

Underway data for Blue Heron cruise BH15-11 in the western arm of Lake Superior from August 2015 (Early Career Great Lakes research project, Novel Nutrient Paleoproxy project)

Website: <https://www.bco-dmo.org/dataset/709669>

Data Type: Cruise Results

Version: 1

Version Date: 2017-07-25

Project

» [EAGER - Introducing Early Career Scientists to Research on the Great Lakes](#) (Early Career Great Lakes research)

» [Calibration of a Novel Nutrient Paleoproxy in the Southern Ocean](#) (Novel Nutrient Paleoproxy)

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Abstract

Underway data for Blue Heron cruise BH15-11 in the western arm of Lake Superior from August 2015 (Early Career Great Lakes research project, Novel Nutrient Paleoproxy project). Underway surface sampling was collected aboard the RV Blue Heron during cruise BH15-11, which sailed from Duluth MN to Duluth MN during August 2015.

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Coverage

Spatial Extent: N:47.4211 E:-89.8107 S:46.749 W:-92.0934

Temporal Extent: 2015-08-26 - 2015-08-28

Dataset Description

This dataset encapsulates all underway surface water data collected during BH15-11 in the western arm of Lake Superior.

Methods & Sampling

Underway surface sampling was collected aboard the RV Blue Heron during cruise BH15-11, which sailed from Duluth MN to Duluth MN during August 2015.

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
- split date and time into separate columns
- added ISO_DateTime_UTC column
- converted latitude and longitude to decimal degrees

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Data Files

File
underway_BH1511.csv (Comma Separated Values (.csv), 8.75 MB) MD5:164e3f9bf4f0a40e10e6dfea97f4de5c Primary data file for dataset ID 709669

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Parameters

Parameter	Description	Units
date	UTC date; YYYYMMDD	unitless
time	UTC time; HHMM	unitless
ISO_DateTime_UTC	Date and time in ISO 8601:2004E format: YYYY-MM-DDTHH:MM:SS.xxZ	unitless
WaterTemp	sea surface water temperature	degrees Celsius
XMISS_Avg	sea surface transmissometry	percent
CHL_f_Avg	sea surface chlorophyll	micrograms per liter (ug/l)
PAR_Avg	sea surface Photosynthetically Available [Active] Radiation; downwelling irradiance	microEinsteins/centimeter ² /second (uE/cm ² /s)
SlrW_Avg	solar irradiance	Watts per square meter (W/m ²)
CDOM_Avg	sea surface colored dissolved organic matter	parts per billion
pH_Avg	sea surface pH: The measure of the acidity or basicity of an aqueous solution	unitless (pH scale)
lat	latitude; north is positive	decimal degrees
lon	longitude; east is positive	decimal degrees

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Fluorometer
Generic Instrument Description	A fluorometer or fluorimeter is a device used to measure parameters of fluorescence: its intensity and wavelength distribution of emission spectrum after excitation by a certain spectrum of light. The instrument is designed to measure the amount of stimulated electromagnetic radiation produced by pulses of electromagnetic radiation emitted into a water sample or in situ.

Dataset-specific Instrument Name	
Generic Instrument Name	pH Sensor
Generic Instrument Description	An instrument that measures the hydrogen ion activity in solutions. The overall concentration of hydrogen ions is inversely related to its pH. The pH scale ranges from 0 to 14 and indicates whether acidic (more H+) or basic (less H+).

Dataset-specific Instrument Name	
Generic Instrument Name	Photosynthetically Available Radiation Sensor
Generic Instrument Description	A PAR sensor measures photosynthetically available (or active) radiation. The sensor measures photon flux density (photons per second per square meter) within the visible wavelength range (typically 400 to 700 nanometers). PAR gives an indication of the total energy available to plants for photosynthesis. This instrument name is used when specific type, make and model are not known.

Dataset-specific Instrument Name	
Generic Instrument Name	Transmissometer
Generic Instrument Description	A transmissometer measures the beam attenuation coefficient of the lightsource over the instrument's path-length. This instrument designation is used when specific manufacturer, make and model are not known.

Dataset-specific Instrument Name	
Generic Instrument Name	Water Temperature Sensor
Generic Instrument Description	General term for an instrument that measures the temperature of the water with which it is in contact (thermometer).

Deployments

BH15-11

Website	https://www.bco-dmo.org/deployment/685923
Platform	R/V Blue Heron
Start Date	2015-08-26
End Date	2015-08-28

Project Information

EAGER - Introducing Early Career Scientists to Research on the Great Lakes (Early Career Great Lakes research)

Coverage: Great Lakes

NSF Award Abstract:

This proposal to fund a research training cruise on the University of Minnesota's R/V Blue Heron for early career scientists from the Great Lakes basin. The proposed work will have two goals: 1) teach early career lacustrine scientists how to acquire, plan for, and manage cruises aboard UNOLS ships, possibly having some impact on the long-term decrease in requests for ship time on UNOLS ships in general; and 2) expose members of the Great Lakes scientific community, which has an abysmally low submittal rate of proposals to NSF requesting UNOLS ships, to UNOLS and the academic fleet. This project mirrors the successful Chief Scientist training program that Dr. Claire Reimers at Oregon State University has run on ocean-going ships such as the R/V Wecoma, New Horizon and Endeavor.

Intellectual Merit :

The training cruise envisioned herein will allow early career scientists to collect seed data and test hypotheses for future proposals to NSF.

Broader Impacts :

This proposal intends to educate the next generation of researchers about the capabilities of UNOLS. This type of outreach between UNOLS and potential users is not only important for the broader scientific community, but doubly important for the Great Lakes community which seems resistant to using assets like the UNOLS fleet.

Calibration of a Novel Nutrient Paleoproxy in the Southern Ocean (Novel Nutrient Paleoproxy)

Coverage: Southern Ocean

NSF Award Abstract:

Human observations of Earth's climate span only a narrow window of Earth History. Understanding how and why Earth's climate changed before human observations can be overcome through the measurement and interpretation of the chemical composition of marine sediments. Accurate interpretation of these records -- also known as "proxy" records, because they stand in for direct measurements of environmental conditions in the past -- first requires that the behavior of the proxy be properly calibrated against direct observations in modern environments. This project will develop a novel proxy for marine nutrient utilization based on a comprehensive characterization of the chemical composition of particulate organic matter in the Southern Ocean. The formation and export of organic matter in the ocean requires nutrients, consumes carbon, and

can influence the global air-sea balance of carbon dioxide. New proxies and calibrations offer novel ways of looking at Earth's climate history and can potentially illuminate interactions within marine ecosystems.

The efficiency of the biological carbon pump depends critically on the availability and utilization of marine nutrients, particularly in the Southern Ocean. However, ambiguity in, and disagreement between current nutrient utilization paleoproxies renders reconstruction of past nutrient regimes uncertain. Cadmium -- a known proxy for phosphate -- offers a means to circumvent many of the known limitations of existing nutrient proxies, but requires a full isotopic characterization before its application. In this project, researchers will trace the stable isotopic composition of cadmium recorded in organic matter using multiple collector inductively coupled plasma mass spectrometry. The researchers will make isotopic measurements across numerous surface nutrient regimes in the Southern Ocean, with a focus on three critical geochemical transitions: the formation of organic carbon at the sea surface, its transit and decomposition through the ocean's interior, and its behavior during burial on the sea floor. This sea surface-to-sea floor calibration will thus comprehensively determine the utility and fidelity of a novel nutrient proxy, allowing a more accurate view of how Earth's climate was related to ocean biogeochemistry in the past.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1430015
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