

Hydrographic data from Niskin bottles collected by CTD profiling on two R/V Endeavor cruises, EN620 and EN642, in the Northern Gulf of Mexico in 2018 and 2019

Website: <https://www.bco-dmo.org/dataset/872254>

Data Type: Cruise Results

Version: 1

Version Date: 2022-03-28

Project

» [Development of low Nitrogen:Phosphorus ratios in the euphotic zone - the Phosphorus side of the story](#)
(GOMP)

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Abstract

This dataset includes the hydrographic data from Niskin bottles collected by CTD profiling on two R/V Endeavor cruises. The EN620 cruise was conducted during August and September 2018. The EN642 cruise was conducted during July and August 2019.

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Coverage

Spatial Extent: N:29.09955 E:-87.0774 S:27.1952 W:-91.82014

Temporal Extent: 2018-08-20 - 2019-08-03

Methods & Sampling

Hydrographic data were collected during casts with a CTD-rosette system (SBE11plus equipped with a fluorometer, transmissometer, oxygen sensor, and a PAR sensor) on two cruises aboard R/V Endeavor. The EN620 cruise was conducted during August and September 2018. The EN642 cruise was conducted during July and August 2019.

Data Processing Description

Data were processed using SeaSave v 7.26.7.107.

BCO-DMO Processing:

- concatenated separate data files for EN620 and EN642 into one dataset;
- renamed fields to comply with BCO-DMO naming conventions;
- added date-time field in ISO8601 format;
- changed date format to YYYY-MM-DD;
- replaced "NA" with "nd" (no data);
- removed separate month, day, and year columns.

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Supplemental Files

File
EN620_CTD_File_Header.pdf (Portable Document Format (.pdf), 438.94 KB) MD5:9f70b453661be25af7522209bf92f75e Representative Sea-Bird SBE 9 header file for CTD/bottle data from EN620 cruise.
EN642_CTD_File_Header.pdf (Portable Document Format (.pdf), 440.18 KB) MD5:db676b98e5c53fd59ede3bab6e68c950 Representative Sea-Bird SBE 9 header file for CTD/bottle data from EN642 cruise.

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Parameters

Parameter	Description	Units
Cruise	Cruise ID number	unitless
Station	Station number	unitless
StnEvent	Station-event number	unitless
Latitude	Latitude	degrees North
Longitude	Longitude	degrees East
BottleID	Bottle ID number	unitless
Bottle	Bottle ID number	unitless
ISO_DateTime_UTC	Date and time (UTC) in ISO8601 format: YYYY-MM-DDThh:mm:ssZ	unitless
Date	Date in format YYYY-MM-DD	unitless
Time	Time in format hh:mm:ss	unitless
TimeJ	Julian Day	unitless
TimeS	Time Elapsed	seconds
DepSM1	Depth, primary	meters
DepSM2	Depth, secondary	meters
PrDM	Pressure	decibars
AltM	Altimeter	meters
Sal00	Salinity, primary	PSU
Sal11	Salinity, secondary	PSU

Sigma_t00	Density (sigma theta) Primary	kilograms per cubic meter (kg/m ³)
Sigma_t11	Density (sigma theta) secondary	kilograms per cubic meter (kg/m ³)
Oxsat	Percent oxygen saturation	unitless (percent)
Potemp090C	Potential temperature, primary	degrees Celsius
Potemp190C	Potential temperature, secondary	degrees Celsius
SvCM	sound velocity primary	meters per second (m/s)
SvCM1	sound velocity secondary	meters per second (m/s)
T090C	Water temperature, primary	degrees Celsius
C0	Conductivity, primary	Siemens per meter (S/m)
V0	Voltage 0, Transmissometer, WET Labs C-Star	volts
CStarAt0	Beam Attenuation	reciprocal meters (1/m)
CStarAt0_SD	Standard deviation of CStarAt0	reciprocal meters (1/m)
CStarTr0	Percent beam transmission	unitless (percent)
CStarTr0_SD	Standard deviation of CStarTr0	unitless (percent)
V1	voltage 1, Fluorometer, WET Labs ECO-AFL/FL	volts
FIECO_AFL	Chlorophyll Fluorescence	milligrams per cubic meter (mg/m ³)
FIECO_AFL_SD	Standard deviation of FIECO_AFL	milligrams per cubic meter (mg/m ³)
V2	voltage 2, Altimeter	volts
V3	voltage 3, PAR/Irradiance, Biospherical/Licor	volts
Par	In situ PAR	photons/m ² /s
V4	voltage 4, Oxygen, SBE 43	volts
Sbeox0V	Oxygen Raw primary	volts
V5	voltage 5, Oxygen, SBE 43, 2	volts
Sbeox1V	Oxygen Raw secondary	volts
V6	voltage 6, User Polynomial	volts
V6_SD	Standard deviation of V6	volts
V7	voltage 7, Free	volts
Spar	Surface PAR	photons/m ² /s
Spar_SD	Standard deviation of Spar	photons/m ² /s
Sbeox0_mmL	Oxygen concentration Primary	micromoles per liter (umol/l)
Sbeox1_mmL	Oxygen concentration secondary	micromoles per liter (umol/l)
T190C	Water temperature, secondary	degrees Celsius
T2_T190C	Difference between primary and secondary temperature measurements	degrees Celsius
C1	Conductivity, secondary	Siemens per meter (S/m)
C2_C1	Difference between primary and secondary conductivity measurements	Siemens per meter (S/m)
Scan	Scan count	unitless

