One meter binned CTD data collected aboard the R/V Pelican during PE17-04 and PE17-20 along the Northern Gulf of Mexico, specifically the Louisiana Shelf region dominated by the discharge of the Mississippi River plume.

Website: https://www.bco-dmo.org/dataset/822194
Data Type: Cruise Results
Version: 1
Version Date: 2020-08-27

Project
» The biotic and abiotic controls on the Silicon cycle in the northern Gulf of Mexico (CLASiC)

Contributors	Affiliation	Role
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Abstract
Coastal LouisianA Silicon Cycling (CLASiC) 1-m binned CTD data collected aboard the R/V Pelican during PE17-04 (late summer 2016) and 17-20 (May 2017) along the Northern Gulf of Mexico, specifically the Louisiana Shelf region dominated by the discharge of the Mississippi River plume.

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Coverage

Spatial Extent: **N**:29.0711 **E**:-89.4523 **S**:28.2633 **W**:-91.6114
Temporal Extent: 2016-08-28 - 2017-05-12

Methods & Sampling

Multiple hydrocasts were conducted at stations denoted in the bottle-file metadata. A SeaBird CTD was used with sensors for the following measurements: conductivity/salinity, temperature, pressure, dissolved oxygen, water transmission/attenuation, chlorophyll a fluorescence and photosynthetically active radiation. All hydrocast data were processed to 1-m bins.

Data Processing Description

SeaBird files were processed in Seasave (Software Version V 7.25.0.151) and binned at 1-m depth intervals.

BCO-DMO Data Manager Processing Notes:
* added a conventional header with dataset name, PI name, version date
* modified parameter names to conform with BCO-DMO naming conventions
* blank values in this dataset are displayed as "nd" for "no data." nd is the default missing data identifier in the BCO-DMO system.
* removed all spaces in headers and replaced with underscores
* removed all units from headers
* converted dates to ISO Format yyyy-mm-dd
* merged Date_Zulu and Time_Zulu to create ISO_DateTime_UTC and then removed Zulu columns
* set Types for each data column
* merged the CLASiC 2016 and 2017 CTD data files into one dataset
* rounded latitude and longitude to four decimal places

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Data Files

File
CTD_concat.csv (Comma Separated Values (.csv), 335.40 KB) MD5:0c20f6c7c0154a590494c237f45e4c6f Primary data file for dataset ID 822194

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Parameters

Parameter	Description	Units
Cruise_Name	Name of specific cruise, no units	unitless
Cast_Number	CTD Number (chronological)	unitless
Latitude	Latitude of hydrocast, decimal degrees North	decimal degrees
Longitude	Longitude of hydrocast, decimal degrees East	decimal degrees
ISO_DateTime_UTC	Date/Time (UTC) ISO formatted	YYYY-MM-DDTHH:MM:SS[.xx]Z
Date_Local	Local date of hydrocast	YYYY-MM-DD
Time_Local	Local time of hydrocast	HH:MM (24 hour clock)
Depth	[salt water, m]	meter (m)
Temperature	CTD Temperature [ITS-90]	degrees Celsius
Salinity	CTD Salinity	PSU
Specific_Conductance	CTD Conductivity	mS/cm
Oxygen	CTD Oxygen sensor	mg/l
Beam_Transmission	Beam Transmission on WET Labs C-Star	%
Beam_Attenuation	Beam Attenuation on WET Labs C-Star	1/m
Fluorescence	Chlorophyll Fluorescence	ug/l
PAR_Irradiance	Photosynthetically Active Radiation/Irradiance, Biospherical Instruments	uE/m2/s

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	CTD-fluorometer
Generic Instrument Description	A CTD-fluorometer is an instrument package designed to measure hydrographic information (pressure, temperature and conductivity) and chlorophyll fluorescence.

Dataset-specific Instrument Name	
Generic Instrument Name	LI-COR Biospherical PAR Sensor
Generic Instrument Description	The LI-COR Biospherical PAR Sensor is used to measure Photosynthetically Available Radiation (PAR) in the water column. This instrument designation is used when specific make and model are not known.

