CTD measurements and Niskin bottle samples at sample depths from USCGC Healy HLY1003, HLY1103, HLY1203 in the Bering, Beaufort and Chukchi seas from 2010 to 2012 (OA - Western Arctic project)

Website: https://www.bco-dmo.org/dataset/525568
Version: 22 August 2014
Version Date: 2014-08-22

Project
» Observation and Prediction of Ocean Acidification in the Western Arctic Ocean - Impacts of Physical and Biogeochemical Processes on Carbonate Mineral States (OA - Western Arctic)

Programs
» Science, Engineering and Education for Sustainability NSF-Wide Investment (SEES): Ocean Acidification (formerly CRI-OA) (SEES-OA)
» NACP-OCB Coastal Synthesis (NACP-OCB Coastal)
» Arctic Observing Network (AON)

Contributors	Affiliation	Role
Mathis, Jeremy	National Oceanic and Atmospheric Administration (NOAA)	Principal Investigator
Monacci, Natalie	University of Alaska Fairbanks (UAF)	Co-Principal Investigator
Stoudt, Chase	University of Alaska Fairbanks (UAF)	Contact
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Dataset Description

Carbon discrete CTD bottle data from the Beaufort and Chukchi seas during Arctic West

Methods & Sampling

(See individual deployments)

Data Processing Description

Data Processing:
Bad Values have been flagged as -999

BCO-DMO Processing Notes

- Generated from original files: "HLY1003_hy1, HLY1103_hy1, HLY1203_hy1.csv" contributed by Chase Stoudt
- UNOLS CruiseId added to each dataset
- Parameter names edited to conform to BCO-DMO naming convention found at Choosing Parameter Name
- Time reformatted from HH:MM to HHMM
- No PH_WS reported for HY1003 and HY1203
- No TCARBN reported for HY1103
- Parameters "PH_WS" and "PH_WS_FLAG_W" added HY1003 and HY1203 data with "nd" for values
- Parameters "TCARBN" and "TCARBN_FLAG_W" added to HY1103 with "nd" for values

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Data Files

File
CTD_Bottle.csv (Comma Separated Values (.csv), 137.47 KB) MD5:1228d353fad0d4f0f166329451f2f436 Primary data file for dataset ID 525568

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Parameters

Parameter	Description	Units
CruiseId	Official UNOLS Cruise Id	text
EXPOCODE	expedition code assigned by the CCHDO: NODCShipCodeYearMonthDay	text
STNNBR	station number	dimensionless
BTLNBR	Bottle Number	text
DATE	Station Date (GMT)	YYYYMMDD
TIME	Station Time (GMT)	HHMM
LATITUDE	Station Latitude (South is negative)	decimal degrees
LONGITUDE	Station Longitude (West is negative)	decimal degrees
DEPTH	Instrument Depth	METERS
CTDPRS	CTD pressure	DBARS
CTDTMP	CTD temperature; ITS-90	degrees celsius
CTDSAL	CTD salinity; PSS-78	PSU
ALKALI	Alkalinity	UMOL/KG
ALKALI_FLAG_W	Alkalinity quality flag (WOCE data quality code)	dimensionless
TCARBN	Total CO2	UMOL/KG
TCARBN_FLAG_W	Total CO2 quality flag (WOCE data quality code)	dimensionless
PH_WS	pH	total scale
PH_WS_FLAG_W	pH quality flag (WOCE data quality code)	dimensionless

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Instruments

Dataset-specific Instrument Name	CTD SBE 911plus
Generic Instrument Name	CTD Sea-Bird SBE 911plus
Dataset-specific Description	Sea Bird 911 CTD
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	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.

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Deployments

HLY1003

Website	https://www.bco-dmo.org/deployment/523770
Platform	USCGC Healy
Start Date	2010-09-07
End Date	2010-09-27
Description	Original cruise data are available from the NSF R2R data catalog USCGC Healy Science-Technical Support **Methods & Sampling** Sampling and Analytical Methodology: Total CO2: Total CO2 analysis was done at the Ocean Acidification Research Center at the University of Alaska Fairbanks with a Marianda Versatile Instrument for the Determination of Titration Alkalinity (VINDTA) 3C coupled with a coulometer (UIC, Inc.). The samples were standardized using Certified Reference Materials (CRMs) provided by Dr. A. Dickson of Scripps Institution of Oceanography. Each 250 mL sample was poisoned with 0.2 mL of mercuric chloride. CRM batch numbers and correction magnitude: 108 (2022.70 ± 0.45 µmol kg-1) and 112 (2011.09 ± 0.47 µmol kg-1) Method Reference: Mathis et al., 2010; Dickson et al. 2007. Bates et al., 2001 Whole cruise CRM values varied by ± 7.04 µmol kg-1 Alkalinity: Alkalinity was measured by an open cell, high precision potentiometric titration on a VINDTA (#19 and 34) instrument with a 250 mL sample. Whole cruise CRM values varied by ± 6.52 µmol kg-1 Method References: Mathis et al., 2010; Dickson et al. 2007. Bates et al., 2001 Related files and references: Mathis, J.T. and Monacci, N.M. 2014. Hydrographic and chemical data obtained during the USCGC Healy Cruise HLY1003 in the Arctic Ocean. September 7-27, 2010. Ocean Acidification Research Center, University of Alaska Fairbanks, USA **Processing Description** Data Processing: - No PH_WS reported for HY1003 and HY1203 - No TCARBN reported for HY1103 - Parameters "PH_WS" and "PH_WS_FLAG_W" added HY1003 and HY1203 data with "nd" for values - Parameters "TCARBN" and "TCARBN_FLAG_W" added to HY1103 with "nd" for values Bad Values have been flagged as -999

