Underway data from USCGC Healy cruise HLY1202 from the Arctic, North of Alaska in 2012 (OA - Canada Basin project)

Website: https://www.bco-dmo.org/dataset/527438
Version: 09 September 2014
Version Date: 2014-09-09

Project
» Ocean Acidification in the Canada Basin: Roles of Sea Ice (OA - Canada Basin)

Program
» Science, Engineering and Education for Sustainability NSF-Wide Investment (SEES): Ocean Acidification (formerly CRI-OA) (SEES-OA)

Contributors	Affiliation	Role
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Dataset Description

USGS Arctic Ocean Carbon Cruise 2012: Onboard Sensors Underway Data
Underway data that was acquired with the USCGC Healy's onboard fixed instrumentation.

For aditional information see:
HLY1202 Cruise Report, Appendix E
U.S. Geological Survey Data Series 862 - Methods

Methods & Sampling

Data acquired by the U.S. Coast Guard Cutter Healy's underway systems and provided by the ship's science support staff. Abbreviated metadata specific to this supplemental file are located the end of the original file after record 42762. Full metadata are available online from the United States Coast Guard at http://icefloe.net/2012_hly1202/

For aditional information see:
HLY1202 Cruise Report, Appendix E
U.S. Geological Survey Data Series 862 - Methods

Data Processing Description

This underway data was acquired with the USCGC Healy's onboard fixed instrumentation. Metadata are available online from the United States Coast Guard at http://icefloe.net/2012_hly1202/

For aditional information see:
HLY1202 Cruise Report, Appendix E
U.S. Geological Survey Data Series 862 - Methods

BCO-DMO Processing Notes
- Generated from original file: "HLY1202_Underway_Data.csv" contributed by Lisa Robbins
- Parameter names edited to conform to BCO-DMO naming convention found at Choosing Parameter Name
- Single Date/Time field split into separate Date and Time fields
- Date reformatted from MM/DD/YYYY to YYYYMMDD
- Time reformatted from HH:MM to HHMM
- "nd" (no data) inserted into blank fields

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Data Files

File
Underway_Data.csv (Comma Separated Values (.csv), 12.72 MB) MD5:8e9410d636be785af8681b56e2e70c49 Primary data file for dataset ID 527438

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Parameters

Parameter	Description	Units
Sample_ID	Sample count; Sample Id	dimensionless
date	date & time UTC (year/month/day hour:minute); Date	YYYYMMDD
time	date & time UTC (year/month/day hour:minute); Time	HHMM
lat	$INGGA;POSMV Latitude (South is negative)	decimal degrees
lon	$INGGA; POSMV Longitude (West is negative)	decimal degrees
cog	$INVTG POSMV Course Over Ground (angular distance from 0 (North); clockwise through 360; 1 minute average)	decimal degrees
sog	$INVTG POSMV Speed Over Ground (Knots; 1 minute average	knots

heading	$PASHR POSMV Ship heading (angular distance from 0 (North); clockwise through 360; 1 minute average)	decimal degrees
depth	$SBCTR Seabeam centerbeam depth (meters; 1 minute average)	meters
SST	$PSSTA SBE3s RemoteTemperature; Sea Chest intake (Celsius; 1 minute average)	degrees Celsius
HullTemp	HullTemp SBE48 Hull Temperature probe; Hull temperature	degrees Celsius
TSG_InTemp	$PSTSA SBE45 Water Temperature (Celsius; 1 minute average)	degrees Celsius
TSG_Cond	$PSTSA SBE45 Water Conductivity (millisiemens/centimeter; 1 minute average)	millisiemens/centimeter
TSG_Sal	$PSTSA SBE45 Water Salinity (PSU; 1 minute average)	PSU
SCF_FL	$PSFLA Seapoint Fluorometer (Ug/l; 1 minute average)	ug/l
SCF_FL_V	$PSFLA Seapoint Fluorometer (Volts; 1 minute average)	milli volts
Chlorophyll_a	$PSFLX Chlorophyll-a Turner C3 Fluorometer Bio Chem Lab (RFU - relative fluorescence units # Notes: 1) A new Turner C3 Fluorometer was installed in the Bio Chem Lab at the beginning of HLY1101. The parameters measured from this instrument are Chlorophyll-a, Phycoerythrin and CDOM. The quality of this data is unknown at this time. Rather large jumps in values were noted for Chlorophyll-a as if the instrument was adjusting the scale automatically. This was observed mostly in the early part of the cruise. It is unknown at this time the reasons for these jumps.	RFU (relative fluorescence units)
Phycoerythrin	$PSFLX Phycoerythrin Turner C3 Fluorometer Bio Chem Lab (RFU - relative fluorescence units) # Notes: 1) A new Turner C3 Fluorometer was installed in the Bio Chem Lab at the beginning of HLY1101. The parameters measured from this instrument are Chlorophyll-a, Phycoerythrin and CDOM. The quality of this data is unknown at this time. Rather large jumps in values were noted for Chlorophyll-a as if the instrument was adjusting the scale automatically. This was observed mostly in the early part of the cruise. It is unknown at this time the reasons for these jumps.	RFU (relative fluorescence units)

