-dmo.org/id/dataset/844709 [view at

BCO-DMO]

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Parameters

Parameter	Description	Units
Cruise	Cruise identification	unitless
Type	Type of cast (CTD)	unitless
DateTime	Date and time of sample collection	unitless
Date	Date of sample collection	unitless
Time	Time of sample collection	unitless
Station	Location of sample collection	unitless
Bottle_Depth	Depth of the sample bottle at collection	meters (m)
Longitude	Longitude, west is negative	decimal degrees North
Latitude	Latitude, south is negative	decimal degrees East
Seafloor_Depth	Depth of seafloor below water surface	meters (m)
Bottle	Bottle number on the CTD	unitless
Depth	Depth of CTD at sample collection	meters (m)
Temperature	CTD water temperature in degrees Celsius	degrees C
Salinity	CTD salinity in practical salinity units (PSU)	PSU
OxygenSBE	CTD dissolved oxygen concentration	micromoles per kilogram (umol/kg)
wetCDOM	wet colored dissolved organic matter concentration	milligrams per cubic meter (mg/m^3)
SPAR	surface photosynthetically active radiation	micromoles photons per square meter per second (umol/m2/s)
PAR	Photosynthetically active radiation	micromoles photons per square meter per second (umol/m2/s)
Turbidity	CTD turbidity in Formazin Turbidity Units (FTU)	FTU
NO3_NO2	Sample nitrate and nitrite concentration	micromoles per liter (umol N/L)
NO2	Sample nitrate concentration	micromoles per liter (umol N/L)
NO3_calculated	Calculated sample nitrate concentration	micromoles per liter (umol N/L)
NH4	Sample ammonium concentration	micromoles per liter (umol N/L)
DIN_calculated	Calculated dissolved inorganic nitrogen concentration	micromoles per liter (umol N/L)
PO4	Sample phosphate concentration	micromoles per liter (umol P/L)
SiO2	Sample silicate concentration	micromoles per liter (umol Si/L)
DOC	Sample dissolved organic carbon concentration	micromoles per liter (umol C/L)
TDN	Sample total dissolved nitrogen concentration	micromoles per liter (umol N/L)
DON_calculated	Calculated dissolved organic nitrogen concentration	micromoles per liter (umol N/L)

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Instruments

Dataset-specific Instrument Name	5 L Niskin bottles
Generic Instrument Name	Niskin bottle
Dataset-specific Description	Water samples were collected from a rosette containing 12, 5L Niskin bottles that had the CTD instrument package mounted below it.
Generic Instrument Description	A Niskin bottle (a next generation water sampler based on the Nansen bottle) is a cylindrical, non-metallic water collection device with stoppers at both ends. The bottles can be attached individually on a hydrowire or deployed in 12, 24, or 36 bottle Rosette systems mounted on a frame and combined with a CTD. Niskin bottles are used to collect discrete water samples for a range of measurements including pigments, nutrients, plankton, etc.

Dataset-specific Instrument Name	Sea-Bird SBE 911 CTD
Generic Instrument Name	CTD Sea-Bird 911
Dataset-specific Description	At all stations, vertical profiles were taken with the Sea-Bird SBE 911 CTD instrument package. The SBE 911 includes the SBE 9 Underwater Unit and the SBE 11 Deck Unit (for real-time readout using conductive wire) for deployment from a vessel. The combination of the SBE 9 and SBE 11 is called a SBE 911. The SBE 9 uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 and SBE 4). The SBE 9 CTD can be configured with auxiliary sensors to measure other parameters including dissolved oxygen, pH, turbidity, fluorescence, light (PAR), light transmission, etc.).
Generic Instrument Description	The Sea-Bird SBE 911 is a type of CTD instrument package. The SBE 911 includes the SBE 9 Underwater Unit and the SBE 11 Deck Unit (for real-time readout using conductive wire) for deployment from a vessel. The combination of the SBE 9 and SBE 11 is called a SBE 911. The SBE 9 uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 and SBE 4). The SBE 9 CTD can be configured with auxiliary sensors to measure other parameters including dissolved oxygen, pH, turbidity, fluorescence, light (PAR), light transmission, etc.). More information from Sea-Bird Electronics.

