CTD profiles from Lake Superior collected during various R/V Blue Heron cruises between 2007-2008 (CARGO project)

Website: https://www.bco-dmo.org/dataset/3644
Data Type: Cruise Results
Version:
Version Date: 2012-07-20

Project
» Primary Production and Grazing Dynamics In the Ultra-Oligotrophic Waters of Lake Superior (CARGO)

Program
» Laurentian Great Lakes Ecosystem Studies (Laurentian Great Lakes Ecosystem Studies)

Contributors	Affiliation	Role
Sterner, Robert W.	University of Minnesota Twin Cities (UMTC)	Principal Investigator, Contact
Brovold, Sandra	University of Minnesota Twin Cities (UMTC)	Technician
Ruff, Zack	University of Minnesota Twin Cities (UMTC)	Technician
Gegg, Stephen R.	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager
York, Amber D.	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

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Coverage

Spatial Extent: **N**:47.356667 **E**:-89.786167 **S**:46.725667 **W**:-91.9475
Temporal Extent: 2007-07-30 - 2008-09-18

Dataset Description

This dataset contains CTD profile data collected during R/V Blue Heron cruises in Lake Superior.

Methods & Sampling

CTD casts were conducted during R/V Blue Heron cruises at designated stations.

Data Processing Description

BCO-DMO Processing Notes

- Generated from original .asc files contributed by Bob Sterner and Zack Ruff
- Upcast data removed from original files
- Awk written to reformat original files
- AWK: CARGO[x]_CTDasc_2_BCODMO.awk
- Header data (parameter names) for CTD data generated from .hdr files
- Space delimited reformatted to tab delimited
- All records with "#" or "*" ignored
- Blank lines ignored
- BCO-DMO header o/p from routine
- Parameter "sbeox0_Mn" corrected to "sbeox0_Mm" 20July2012/srg

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Data Files

File
CARGO_CTD.csv (Comma Separated Values (.csv), 54.58 MB) MD5:fb75cb4ef048609d8412f129859980e9 Primary data file for dataset ID 3644

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Parameters

Parameter	Description	Units
CruiseId	Cruise Id	text
Station	Station - From Station List	text
Cast	CTD cast at the same station	integer
Date	Station date (GMT)	YYYYMMDD
Time	Station time (GMT)	HHMMSS
Lat	Station latitude (South is negative)	decimal degrees
Lon	Station longitude (West is negative)	decimal degrees
prDM	Pressure digiquartz SBE 9+ SeaBird documentaion for converting pressure in decibars to depth in meters available at:http://www.seabird.com/application_notes/AN69.htm Formula for fresh water: depth (meters) = pressure (decibars) * 1.019716	db
t090	Temp ITS-90 SBE 3+	deg C
c0	Conductivity SBE 4C	uS/cm
specc	Specific Conductance SBE 4C	uS/cm
wetStar	Chl-a Wetlabs Wetstar WS3S	mg/m^3
wetCDOM	CDOM Wetlabs Wetstar WSCD	mg/m^3
par	PAR/Irradiance Biospherical QSP-200L	(tbd)
dz_dt	Descent Rate calculated by software	m/s
ph	pH SBE 27I	pH
sal00	Salinity SBE 4C	PSU
xmiss	Beam Transmission Chelsea/Seatech/Wetlab CStar	percentage
sbeox0_Mm	DO SBE 43	umol/Kg
spar	SPAR/Surface Irradiance	(tbd)
latitude	Data latitude (South is negative)	decimal degrees
longitude	Data longitude (West is negative)	decimal degrees
scan	scan count calculated by software	integer
flag	Flag calculated by software	integer
sbeox0_Mg	DO SBE 43	mg/l

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Instruments

Dataset-specific Instrument Name	CTD Sea-Bird SBE 911plus
Generic Instrument Name	CTD Sea-Bird SBE 911plus
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	SBE 27I
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	PAR/Irradiance Biospherical QSP-200L
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	SBE 4C
Generic Instrument Name	Salinity Sensor
Generic Instrument Description	Category of instrument that simultaneously measures electrical conductivity and temperature in the water column to provide temperature and salinity data.