HLY1103

Website	https://www.bco-dmo.org/deployment/523773
Platform	USCGC Healy
Start Date	2011-10-03
End Date	2011-10-27
Description	Original cruise data are available from the NSF R2R data catalog USCGC Healy Science-Technical Support **Methods & Sampling** Sampling and Analytical Methodology: pH: pH was analyzed by a Spectrophotometric method using purified mCP at a temperature of 25C Total Scale. Accuracy Info: 0.001 in precision and 0.002 in accuracy. Method References: Xuewu Liu, Mark C. Patsavas, and Robert H. Byrne Purification and Characterization of meta-Cresol Purple for Spectrophotometric Seawater pH Measurements Environmental Science & Technology 2011 45 (11), 4862-4868 Alkalinity: Alkalinity was measured by a one point spectrophotometric measurement with a 300 mL sample. Whole cruise CRM values varied by ± 1 µmol kg- Method References: Xuewu Liu, Robert H. Byrne*, Michael Lindemuth, Regina Easley, and Jeremy Mathis A rapid automated procedure for laboratory and shipboard spectrophotometric measurements of seawater alkalinity: continuously monitored single-step acid additions (In preparation to Marine Chemistry) Related files and references: Mathis, J.T. and Monacci, N.M. 2014. Hydrographic and chemical data obtained during the USCGC Healy Cruise HLY1103 in the Arctic Ocean. October 5-27, 2011. Ocean Acidification Research Center, University of Alaska Fairbanks, USA **Processing Description** Data Processing: - No PH_WS reported for HY1003 and HY1303 - No TCARBN reported for HY1103 - Parameters "PH_WS" and "PH_WS_FLAG_W" added HY1003 and HY1203 data with "nd" for values - Parameters "TCARBN" and "TCARBN_FLAG_W" added to HY1103 with "nd" for values Bad Values have been flagged as -999

HLY1203

Website	https://www.bco-dmo.org/deployment/523775
Platform	USCGC Healy
Start Date	2012-10-05
End Date	2012-10-25
Description	Original cruise data are available from the NSF R2R data catalog USCGC Healy Science-Technical Support **Methods & Sampling** Sampling and Analytical Methodology: Total CO2: The analysis was done at sea with a Marianda Automated Infra Red Inorganic Carbon Analyzer (AIRICA) couple with a LI-COR LI-7000 CO2/H2O Gas Analyzer. The samples were standardized using Certified Reference Materials (CRMs) provided by Dr. A. Dickson of Scripps Institution of Oceanography. Each 250 mL sample was poisoned with 0.2 mL of mercuric chloride. CRM batch numbers and correction magnitude: 119 (2014.78 ± 0.79 µmol kg-1) Method Reference: Mathis et al., 2010; Dickson et al. 2007. Bates et al., 2001 Whole cruise CRM values varied by ± 5.04 µmol kg-1 Alkalinity: Alkalinity was measured by an open cell, high precision potentiometric titration on a VINDTA instrument with a 250 mL sample. CRM Scale: Batch 119 (2014.78 ± 0.79 µmol kg-1). Whole cruise CRM values varied by ± 5.04 µmol kg-1. Method References: Mathis et al., 2010; Dickson et al. 2007. Bates et al., 2001 Related files and references: Mathis, J.T. and Monacci, N.M. 2014. Hydrographic and chemical data obtained during the USCGC Healy Cruise HLY1203 in the Arctic Ocean. October 05-25, 2012. Ocean Acidification Research Center, University of Alaska Fairbanks, USA **Processing Description** Data Processing: - No PH_WS reported for HY1003 and HY1203 - No TCARBN reported for HY1103 - Parameters "PH_WS" and "PH_WS_FLAG_W" added HY1003 and HY1203 data with "nd" for values - Parameters "TCARBN" and "TCARBN_FLAG_W" added to HY1103 with "nd" for values Bad Values have been flagged as -999