Instruments

Dataset-specific Instrument Name	altimeter
Generic Instrument Name	Altimeter
Generic Instrument Description	An instrument that measures height above a fixed surface. The data can be used to map ocean-surface topography and generate gridded surface height fields.

Dataset-specific Instrument Name	Seabird SBE 11plus v5.2
Generic Instrument Name	CTD Sea-Bird SBE 911plus
Dataset-specific Description	R/V Endeavor is equipped with an SBE 911+ CTD: High quality ducted/pumped system with digiquartz pressure sensor and dual temperature and conductivity sensors. 6800-meter capability and data rate of 24 scans per second.
Generic Instrument Description	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	PAR/Irradiance, Biospherical/Licor
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	Niskin bottle
Generic Instrument Name	Niskin bottle
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	SBE43
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 Sea-Bird Electronics

Dataset-specific Instrument Name	WET Labs ECO-AFL/FL
Generic Instrument Name	Wet Labs ECO-AFL/FL Fluorometer
Generic Instrument Description	The Environmental Characterization Optics (ECO) series of single channel fluorometers delivers both high resolution and wide ranges across the entire line of parameters using 14 bit digital processing. The ECO series excels in biological monitoring and dye trace studies. The potted optics block results in long term stability of the instrument and the optional anti-biofouling technology delivers truly long term field measurements. more information from Wet Labs

Dataset-specific Instrument Name	Transmissometer, WET Labs C-Star
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

EN620

Website	https://www.bco-dmo.org/deployment/871952
Platform	R/V Endeavor
Start Date	2018-08-19
End Date	2018-09-03
Description	See additional cruise information from the Rolling Deck to Repository (R2R): https://www.rvdata.us/search/cruise/EN620

EN642

Website	https://www.bco-dmo.org/deployment/872109
Platform	R/V Endeavor
Start Date	2019-07-21
End Date	2019-08-04
Description	See additional cruise information from the Rolling Deck to Repository (R2R): https://www.rvdata.us/search/cruise/EN642

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Project Information

Development of low Nitrogen:Phosphorus ratios in the euphotic zone - the Phosphorus side of the story (GOMP)

Coverage: Gulf of Mexico

NSF Award Abstract

This research will study the processes that cause the relative biological availability of nitrogen (N) and phosphorus (P) in the upper ocean to change as water moves from the coast to offshore in the northern Gulf of Mexico. Both N and P are required nutrients. Consequently, the ratio of N to P in the upper ocean has important consequences for plant growth and the marine food web structure. Typically, as water moves offshore bioavailable N declines faster than bioavailable P. While processes that alter either element will affect the N to P ratio, previous research has focused mainly on the N side of the relationship, examining cycling and the selective removal of different forms of N from the water by marine microorganisms. This project will focus instead on the less-studied P side of the N to P ratio in the upper ocean. It will use shipboard experiments to quantify microbiological processes that maintain P availability in the upper ocean, even as N availability declines. Given that low N availability relative to P limits plant growth in most of the ocean's sunlit surface waters, understanding how this chemical ratio develops as water moves offshore is of fundamental importance for the study of marine ecosystems worldwide. Educational impact will include at least seven students' direct participation in the research, providing hands-on and cross-disciplinary training, as well as practical experience at sea. Two middle school teachers will also participate in the oceanographic cruises. They will incorporate field results and personal experiences into lesson plans and teachers' workshops. The project will also develop public outreach activities that focus on the unique value of marine ecosystems of the Gulf of Mexico.

This project will test the hypothesis that the decline in the ratio of bioavailable N to P in surface water as it moves offshore develops from preferential phosphorus retention as opposed to removal of biologically-available forms of nitrogen. As part of the research associated with this central hypothesis, the project will quantitatively compare the relative importance of different phosphorus-retention mechanisms during two oceanographic cruises in the northern Gulf of Mexico. Previous observations of spatial changes in N and P availability are common. The researchers will track discrete water masses with Lagrangian drifters for time course sampling, and use physical oceanographic measurements to quantify potential N to P ratio changes contributed by vertical and horizontal mixing. Shipboard incubation experiments will quantify and compare rates for the key microbiological processes thought to affect phosphorus retention in the upper ocean. This focus on potential P-retention processes rather than N loss as an explanation of commonly observed declines in surface ocean N to P ratio represents a unique contribution to the complete understanding of the complex feedback mechanisms between nutrient cycles and marine ecosystem function.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1737240

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