Dataset-specific Instrument Name	SBE 43 Dissolved Oxygen Sensor
Generic Instrument Name	Sea-Bird SBE 43 Dissolved Oxygen Sensor
Dataset-specific Description	SBE 43
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	Transmissometer
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	Chl-a Wetlabs Wetstar WS3S
Generic Instrument Name	WETLabs WETStar fluorometer
Generic Instrument Description	Submersible fluorometer designed for through-flow or pumped CTD applications manufactured by WetLabs and which can be configured for various types of fluorescence. The probe has a temperature range of 0-30 degrees C and a depth rating of 600m.

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Deployments

BH07-09

Website	https://www.bco-dmo.org/deployment/58792
Platform	R/V Blue Heron
Report	http://bcodata.whoi.edu/LaurentianGreatLakes_Chemistry/BH07-09_CARGO1_Synopsis.pdf
Start Date	2007-07-30
End Date	2007-08-01
Description	Cruise Name:CARGO 1 Dates: 30 July - 01 August 2007 Vessel: R/V Blue Heron UNOLS Cruise ID: BH07-09 (Not verified srg/13April2012) First cruise on Sea Grant project on production and grazing. The lake was stratified and a DCM was present. Participants: Sterner, Brovold, Seegers, Jeyasingh, and Stark **Methods & Sampling** * Sea-Bird SBE 9 Data File: * FileName = C:SeasaveRawCTD_2007Cargo1CD-1_1pm.dat * Software Version Seasave Win32 V 5.37d * Temperature SN = 2723 * Conductivity SN = 2271 * Number of Bytes Per Scan = 34 * Number of Voltage Words = 5 * Number of Scans Averaged by the Deck Unit = 1 * System UpLoad Time = Jul 30 2007 13:03:56 * NMEA Latitude = 47 03.77 N * NMEA Longitude = 091 25.91 W * NMEA UTC (Time) = Jul 30 2007 17:58:50 * Store Lat/Lon Data = Append to Every Scan ** Ship: BH ** Cruise: ** Station: ** Latitude: ** Longitude: ** Full sun, calm seas # nquan = 18 # nvalues = 28347 # units = specified # name 0 = prDM: Pressure, Digiquartz [db] # name 1 = t090C: Temperature [ITS-90, deg C] # name 2 = c0uS/cm: Conductivity [uS/cm] # name 3 = specc: Specific Conductance [uS/cm] # name 4 = xmiss: Beam Transmission, Chelsea/Seatech/Wetlab