CDOM	$PSFLX CDOM Turner C3 Fluorometer Bio Chem Lab (RFU - relative fluorescence units) # Notes: 1) A new Turner C3 Fluorometer was installed in the Bio Chem Lab at the beginning of HLY1101. The parameters measured from this instrument are Chlorophyll-a, Phycoerythrin and CDOM. The quality of this data is unknown at this time. Rather large jumps in values were noted for Chlorophyll-a as if the instrument was adjusting the scale automatically. This was observed mostly in the early part of the cruise. It is unknown at this time the reasons for these jumps.	RFU (relative fluorescence units)
SBE_Oxy	$PSOXA SBE-43 Oxygen(ml/l; 1 minute average)	ml/l
SBE_Oxy_Raw	$PSOXA SBE-43 Oxygen(Volts; 1 minute average)	volts
SBE_Oxy_T	$PSOXA SBE-43 Oxygen Temperature(Deg C; 1 minute average)	degrees Celsius
tsg_flow_A	$PSFMA Flowmeter in-line with PSTSGA; PSOXA; PSFLA (LitersPerMinute; minimum value in 1 minute interval)	Liters/Minute
SWR	$PSSRA Short Wave Radiation (W/M^2; 1 minute average)	W/M^2
LWR	$PSSRA Long Wave Radiation (W/M^2; 1 minute average)	W/M^2
LWR_Dome_T	$PSSRA LWD Dome Temperature (Deg K; 1 minute average)	Deg K
LWR_Body_T	$PSSRA LWD Body Temperature (Deg K; 1 minute average)	Deg K
PAR	$PSSPA Surface PAR (uE/Sec/M^2; 1 minute average)	uE/Sec/M^2
JS_Air_Temp	$PSATC Bow Jackstaff Air Temperature (Deg C; 1 minute average)	degrees Celsius
Bridge_RH	$PSMEB Bridge RM Young Relative Humidity (percent; 1 minute average)	percent
Bridge_Baro	$PSMEB Bridge RM Young Barometric Pressure (millibars; 1 minute average)	mbars
JS_WndDirR	$PSWDC Jackstaff Relative wind direction (deg; 1 minute average)	decimal degrees
JS_WndSpdR	$PSWDC Jackstaff Relative wind speed (m/s; 1 minute average)	m/s

