Hydrographic, nutrient and oxygen data from CTD bottles and beam transmission and fluorescence data from CTD profiles during R/V Point Sur PS1809 (HRR legs 1, 2, 3) at the Gulf Mexico, Louisiana and Texas coast, Sept-Oct 2017

Website: https://www.bco-dmo.org/dataset/784290
Data Type: Cruise Results
Version: 1
Version Date: 2019-12-12

Project
» RAPID: Hurricane Impact on Phytoplankton Community Dynamics and Metabolic Response (HRR)

Contributors	Affiliation	Role
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Abstract
Hydrographic, nutrient and oxygen data from CTD bottles and beam transmission and fluorescence data from CTD profiles during R/V Point Sur PS1809 (HRR legs 1, 2, 3) at the Gulf Mexico, Louisiana and Texas coast, Sept-Oct 2017.

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Coverage

Spatial Extent: **N**:29.49068 **E**:-93.53278 **S**:27.09325 **W**:-97.26842
Temporal Extent: 2017-09-23 - 2017-10-01

Dataset Description

Hydrographic, nutrient and oxygen data from CTD bottles and beam transmission and fluorescence data from CTD profiles during R/V Point Sur PS1809 (HRR legs 1, 2, 3) at the Gulf Mexico, Louisiana and Texas coast, Sept-Oct 2017.

Methods & Sampling

Nutrient Analysis Equipment and Techniques:

Nutrient samples were collected, filtered (0.2 µm Acropak-200 polyethersulfone filters, Pall) and frozen on board until analysis on shore up to 3 months later. Nutrient analyses (phosphate, silicate, nitrate+nitrite, nitrite, ammonium, and urea) were performed on a 6-channel Astoria-Pacific autoanalyzer using standard methods (WHPO 1994). Ammonia analyses were based on Solorzano (1969), using phenol/hypochlorite in alkaline medium with a sodium nitroprusside catalyst. Urea analyses were based on Aminot and Kerouel (1982) using diacetyl monoxime in acid solution.

Dissolved Oxygen Analysis Equipment and Techniques:

Samples were collected for dissolved oxygen analyses soon after the rosette was brought on board. Using a Tygon or silicone drawing tube, nominal 125 ml volume-calibrated iodine flasks were rinsed 3 times with minimal agitation, then filled and allowed to overflow for at least 3 flask volumes. Reagents (MnCl2 then NaI/NaOH) were added to fix the oxygen before stoppering. The flasks were shaken twice (> 1-minute inversions) to assure thorough dispersion of the precipitate. The lip of the flask stopper was filled with ultrapure water to prevent access to atmospheric oxygen during the up to 3 hours between sample collection and analysis.

Oxygen flask volumes were determined gravimetrically to determine flask volumes at TAMU Geochemical and Environmental Research Group (GERG). This is done once before using flasks for the first time and periodically thereafter when a suspect volume is detected.

Dissolved oxygen analyses were performed with an automated Winkler oxygen titrator (Langdon Enterprises, Miami) using amperometric end-point detection. Thiosulfate (nominally 0.01 N) was standardized against 0.01 N potassium iodate prior to sample analysis.

Salinity Analysis Equipment and Techniques:

Salinity samples were drawn into 200 mL Kimax high-alumina borosilicate bottles, which were rinsed three times with sample prior to filling to the shoulder. The bottles were sealed with plastic insert thimbles to reduce evaporation. PSS78 salinity (UNESCO 1981) was calculated for each sample from the measured conductivity ratios.

A Guildline Autosal 8400B salinometer (S/N 65715) was used for salinity/conductivity measurements. The salinity analyses were performed after samples had equilibrated to laboratory temperature, usually within 6 weeks after collection. The salinometer was standardized for each group of analyses using OSIL standard seawater, with frequent use of a secondary deep water standard to check for drift during runs.

Data Processing Description

SBE Data Processing Version 7.26.6.28 was used to process the raw Sea-Bird CTD data (.hex) into a human-readable format (.cnv). The order of functions ran via SBE Data Processing was: Data Conversion, Filter, Align CTD, Cell Thermal Mass, Loop Edit, Derive, and Bin Average.