CStar [%] # name 5 = wetStar: Fluorescence, Wetlab Wetstar [mg/m^3] # name 6 = dz/dtM: Descent Rate [m/s] # name 7 = ph: pH # name 8 = par: PAR/Irradiance, Biospherical/Licor # name 9 = sal00: Salinity [PSU] # name 10 = sbeox0Mm/Kg: Oxygen, SBE 43 [umol/Kg] # name 11 = sbeox0Mg/L: Oxygen, SBE 43 [mg/l] # name 12 = wetCDOM: Fluorescence, Wetlab CDOM [mg/m^3] # name 13 = spar: SPAR/Surface Irradiance # name 14 = latitude: Latitude [deg] # name 15 = longitude: Longitude [deg] # name 16 = scan: Scan Count # name 17 = flag: 0.000e+00 # span 0 = 0.761, 242.898 # span 1 = -9.9511, 98.9762 # span 2 = 57.726717, 105.640078 # span 3 = 30.341, 251.344 # span 4 = 41.4291, 76.8061 # span 5 = 0.6537, 5.5738 # span 6 = -0.708, 0.734 # span 7 = 7.890, 8.395 # span 8 = 5.1288e+00, 9.9990e+03 # span 9 = 0.0312, 0.0868 # span 10 = 96.820, 646.479 # span 11 = 3.00280, 20.65045 # span 12 = 0.2039, 5.0377 # span 13 = 2.4946e+03, 2.5297e+03 # span 14 = 47.06282, 47.06382 # span 15 = -91.43182, -91.42882 # span 16 = 1, 28347 # span 17 = 0.0000e+00, 0.0000e+00 # interval = seconds: 0.0416667 # start_time = Jul 30 2007 13:03:56 # bad_flag = -9.990e-29 # sensor 0 = Frequency 0 temperature, 2723, 30 Jan 2007 # sensor 1 = Frequency 1 conductivity, 2271, 31 Jan 2007, cpcor = -9.5700e-08 # sensor 2 = Frequency 2 pressure, 756869, 17-Feb-04 # sensor 3 = Extrnl Volt 0 Oxygen, SBE, primary, 0471, 13 Mar 2007 # sensor 4 = Extrnl Volt 1 WET Labs, CDOM # sensor 5 = Extrnl Volt 2 pH, 270135, 21 Feb 2007 # sensor 6 = Extrnl Volt 3 oxidation reduction potential, 270135, 21 Feb 2007 # sensor 7 = Extrnl Volt 4 transmissometer, primary, CST-268PR, 27 Feb 2007 # sensor 8 = Extrnl Volt 5 WET Labs, WETStar fluorometer, WS3S-553P, 15 Feb 2007 # sensor 9 = Extrnl Volt 6 altimeter # sensor 10 = Extrnl Volt 7 irradiance (PAR), primary, 4554, 8 Feb 2007 # sensor 11 = Extrnl Volt 9 surface irradiance (SPAR), degrees = 0.0 # datcnv_date = Aug 01 2007 14:53:56, 5.37e # datcnv_in = C:SeasaveRawCTD_2007Cargo130 July 2007CD-1_1pm.dat C:SeasaveConfiguration FilesApril2007.con # datcnv_skipover = 0 # file_type = ascii *END*