JS_WndDirT	$PSWDC Jackstaff True wind direction (deg; 1 minute average)	decimal degrees
JS_WndSpdT	$PSWDC Jackstaff True wind speed (m/s; 1 minute average)	m/s
MM_WndDirR	$PSWDB Main Mast Relative wind direction (deg; 1 minute average)	decimal degrees
MM_WndSpdR	$PSWDB Main Mast Relative wind speed (m/s; 1 minute average)	m/s
MM_WndDirT	$PSWDB Main Mast True wind direction (deg; 1 minute average)	decimal degrees
MM_WndSpdT	$PSWDB Main Mast True wind speed (m/s; 1 minute average)	m/s
StbdWndDirR	RMYoung Relative Wind Direction starboard (angular distance from 0 (North); clockwise through 360; 1 minute average)	decimal degrees
StbdWndSpdR	RMYoung Relative Wind Speed starboard (Knots; 1 minute average)	knots
StbdWndDirT	RMYoung True Wind Direction starboard (angular distance from 0 (North); clockwise through 360; 1 minute average)	decimal degrees
StbdWndSpdT	RMYoung True Wind Speed starboard (Knots; 1 minute average)	knots
PortWndDirR	RMYoung Relative Wind Direction port (angular distance from 0 (North); clockwise through 360; 1 minute average)	decimal degrees
PortWndSpdR	RMYoung Relative Wind Speed port (Knots; 1 minute average)	knots
PortWndDirT	RMYoung True Wind Direction port (angular distance from 0 (North); clockwise through 360; 1 minute average)	decimal degrees
PortWndSpdT	RMYoung True Wind Speed port (Knots; 1 minute average)	knots
OxySat	OxySat Dissolved oxygen (DO) saturation as a function of T and S (Weiss)	ml/L
AOU	AOU Apparent Oxygen Utilization (AOU)	ml/L

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Deployments

HLY1202

Website	https://www.bco-dmo.org/deployment/523780
Platform	USCGC Healy
Report	http://dmoserv3.whoi.edu/data_docs/OA_Canada_Basin/HEALY1202_FINAL_CRUISE_REPORT-3.pdf
Start Date	2012-08-26
End Date	2012-09-24
Description	Original cruise data are available from the NSF R2R data catalog USCGC Healy Science-Technical Support Summary From August 25 to September 27, 2012, the United States Coast Guard Cutter (USCGC) Healy was part of an Extended Continental Shelf Project to determine the limits of the extended continental shelf in the Arctic. On a non-interference basis, a USGS ocean acidification team participated on the cruise to collect baseline water data in the Arctic. The collection of data extended from coastal waters near Barrow, Alaska, to 83°2'N., -175°36'W., and southward back to coastal waters near Barrow and on to Dutch Harbor, Alaska. As a consequence, a number of hypotheses were tested and questions asked associated with ocean acidification, including: - What is the saturation state for different parts of the basin? - What factors drive the saturation state in the different parts of the basin? - How does saturation state compare to other regions? - How do the carbon fluxes compare in the different parts of the basin? - What is the buffering capacity of the water (Revelle factor)? - What kind of variability does carbon demonstrate in the Arctic (near shore versus offshore and diurnal)? During the cruise, underway continuous and discrete water samples were collected, and discrete water samples were collected at stations to document the carbonate chemistry of the Arctic waters and quantify the saturation state of seawater with respect to calcium carbonate. These data are critical for providing baseline information in areas where no data have existed prior and will also be used to test existing models and predict future trends.

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Project Information

Ocean Acidification in the Canada Basin: Roles of Sea Ice (OA - Canada Basin)

Website: http://coastal.er.usgs.gov/ocean-acidification/polar.html

Coverage: Beaufort Sea, Canada Basin

Extracted from the NSF award abstract:

The proposed research aims to identify mechanisms of ocean acidification and carbonate undersaturation in the Canada Basin of the Arctic Ocean. The investigators will use a 3-year dataset to address the role of two specific mechanisms involving sea-ice processes: (1) surface water freshening and undersaturation resulting from recent enhanced melting of multi-year sea-ice, and (2) surface water undersaturation resulting from a "carbon-pumping" mechanism driven by brine rejection and carbonate mineral precipitation during increasingly cyclical seasonal sea ice growth and decay. The proposed work would expand understanding of the inorganic carbon cycle, air-sea CO2 exchange rates and acidification in the Arctic Ocean. Understanding baselines and how they are changing is important for setting realistic parameters for process studies on the effects of ocean acidification on flora and fauna.