Dataset-specific Instrument Name	
Generic Instrument Name	Sea-Bird SBE 43 Dissolved Oxygen Sensor
Generic Instrument Description	The Sea-Bird SBE 43 dissolved oxygen sensor is a redesign of the Clark polarographic membrane type of dissolved oxygen sensors. More information from the manufacturer: https://www.seabird.com/products/sbe-43-dissolved-oxygen-sensor

Dataset-specific Instrument Name	
Generic Instrument Name	Sea-Bird SBE 911plus CTD
Generic Instrument Description	[tethered, real-time] The Sea-Bird SBE 911 plus is a type of CTD instrument package for continuous measurement of conductivity, temperature and pressure. The SBE 911 plus includes the SBE 9plus Underwater Unit and the SBE 11plus Deck Unit (for real-time readout using conductive wire) for deployment from a vessel. The combination of the SBE 9 plus and SBE 11 plus is called a SBE 911 plus. The SBE 9 plus uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 plus and SBE 4). The SBE 9 plus CTD can be configured with up to eight 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	
Generic Instrument Name	WET Labs {Sea-Bird WETLabs} C-Star transmissometer
Generic Instrument Description	The C-Star transmissometer has a novel monolithic housing with a highly integrated opto-electronic design to provide a low cost, compact solution for underwater measurements of beam transmittance. The C-Star is capable of free space measurements or flow-through sampling when used with a pump and optical flow tubes. The sensor can be used in profiling, moored, or underway applications. Available with a 6000 m depth rating. More information on Sea-Bird website: https://www.seabird.com/c-star-transmissometer/product?id=60762467717

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Deployments

PE17-20

Website	https://www.bco-dmo.org/deployment/792830
Platform	R/V Pelican
Start Date	2017-05-03
End Date	2017-05-13
Description	More information about this cruise can be found in R2R: https://www.rvdata.us/search/cruise/PE17-20

PE17-04

Website	https://www.bco-dmo.org/deployment/822209
Platform	R/V Pelican
Start Date	2016-08-26
End Date	2016-09-06

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Project Information

The biotic and abiotic controls on the Silicon cycle in the northern Gulf of Mexico (CLASiC)

Coverage: Northern Gulf of Mexico, specifically the Louisiana Shelf region dominated by the discharge of the Mississippi River on the western side of the delta

NSF Award Abstract:
The Louisiana Shelf system in the northern Gulf of Mexico is fed by the Mississippi River and its many tributaries which contribute large quantities of nutrients from agricultural fertilizer to the region. Input of these nutrients, especially nitrogen, has led to eutrophication. Eutrophication is the process wherein a body of water such as the Louisiana Shelf becomes enriched in dissolved nutrients that increase phytoplankton growth which eventually leads to decreased oxygen levels in bottom waters. This has certainly been observed in this area, and diatoms, a phytoplankton which represents the base of the food chain, have shown variable silicon/nitrogen (Si/N) ratios. Because diatoms create their shells from silicon, their growth is controlled not only

by nitrogen inputs but the availability of silicon. Lower Si/N ratios are showing that silicon may be playing an increasingly important role in regulating diatom production in the system. For this reason, a scientist from the University of South Alabama will determine the biogeochemical processes controlling changes in Si/N ratios in the Louisiana Shelf system. One graduate student on their way to a doctorate degree and three undergraduate students will be supported and trained as part of this project. Also, four scholarships for low-income, high school students from Title 1 schools will get to participate in a month-long summer Marine Science course at the Dauphin Island Sea Laboratory and be included in the research project. The study has significant societal benefits given this is an area where $2.4 trillion gross domestic product revenue is tied up in coastal resources. Since diatoms are at the base of the food chain that is the biotic control on said coastal resources, the growth of diatoms in response to eutrophication is important to study.

Eutrophication of the Mississippi River and its tributaries has the potential to alter the biological landscape of the Louisiana Shelf system in the northern Gulf of Mexico by influencing the Si/N ratios below those that are optimal for diatom growth. A scientist from the University of South Alabama believes the observed changes in the Si/N ratio may indicate silicon now plays an important role in regulating diatom production in the system. As such, understanding the biotic and abiotic processes controlling the silicon cycle is crucial because diatoms dominate at the base of the food chain in this highly productive region. The study will focus on following issues: (1) the importance of recycled silicon sources on diatom production; (2) can heavily-silicified diatoms adapt to changing Si/N ratios more effectively than lightly-silicified diatoms; and (3) the role of reverse weathering in sequestering silicon thereby reducing diffusive pore-water transport. To attain these goals, a new analytical approach, the PDMPO method (compound 2-(4-pyridyl)-5-((4-(2-dimethylaminoethylamino-carbamoyl)methoxy)phenyl)oxazole) that quantitatively measures taxa-specific silica production would be used.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1558957

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