BH07-17

Website	https://www.bco-dmo.org/deployment/58793
Platform	R/V Blue Heron
Report	http://bcodata.whoi.edu/LaurentianGreatLakes_Chemistry/BH07-17_CARGO2_Synopsis.pdf
Start Date	2007-10-05
End Date	2007-10-07
Description	Cruise Name:CARGO 2 Dates: 05 - 07 October 2007 Vessel: R/V Blue Heron UNOLS Cruise ID: BH07-17 (Not verified srg/13April2012) Participants: R. Sterner, et al **Methods & Sampling** * Sea-Bird SBE 9 Data File: * FileName = C:SeasaveRawCTD_2007Sterner_OctCD1.dat * Software Version Seasave Win32 V 5.37d * Temperature SN = 2723 * Conductivity SN = 2271 * Number of Bytes Per Scan = 34 * Number of Voltage Words = 5 * Number of Scans Averaged by the Deck Unit = 1 * System UpLoad Time = Oct 05 2007 03:51:36 * NMEA Latitude = 47 03.80 N * NMEA Longitude = 091 26.05 W * NMEA UTC (Time) = Oct 05 2007 08:50:42 * Store Lat/Lon Data = Append to Every Scan ** Ship: ** Cruise: ** Station: ** Latitude: ** Longitude: # nquan = 18 # nvalues = 36594 # units = specified # name 0 = prDM: Pressure, Digiquartz [db] # name 1 = t090C: Temperature [ITS-90, deg C] # name 2 = c0uS/cm: Conductivity [uS/cm] # name 3 = specc: Specific Conductance [uS/cm] # name 4 = xmiss: Beam Transmission, Chelsea/Seatech/Wetlab CStar [%] # name 5 = wetStar: Fluorescence, Wetlab Wetstar [mg/m^3] # name 6 = dz/dtM: Descent Rate [m/s] # name 7 = ph: pH # name 8 = par: PAR/Irradiance, Biospherical/Licor # name 9 = sal00: Salinity [PSU] # name 10 = sbeox0Mm/Kg: Oxygen, SBE 43 [umol/Kg] # name 11 = sbeox0Mg/L: Oxygen, SBE 43 [mg/l] # name 12 = wetCDOM: Fluorescence, Wetlab CDOM [mg/m^3] # name 13 = spar: SPAR/Surface Irradiance # name 14 = latitude: Latitude [deg] # name 15 = longitude: Longitude [deg] # name 16 = scan: Scan Count # name 17 = flag: 0.000e+00 # span 0 = 1.014, 241.756 # span 1 = 3.7582, 11.3039 # span 2 = 57.727015, 72.043038 # span 3 = 97.925, 102.120 # span 4 = 78.9835, 85.9137 # span 5 = 0.4576, 4.3795 # span 6 = -0.931, 0.806 # span 7 = 10.510, 11.177 # span 8 = 5.1288e+00, 5.6735e+01 # span 9 = 0.0436, 0.0474 # span 10 = 335.574, 415.322 # span 11 = 10.73408, 13.29016 # span 12 = 1.1051, 2.9076 # span 13 = 0.0000e+00, 2.1940e+00 # span 14 = 47.05972, 47.06336 # span 15 = -91.43864, -91.43416 # span 16 = 1, 36594 # span 17 = 0.0000e+00, 0.0000e+00 # interval = seconds: 0.0416667 # start_time = Oct 05 2007 03:51:36 # bad_flag = -9.990e-29 # sensor 0 = Frequency 0 temperature, 2723, 30 Jan 2007 # sensor 1 = Frequency 1 conductivity, 2271, 31 Jan 2007, cpcor = -9.5700e-08 # sensor 2 = Frequency 2 pressure, 756869, 17-Feb-04 # sensor 3 = Extrnl Volt 0 Oxygen, SBE, primary, 0471, 13 Mar 2007 # sensor 4 = Extrnl Volt 1 WET Labs, CDOM # sensor 5 = Extrnl Volt 2 pH, 270135, 21 Feb 2007 # sensor 6 = Extrnl Volt 3 oxidation reduction potential, 270135, 21 Feb 2007 # sensor 7 = Extrnl Volt 4 transmissometer, primary, CST-268PR, 27 Feb 2007 # sensor 8 = Extrnl Volt 5 WET Labs, WETStar fluorometer, 15 Feb 2007 # sensor 9 = Extrnl Volt 6 altimeter # sensor 10 = Extrnl Volt 7 irradiance (PAR), primary, 4554, 8 Feb 2007 # sensor 11 = Extrnl Volt 9 surface irradiance (SPAR), degrees = 0.0 # datcnv_date = Oct 05 2007 11:19:06, 5.37e # datcnv_in = C:SeasaveRawCTD_2007Sterner_OctCD1.dat C:SeasaveRawCTD_2007Sterner_OctCD1.CON # datcnv_skipover = 0 # file_type = ascii *END*