Dataset-specific Instrument Name	Shimazdu Instruments TOC-VCSH and TNM-1
Generic Instrument Name	Total Organic Carbon Analyzer
Dataset-specific Description	Water samples were analyzed for dissolved organic carbon (DOC) and total dissolved nitrogen (TDN) content using a Shimazdu Instruments TOC-VCSH and TNM-1 with attached ASI-V auto sampler.
Generic Instrument Description	A unit that accurately determines the carbon concentrations of organic compounds typically by detecting and measuring its combustion product (CO2). See description document at: http://bcodata.whoi.edu/LaurentianGreatLakes_Chemistry/bs116.pdf

Dataset-specific Instrument Name	Lachat Instruments QuikChem® FIA+ 8000 Series Automated Ion Analyzer
Generic Instrument Name	Flow Injection Analyzer
Dataset-specific Description	Water samples were analyzed for $NO_3^- + NO_2^-$, NO_2^-, PO_4^{3-}, SiO_2, and NH_4^+ using a Lachat Instruments QuikChem® FIA+ 8000 Series Automated Ion Analyzer with an ASX-400 Series XYZ autosampler.
Generic Instrument Description	An instrument that performs flow injection analysis. Flow injection analysis (FIA) is an approach to chemical analysis that is accomplished by injecting a plug of sample into a flowing carrier stream. FIA is an automated method in which a sample is injected into a continuous flow of a carrier solution that mixes with other continuously flowing solutions before reaching a detector. Precision is dramatically increased when FIA is used instead of manual injections and as a result very specific FIA systems have been developed for a wide array of analytical techniques.

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Deployments

PE18-11

Website	https://www.bco-dmo.org/deployment/789096
Platform	R/V Pelican
Start Date	2017-09-28
End Date	2017-10-11
Description	Additional cruise information is available from the Rolling Deck to Repository (R2R): https://www.rvdata.us/search/cruise/PE18-11

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Project Information

Collaborative Research: A RAPID response to Hurricane Harvey's impacts on coastal carbon cycle, metabolic balance and ocean acidification (HarveyCarbonCycle)

Coverage: Northwestern Gulf of Mexico

NSF Award Abstract:
Understanding how extreme events, like hurricanes, impact coastal ecosystems and the cycling of elements like carbon and oxygen, is important for improving our ability to predict how the global carbon cycle will respond to climate. This team of investigators, who have already been working together on understanding the carbon cycle in the Gulf of Mexico continental shelves, have important recent data against which to measure the effects of the passage of Hurricane Harvey in August, 2017. They will sample the waters and sediments of the northwestern Gulf of Mexico in September, October, and January to assess Harvey's impacts on a timescale of weeks to months.

The researchers pose three specific questions: 1. Will the region become a major source of carbon dioxide to the atmosphere, releasing carbon accumulated in the bottom water and sediments, and will this potential impact be faster and greater than during normal fall and winter mixing events? Will this process acidify the surface water and for how long? 2. Will the metabolic balance be substantially pushed toward net heterotrophy

as a result of the storm in comparison to other years? 3. Can the amount of material delivered or redeposited across the continental shelf by a tropical cyclone be considerably larger than that related to winter storm systems? The PIs will measure water column nutrients, oxygen, organic carbon, and inorganic carbon system parameters; determine water column and benthic metabolic and nutrient flux rates; and sediment organic matter deposition rates. They will also collect end member river samples. They will compare the immediate (mid-Sept) but limited post-hurricane data and one-month post-hurricane, more detailed data with those collected in July and April to study the impacts of the storms. they will also compare 2017-2018 seasonal data to seasonal data over the same region collected in the past (2006-2008 and 2009-2010). They will also compare the impacts of Hurricane Harvey to those of Hurricanes Katrina and Rita (2005) and Tropical Storm Cindy (June 2017). The project will involve graduate and postdoctoral research and work to communicate results to the public.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1760687

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