Models project the Arctic Ocean will become undersaturated with respect to carbonate minerals in the next decade. Recent field results indicate parts may already be undersaturated in late summer months when ice melt is at its greatest extent. However, few comprehensive datasets of carbonate system parameters in the Arctic Ocean exist. Researchers from the U.S. Geological Survey (USGS) and University of South Florida (USF) collected high-resolution measurements of pCO2, pH, total dissolved inorganic carbon (DIC), total alkalinity (TA), and carbonate (CO3-2) from the Canada Basin that fill critical information gaps concerning Arctic carbon variability. A Multiparameter Inorganic Carbon Analyzer (MICA) was used to collect approximately 1,800

measurements of pH and DIC along an 11,965-km trackline in August and September 2012. In addition, over 500 discrete surface water samples were taken. These data are being used to characterize and model regional pCO2, pH, and carbonate mineral saturation state. A high-resolution, three-dimensional map of these results will be presented.

Data collected on the August 2012 Arctic Cruise will be used to create regional maps of seawater carbonate parameters, including pCO2 flux/change maps, and derivative maps on saturation state. Maps depicting pCO2 and carbonate saturation states over large latitudinal and nearshore to offshore gradients are needed for the Arctic, where significant decline of carbonate ecosystems, habitats, and calcifying organisms are predicted over the next decade. The data will allow the USGS to map variations in ocean chemistry along designated tracks and will be used in models to predict future Arctic Ocean saturation states.

Note: Jonathan Wynn is a former Pricipal Investigator for this project

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Program Information

Science, Engineering and Education for Sustainability NSF-Wide Investment (SEES): Ocean Acidification (formerly CRI-OA) (SEES-OA)

Website: https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503477

Coverage: global

NSF Climate Research Investment (CRI) activities that were initiated in 2010 are now included under Science, Engineering and Education for Sustainability NSF-Wide Investment (SEES). SEES is a portfolio of activities that highlights NSF's unique role in helping society address the challenge(s) of achieving sustainability. Detailed information about the SEES program is available from NSF (https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504707).

In recognition of the need for basic research concerning the nature, extent and impact of ocean acidification on oceanic environments in the past, present and future, the goal of the SEES: OA program is to understand (a) the chemistry and physical chemistry of ocean acidification; (b) how ocean acidification interacts with processes at the organismal level; and (c) how the earth system history informs our understanding of the effects of ocean acidification on the present day and future ocean.

Solicitations issued under this program:
NSF 10-530, FY 2010-FY2011
NSF 12-500, FY 2012
NSF 12-600, FY 2013
NSF 13-586, FY 2014
NSF 13-586 was the final solicitation that will be released for this program.

PI Meetings:
1st U.S. Ocean Acidification PI Meeting(March 22-24, 2011, Woods Hole, MA)
2nd U.S. Ocean Acidification PI Meeting(Sept. 18-20, 2013, Washington, DC)
3rd U.S. Ocean Acidification PI Meeting (June 9-11, 2015, Woods Hole, MA – Tentative)

NSF media releases for the Ocean Acidification Program:

Press Release 10-186 NSF Awards Grants to Study Effects of Ocean Acidification

Discovery Blue Mussels "Hang On" Along Rocky Shores: For How Long?

Discovery nsf.gov - National Science Foundation (NSF) Discoveries - Trouble in Paradise: Ocean Acidification This Way Comes - US National Science Foundation (NSF)

Press Release 12-179 nsf.gov - National Science Foundation (NSF) News - Ocean Acidification: Finding New Answers Through National Science Foundation Research Grants - US National Science Foundation (NSF)

Press Release 13-102 World Oceans Month Brings Mixed News for Oysters

Press Release 13-108 nsf.gov - National Science Foundation (NSF) News - Natural Underwater Springs Show How Coral Reefs Respond to Ocean Acidification - US National Science Foundation (NSF)

Press Release 13-148 Ocean acidification: Making new discoveries through National Science Foundation research grants

Press Release 13-148 - Video nsf.gov - News - Video - NSF Ocean Sciences Division Director David Conover answers questions about ocean acidification. - US National Science Foundation (NSF)

Press Release 14-010 nsf.gov - National Science Foundation (NSF) News - Palau's coral reefs surprisingly resistant to ocean acidification - US National Science Foundation (NSF)

Press Release 14-116 nsf.gov - National Science Foundation (NSF) News - Ocean Acidification: NSF awards $11.4 million in new grants to study effects on marine ecosystems - US National Science Foundation (NSF)

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Funding

Funding Source	Award
NSF Arctic Sciences (NSF ARC)	PLR-1220032

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