BH07-19

Website	https://www.bco-dmo.org/deployment/58794
Platform	R/V Blue Heron
Report	http://bcodata.whoi.edu/LaurentianGreatLakes_Chemistry/BH07-19_CARGO3_Synopsis.pdf
Start Date	2007-11-07
End Date	2007-11-09
Description	Cruise Name:CARGO 3 Dates: 07 - 09 November 2007 Vessel: R/V Blue Heron UNOLS Cruise ID: BH07-19 (Not verified srg/13April2012) Participants: Sterner (Chief Scientist), Brovold, Seegers, Michelle McCrackin (ASU) **Methods & Sampling** * Sea-Bird SBE 9 Data File: * FileName = C:SeasaveRawCTD_2007Cargo3CD1_1.dat * Software Version Seasave Win32 V 5.37d * Temperature SN = 2723 * Conductivity SN = 2271 * Number of Bytes Per Scan = 34 * Number of Voltage Words = 5 * Number of Scans Averaged by the Deck Unit = 1 * System UpLoad Time = Nov 07 2007 12:49:26 * NMEA Latitude = 47 04.07 N * NMEA Longitude = 091 25.39 W * NMEA UTC (Time) = Nov 07 2007 18:47:56 * Store Lat/Lon Data = Append to Every Scan ** Ship: ** Cruise: ** Station: ** Latitude: ** Longitude: # nquan = 18 # nvalues = 29679 # units = specified # name 0 = prDM: Pressure, Digiquartz [db] # name 1 = t090C: Temperature [ITS-90, deg C] # name 2 = c0uS/cm: Conductivity [uS/cm] # name 3 = specc: Specific Conductance [uS/cm] # name 4 = xmiss: Beam Transmission, Chelsea/Seatech/Wetlab CStar [%] # name 5 = wetStar: Fluorescence, Wetlab Wetstar [mg/m^3] # name 6 = dz/dtM: Descent Rate [m/s] # name 7 = ph: pH # name 8 = par: PAR/Irradiance, Biospherical/Licor # name 9 = sal00: Salinity [PSU] # name 10 = sbeox0Mm/Kg: Oxygen, SBE 43 [umol/Kg] # name 11 = sbeox0Mg/L: Oxygen, SBE 43 [mg/l] # name 12 = wetCDOM: Fluorescence, Wetlab CDOM [mg/m^3] # name 13 = spar: SPAR/Surface Irradiance # name 14 = latitude: Latitude [deg] # name 15 = longitude: Longitude [deg] # name 16 = scan: Scan Count # name 17 = flag: 0.000e+00 # span 0 = 0.341, 248.256 # span 1 = 3.8592, 8.3850 # span 2 = 58.061369, 67.269806 # span 3 = 98.691, 101.961 # span 4 = 78.3279, 83.0339 # span 5 = 0.4220, 3.1316 # span 6 = -1.315, 1.182 # span 7 = 10.696, 11.710 # span 8 = 4.8278e+00, 9.9990e+03 # span 9 = 0.0438, 0.0467 # span 10 = 341.972, 398.351 # span 11 = 10.94146, 12.74717 # span 12 = 2.2522, 3.5630 # span 13 = 7.7887e+02, 1.2286e+03 # span 14 = 47.06782, 47.07118 # span 15 = -91.42330, -91.41960 # span 16 = 1, 29679 # span 17 = 0.0000e+00, 0.0000e+00 # interval = seconds: 0.0416667 # start_time = Nov 07 2007 12:49:26 # bad_flag = -9.990e-29 # sensor 0 = Frequency 0 temperature, 2723, 30 Jan 2007 # sensor 1 = Frequency 1 conductivity, 2271, 31 Jan 2007, cpcor = -9.5700e-08 # sensor 2 = Frequency 2 pressure, 756869, 17-Feb-04 # sensor 3 = Extrnl Volt 0 Oxygen, SBE, primary, 0471, 13 Mar 2007 # sensor 4 = Extrnl Volt 1 WET Labs, CDOM # sensor 5 = Extrnl Volt 2 pH, 270135, 21 Feb 2007 # sensor 6 = Extrnl Volt 3 oxidation reduction potential, 270135, 21 Feb 2007 # sensor 7 = Extrnl Volt 4 transmissometer, primary, CST-268PR, 27 Feb 2007 # sensor 8 = Extrnl Volt 5 WET Labs, WETStar fluorometer, 15 Feb 2007 # sensor 9 = Extrnl Volt 6 altimeter # sensor 10 = Extrnl Volt 7 irradiance (PAR), primary, 4554, 8 Feb 2007 # sensor 11 = Extrnl Volt 9 surface irradiance (SPAR), degrees = 0.0 # datcnv_date = Nov 09 2007 07:39:36, 5.37e # datcnv_in = C:SeasaveRawCTD_2007Cargo3CD1_1.dat C:SeasaveRawCTD_2007Cargo3CD1_1.CON # datcnv_skipover = 0 # file_type = ascii *END*