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Project Information

Observation and Prediction of Ocean Acidification in the Western Arctic Ocean - Impacts of Physical and Biogeochemical Processes on Carbonate Mineral States (OA - Western Arctic)

Website: https://www.sfos.uaf.edu/oarc/

Coverage: Beaufort and Chukchi Seas

Extracted from the NSF award abstract:

The investigators will assess ocean acidification in the western Arctic Ocean, using ship time that is currently scheduled for annual mooring turnarounds in the Beaufort Sea. On these cruises, in September of 2011-2013, the investigators will collect samples for measurement of carbonate system parameters, inorganic nutrients, dissolved oxygen, oxygen isotopes, and oxygen/argon ratios, as well as continuous underway measurements of dissolved oxygen, oxygen/argon ratios, and pCO2. These data will be used to gain insights and perspectives into the extent of ocean acidification in the western Arctic Ocean; the key physical, chemical, and biological processes influencing the saturation states of aragonite and calcite; and potential impacts to pelagic and benthic communities. Water column observations will be synthesized with data from the associated NSF AON (Arctic Observing Network)-funded mooring, including temperature, salinity, nitrate, oxygen, pCO2, and pH, as well as carbon and hydrographic data collected on other cruises in the region. During each field season the PI will travel to several native villages to discuss the potential impacts of ocean acidification at town meetings and in classrooms. The work will contribute to carbon cycle studies coordinated under a variety of science plans and implementation structures that aim to establish accurate estimates of carbon budgets and fluxes and the

underlying mechanisms that regulate them.

NOTE: Rolf Sonnerup is a former Principal Investigator (PI) on award PLR_1040694, Laurie Juranek is a former Co-PI, who is now PI for this award.

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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)

NACP-OCB Coastal Synthesis (NACP-OCB Coastal)

Website: http://www.nacarbon.org/cgi-nacp/working_groups/wg.pl?synthesis=1#coastal

Coverage: global coastal zones

In late June 2008, the OCB Project Office sent out a call for participation in the Coastal Synthesis Activity as part of the North American Carbon Program (NACP) Interim Synthesis Activities. The objective of this activity is to stimulate the synthesis and publication of recent observational and modeling results on carbon cycle fluxes and processes along the North American continental margin. The current state of knowledge of the magnitude, spatial distribution, and inter-annual variability of carbon sources and sinks in coastal waters is incomplete. Thus, the goal of this activity is to synthesize individual, small-scale studies across broader spatial and temporal scales to improve quantitative assessments of the North American coastal carbon cycle. Because the coastal oceans have important and complex linkages with terrestrial, atmospheric, and open ocean biogeochemical cycles, we encourage the participation of researchers focused on both organic and inorganic carbon, as well as nitrogen and phosphorous cycle topics related to carbon balance and related issues such as hypoxia impacts on continental margins.

Planning for the coastal synthesis activity was initiated during a breakout session at the 2008 OCB Summer Science Workshop. The proposed coastal synthesis activity is initially broken into five U.S. geographical sub-regions (Atlantic Coast, Pacific Coast, Gulf Coast, Arctic Coast, and Laurentian Great Lakes), with leads identified for each region. Researchers were encouraged to consider ongoing projects and think about how those projects might relate to one or more of the regional syntheses. Additional information available at the NACP Web site (http://www.nacarbon.org/cgi-bin/working_groups/wg.pl) includes a list of active NACP Interim Synthesis activities and working groups.

The majority of data sets uploaded for this project will be synthesis data sets, representing an integration of previously compiled data from the various sub-regions.

Related Links:

NACP Coastal Synthesis Web Site (includes regional links)

Arctic Observing Network (AON)

Website: http://www.arcus.org/search-program/aon

Coverage: Arctic Ocean

The AON is envisioned as a system of atmospheric, land- and ocean-based environmental monitoring capabilities--from ocean buoys to satellites--that will significantly advance our observations of Arctic environmental conditions. AON is an integral part of the interagency U.S. government initiative--the Study of Environmental Arctic Change (SEARCH) program, an NSF initiative growing out of the International Polar Year (IPY) to improve observational capabilities in the Arctic and leave a long-term legacy for the benefit of science and society. Data from the AON will contribute to scientific research leading to (1) increased knowledge and understanding of the regional and global causes and consequences of present-day environmental arctic

change, (2) scenarios for and prediction of the course of future arctic change and its regional and global consequences, and (3) the development of adaptive responses to arctic change.

AON currently consists of 51 projects funded by the NSF Office of Polar Programs. The AON projects fall into the following SEARCH Implementation Plan categories: Atmosphere; Ocean and Sea Ice; Hydrology/Cryosphere; Terrestrial Ecosystems; and Human Dimensions.

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Funding

Funding Source	Award
NSF Arctic Sciences (NSF ARC)	PLR-1041102

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