BCO-DMO Processing Notes:
- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions (e.g., replaced spaces and hyphens with underscores)
- added columns for cruise_id, cruise_name, and chf_sci
- commented out units row

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Data Files

File
bottle.csv (Comma Separated Values (.csv), 136.21 KB) MD5:937eac8645fe14aaa460a91f56fd59b5 Primary data file for dataset ID 784290

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Related Publications

Aminot Alain, Kerouel R. (1982). Dosage automatique de l'urée dans l'eau de mer : une méthode très sensible à la diacétylmonoxime. Canadian journal of fisheries and aquatic sciences, 39, 174-183. https://archimer.ifremer.fr/doc/1982/publication-5350.pdf
Methods

SOLÓRZANO, L. (1969). DETERMINATION OF AMMONIA IN NATURAL WATERS BY THE PHENOLHYPOCHLORITE METHOD 1 1 This research was fully supported by U.S. Atomic Energy Commission Contract No. ATS (11-1) GEN 10, P.A. 20. Limnology and Oceanography, 14(5), 799–801. doi:10.4319/lo.1969.14.5.0799
Methods

WHPO. 1994. WHP Operations and Methods. WOCE Hydrographic Office Report 91/1, as revised, WOCE Hydrographic Program Office, Woods Hole, MA.
Methods

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Parameters

Parameter	Description	Units
cruise_id	official cruise identifier (R2R)	unitless
leg_name	cruise leg name given by participants	unitless
HRR_Leg	Leg of cruise (HRR1; HRR2; HRR3)	unitless
chf_sci	chief scientist	unitless
Sta_Sequence	Order of stations	unitless
Station	Name of sampling station	unitless
Latitude	Latitude of sampling station	decimal degrees
Longitude	Longitude of sampling station	decimal degrees
Water_Depth	Maximum depth of bathymetry at station	meters
ISO_DateTime_UTC	Date and time; ISO formatted: yyyy-mm-ddTHH:MMZ	unitless
Year	Year water samples were taken in the format yyyy	unitless
Month	Month water samples were taken	mm
Day	Day water samples were taken	dd
Time	Time water samples were taken; HH:MM UTC	unitless
Niskin_Bottle_id	Niskin bottle identifier	unitless
Bottle_Depth	Depth at which Niskin bottle was closed	meters
Nutrient_Bottle_id	Sample bottle number containing nutrient water sample	unitless
NO3_umol_L	Nutrient analysis of nitrate content	micromol/liter
NO3_mg_L_N	Nutrient analysis of nitrate content	milligrams/liter
HPO4_umol_L	Nutrient analysis of hydrogen phosphate content	micromol/liter

HPO4_mg_L_P	Nutrient analysis of hydrogen phosphate content	milligrams/liter
HSIO3_umol_L	Nutrient analysis of hydrogen silicate content	micromol/liter
HSIO3_mg_L_SiO3	Nutrient analysis of hydrogen silicate content	milligrams/liter
NH4__umol_L	Nutrient analysis of ammonium content	micromol/liter
NH4_mg_L_N	Nutrient analysis of ammonium content	milligrams/liter
NO2_umol_L	Nutrient analysis of nitrogen dioxide content	micromol/liter
NO2_mg_L_N	Nutrient analysis of nitrogen dioxide content	milligrams/liter
Urea_umol_L	Nutrient analysis of urea content	micromol/liter
Urea_mg_L_N	Nutrient analysis of urea content	milligrams/liter
NO3_NO2_uM	Total nitrogen present in water sample	microMolar
Salinity_Bottle_id	Sample bottle number containing salinity water sample	unitless
Sample_Salinity	Salinity of collected water sample	practical salinity units
CTD_Salinity	Salinity recorded from CTD	practical salinity units
Oxygen_Bottle_id	Sample bottle number containing oxygen water sample	unitless
Burrette_Reading	Burrette reading of oxygen water sample	unitless
DO_mL_L	Calculated dissolved oxygen content in water sample	milliliters/liter
DO_mg_L	Calculated dissolved oxygen content in water sample	milligrams/liter
DO_mM_L	Calculated dissolved oxygen content in water sample	millimol/liter
Salinity_derived	Derived salinity from BTL file	practical salinity units
Potl_Temp_derived	Derived potential temperature from BTL file	degrees Celsius
DO_derived	Derived dissolved oxygen content from BTL file	milliliters/liter
Density_derived	Derived density from BTL file	kilograms/meter^3
Conductivity	Conductivity from BTL file	Siemans/meter
Beam_Transmission	Beam transmission from BTL file (percent)	unitless
PAR_Irradiance	PAR from BTL file	micromol /meter^2/second
Fluorescence_CDOM_mg_m3	CDOM fluorescence from BTL file	milligrams/meter^3
Fluorescence_ECO_AFL_FL_mg_m3	Chl-A fluorescence from BTL file	milligrams/meter^3
BTL_File_Depth	Average depth from BTL file	meters
Comments	Comments	unitless

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Instruments

Dataset-specific Instrument Name	Guildline Autosal 8400B salinometer
Generic Instrument Name	Autosal salinometer
Dataset-specific Description	Used to measure bottle sample salinity/conductivity.
Generic Instrument Description	The salinometer is an instrument for measuring the salinity of a water sample.