BH08-01

Website	https://www.bco-dmo.org/deployment/58795
Platform	R/V Blue Heron
Report	http://bcodata.whoi.edu/LaurentianGreatLakes_Chemistry/BH08-01_CARGO4_Cruise_Outline.pdf
Start Date	2008-04-29
End Date	2008-05-01
Description	Cruise Name:CARGO 4 Dates: 29 April - 01 May 2008 Vessel: R/V Blue Heron UNOLS Cruise ID: BH08-01 (Not verified srg/13April2012) Participants: R. Sterner, et al **Methods & Sampling** * Sea-Bird SBE 9 Data File: * FileName = C:SeasaveRawCTD_2008Sternerapr2008CD1.dat * Software Version Seasave Win32 V 5.37d * Temperature SN = 2723 * Conductivity SN = 2271 * Number of Bytes Per Scan = 34 * Number of Voltage Words = 5 * Number of Scans Averaged by the Deck Unit = 1 * System UpLoad Time = Apr 29 2008 10:56:01 * NMEA Latitude = 47 03.88 N * NMEA Longitude = 091 25.53 W * NMEA UTC (Time) = Apr 29 2008 15:51:05 * Store Lat/Lon Data = Append to Every Scan ** Ship: ** Cruise: ** Station: ** Latitude: ** Longitude: # nquan = 18 # nvalues = 30756 # units = specified # name 0 = prDM: Pressure, Digiquartz [db] # name 1 = t090C: Temperature [ITS-90, deg C] # name 2 = c0uS/cm: Conductivity [uS/cm] # name 3 = specc: Specific Conductance [uS/cm] # name 4 = xmiss: Beam Transmission, Chelsea/Seatech/Wetlab CStar [%] # name 5 = wetStar: Fluorescence, Wetlab Wetstar [mg/m^3] # name 6 = dz/dtM: Descent Rate [m/s] # name 7 = ph: pH # name 8 = par: PAR/Irradiance, Biospherical/Licor # name 9 = sal00: Salinity [PSU] # name 10 = sbeox0Mm/Kg: Oxygen, SBE 43 [umol/Kg] # name 11 = sbeox0Mg/L: Oxygen, SBE 43 [mg/l] # name 12 = wetCDOM: Fluorescence, Wetlab CDOM [mg/m^3] # name 13 = spar: SPAR/Surface Irradiance # name 14 = latitude: Latitude [deg] # name 15 = longitude: Longitude [deg] # name 16 = scan: Scan Count # name 17 = flag: 0.000e+00 # span 0 = 0.253, 244.807 # span 1 = 1.7997, 3.3803 # span 2 = 54.011600, 57.477159 # span 3 = 99.934, 104.224 # span 4 = 76.2442, 85.0006 # span 5 = 0.2501, 2.7697 # span 6 = -0.869, 0.737 # span 7 = 3.541, 3.618 # span 8 = 5.1288e+00, 9.9990e+03 # span 9 = 0.0423, 0.0441 # span 10 = 375.601, 414.188 # span 11 = 12.01915, 13.25345 # span 12 = 1.6440, 4.7619 # span 13 = 2.1633e+03, 2.2247e+03 # span 14 = 47.06466, 47.06650 # span 15 = -91.42556, -91.42046 # span 16 = 1, 30756 # span 17 = 0.0000e+00, 0.0000e+00 # interval = seconds: 0.0416667 # start_time = Apr 29 2008 10:56:01 # bad_flag = -9.990e-29 # sensor 0 = Frequency 0 temperature, 2723, 30 Jan 2008 # sensor 1 = Frequency 1 conductivity, 2271, 29 Jan 2008, cpcor = -9.5700e-08 # sensor 2 = Frequency 2 pressure, 756869, 17-Feb-04 # sensor 3 = Extrnl Volt 0 Oxygen, SBE, primary, 0471, 5 Mar 2008 # sensor 4 = Extrnl Volt 1 WET Labs, CDOM # sensor 5 = Extrnl Volt 2 pH, 270135, 26 Feb 2008 # sensor 6 = Extrnl Volt 3 oxidation reduction potential, 270135, 26 Feb 2008 # sensor 7 = Extrnl Volt 4 transmissometer, primary, CST-268PR, 27 Feb 2007 # sensor 8 = Extrnl Volt 5 WET Labs, WETStar fluorometer, 11 Mar 2008 # sensor 9 = Extrnl Volt 6 altimeter # sensor 10 = Extrnl Volt 7 irradiance (PAR), primary, 4554, 8 Feb 2007 # sensor 11 = Extrnl Volt 9 surface irradiance (SPAR), degrees = 0.0 # datcnv_date = May 01 2008 06:52:08, 5.37e # datcnv_in = C:SeasaveRawCTD_2008Sternerapr2008CD1.dat C:SeasaveRawCTD_2008Sternerapr2008CD1.CON # datcnv_skipover = 0 # file_type = ascii *END*

BH08-11

Website	https://www.bco-dmo.org/deployment/58796
Platform	R/V Blue Heron
Report	http://bcodata.whoi.edu/LaurentianGreatLakes_Chemistry/BH08-11_CARGO5_Cruise_Outline.pdf
Start Date	2008-07-30
End Date	2008-08-01
Description	Cruise Name:CARGO 5 Dates: 30 July - 01 August 2008 Vessel: R/V Blue Heron UNOLS Cruise ID: BH08-11 (Not verified srg/13April2012) Participants: R. Sterner, et al **Methods & Sampling** * Sea-Bird SBE 9 Data File: * FileName = C:SeasaveRawCTD_2008Cargo 5CD1_1.dat * Software Version Seasave Win32 V 5.37d * Temperature SN = 2723 * Conductivity SN = 2271 * Number of Bytes Per Scan = 34 * Number of Voltage Words = 5 * Number of Scans Averaged by the Deck Unit = 1 * System UpLoad Time = Jul 30 2008 10:55:31 * NMEA Latitude = 47 03.99 N * NMEA Longitude = 091 25.64 W * NMEA UTC (Time) = Jul 30 2008 15:54:05 * Store Lat/Lon Data = Append to Every Scan ** Ship: ** Cruise: ** Station: ** Latitude: ** Longitude: # nquan = 18 # nvalues = 31537 # units = specified # name 0 = prDM: Pressure, Digiquartz [db] # name 1 = t090C: Temperature [ITS-90, deg C] # name 2 = c0uS/cm: Conductivity [uS/cm] # name 3 = specc: Specific Conductance [uS/cm] # name 4 = xmiss: Beam Transmission, Chelsea/Seatech/Wetlab CStar [%] # name 5 = wetStar: Fluorescence, Wetlab Wetstar [mg/m^3] # name 6 = dz/dtM: Descent Rate [m/s] # name 7 = ph: pH # name 8 = par: PAR/Irradiance, Biospherical/Licor # name 9 = sal00: Salinity [PSU] # name 10 = sbeox0Mm/Kg: Oxygen, SBE 43 [umol/Kg] # name 11 = sbeox0Mg/L: Oxygen, SBE 43 [mg/l] # name 12 = wetCDOM: Fluorescence, Wetlab CDOM [mg/m^3] # name 13 = spar: SPAR/Surface Irradiance # name 14 = latitude: Latitude [deg] # name 15 = longitude: Longitude [deg] # name 16 = scan: Scan Count # name 17 = flag: 0.000e+00 # span 0 = 2.999, 249.946 # span 1 = 3.5956, 22.2551 # span 2 = -0.989767, 91.668541 # span 3 = -1.095, 121.635 # span 4 = -1.1122, 85.2816 # span 5 = -1.2166, 5.7783 # span 6 = -0.776, 0.544 # span 7 = -2.492, 16.103 # span 8 = 3.3008e+00, 9.9990e+03 # span 9 = 0.0000, 0.0582 # span 10 = -61.784, 404.296 # span 11 = -1.97608, 12.93727 # span 12 = -2.7360, 12.9280 # span 13 = 1.0027e+03, 2.4178e+03 # span 14 = 47.06536, 47.06656 # span 15 = -91.42736, -91.42390 # span 16 = 1, 31537 # span 17 = 0.0000e+00, 0.0000e+00 # interval = seconds: 0.0416667 # start_time = Jul 30 2008 10:55:31 # bad_flag = -9.990e-29 # sensor 0 = Frequency 0 temperature, 2723, 30 Jan 2008 # sensor 1 = Frequency 1 conductivity, 2271, 29 Jan 2008, cpcor = -9.5700e-08 # sensor 2 = Frequency 2 pressure, 756869, 17-Feb-04 # sensor 3 = Extrnl Volt 0 Oxygen, SBE, primary, 0471, 5 Mar 2008 # sensor 4 = Extrnl Volt 1 WET Labs, CDOM # sensor 5 = Extrnl Volt 2 pH, 270135, 26 Feb 2008 # sensor 6 = Extrnl Volt 3 oxidation reduction potential, 270135, 26 Feb 2008 # sensor 7 = Extrnl Volt 4 transmissometer, primary, CST-268PR, 27 Feb 2007 # sensor 8 = Extrnl Volt 5 WET Labs, WETStar fluorometer, 11 Mar 2008 # sensor 9 = Extrnl Volt 6 altimeter # sensor 10 = Extrnl Volt 7 irradiance (PAR), primary, 4554, 8 Feb 2007 # sensor 11 = Extrnl Volt 9 surface irradiance (SPAR), degrees = 0.0 # datcnv_date = Aug 01 2008 07:21:21, 5.37e # datcnv_in = C:SeasaveRawCTD_2008Cargo 5CD1_1.dat C:SeasaveRawCTD_2008Cargo 5CD1_1.CON # datcnv_skipover = 0 # file_type = ascii *END*