Dataset-specific Instrument Name	
Generic Instrument Name	CTD Sea-Bird
Generic Instrument Description	Conductivity, Temperature, Depth (CTD) sensor package from SeaBird Electronics, no specific unit identified. This instrument designation is used when specific make and model are not known. See also other SeaBird instruments listed under CTD. More information from Sea-Bird Electronics.

Dataset-specific Instrument Name	
Generic Instrument Name	Niskin bottle
Dataset-specific Description	Used to collect water samples at discrete depths.
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	6-channel Astoria-Pacific autoanalyzer
Generic Instrument Name	Nutrient Autoanalyzer
Dataset-specific Description	Used for nutrient analyses: phosphate, silicate, nitrate+nitrite, nitrite, ammonium, and urea.
Generic Instrument Description	Nutrient Autoanalyzer is a generic term used when specific type, make and model were not specified. In general, a Nutrient Autoanalyzer is an automated flow-thru system for doing nutrient analysis (nitrate, ammonium, orthophosphate, and silicate) on seawater samples.

Dataset-specific Instrument Name	Winkler oxygen titrator (Langdon Enterprises, Miami)
Generic Instrument Name	Winkler Oxygen Titrator
Dataset-specific Description	Used to measure dissolved oxygen concentrations.
Generic Instrument Description	A Winkler Oxygen Titration system is used for determining concentration of dissolved oxygen in seawater.

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Deployments

PS1809

Website	https://www.bco-dmo.org/deployment/784313
Platform	R/V Point Sur
Start Date	2017-09-22
End Date	2017-10-03
Description	HRR study with three legs. Chief Scientists: Steve DiMarco (Leg 1); Kristen Thyng (Leg 2); Lisa Campbell (Leg 3). R2R Cruise Page: https://www.rvdata.us/search/cruise/PS1809

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Project Information

RAPID: Hurricane Impact on Phytoplankton Community Dynamics and Metabolic Response (HRR)

Coverage: Texas coast

NSF Award Abstract:
Hurricane Harvey is the strongest hurricane to hit the Texas coast in decades and the resulting tidal surges, flooding and terrestrial runoff have had a severe impact on the coastal ocean. The effects on the phytoplankton, the first link in the food chain, may be unprecedented. To determine how the phytoplankton community will respond to such drastic changes in salinity, nutrient inputs, and potential toxins, immediate and continuous sampling is the only way to fully capture the effects and to identify when conditions return to "normal". An automated, continuous phytoplankton imaging instrument that is deployed on the Texas coast records images of the phytoplankton and permits calculation of the abundance of different species. Together with molecular information on the genes that have been "turned on", or expressed, outcomes of this project will help determine the responses of individual types of phytoplankton. Extreme storms are expected to increase in frequency with future climate change, so the responses identified now will be valuable in predicting how such events will affect these primary producers, which in turn support most of the food webs in marine ecosystems, in the future.

High temporal resolution observations from the Imaging FlowCytobot (IFCB) have revealed that hurricanes in the Gulf of Mexico cause drastic changes in the phytoplankton community structure. The objectives of this RAPID project are: 1) to characterize the dynamics of the phytoplankton species in relation to the environmental variables along the Texas coast; 2) to assess the short and long-term changes in the phytoplankton community; and 3) to identify the strategies of the phytoplankton community for resource acquisition. To accomplish these objectives, this project will utilize IFCB time series to follow phytoplankton community structure during the recovery period from Hurricane Harvey. In addition, two RAPID response cruises (in late September and early October) to sample at 5 sites along a transect from Galveston to Port Aransas, TX. At each station, CTD profiles and water samples from surface and the chlorophyll maximum will

be collected for nutrients, carbonate chemistry, and RNA sequencing for metatranscriptomic analysis. Metatranscriptomics can provide an indication of the metabolic strategies employed and functional relationships within the plankton community in response to changes in the environment. The advantage of a metatranscriptomic approach is that the entire molecular response to the environment is captured. So, while the response of phytoplankton to increased nutrient inputs from floodwater runoff is targeted, the responses to other environmental stresses (toxics, hypoxia, acidification) are also captured. Analyses of this time series using multivariate statistical techniques, such as principal component analysis (PCA), and network analysis, a powerful technique for identifying potential interactions among taxa, will provide insights on the environmental factors and metabolic responses structuring the community during the aftermath of the hurricane.

Related data from the The Texas Observatory for Algal Succession Time-Series (TOAST) can be found at the following: https://toast.tamu.edu/timeline?dataset=HRR_Cruise

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1760620

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