BH08-19

Website	https://www.bco-dmo.org/deployment/58797
Platform	R/V Blue Heron
Report	http://bcodata.whoi.edu/LaurentianGreatLakes_Chemistry/BH08-19_CARGO6_Cruise_Outline.pdf
Start Date	2008-09-16
End Date	2008-09-18
Description	Cruise Name:CARGO 6 Dates: 16 - 18 September 2008 Vessel: R/V Blue Heron UNOLS Cruise ID: BH08-19 (Not verified srg/13April2012) Participants: R. Sterner, et al **Methods & Sampling** * Sea-Bird SBE 9 Data File: * FileName = C:SeasaveRawCTD_2008Cargo 6CD1_1.dat * Software Version Seasave Win32 V 5.37d * Temperature SN = 2723 * Conductivity SN = 2271 * Number of Bytes Per Scan = 34 * Number of Voltage Words = 5 * Number of Scans Averaged by the Deck Unit = 1 * System UpLoad Time = Sep 16 2008 12:00:10 * NMEA Latitude = 47 03.93 N * NMEA Longitude = 091 25.51 W * NMEA UTC (Time) = Sep 16 2008 16:57:41 * Store Lat/Lon Data = Append to Every Scan ** Ship: ** Cruise: ** Station: ** Latitude: ** Longitude: # nquan = 18 # nvalues = 26205 # units = specified # name 0 = prDM: Pressure, Digiquartz [db] # name 1 = t090C: Temperature [ITS-90, deg C] # name 2 = c0uS/cm: Conductivity [uS/cm] # name 3 = specc: Specific Conductance [uS/cm] # name 4 = xmiss: Beam Transmission, Chelsea/Seatech/Wetlab CStar [%] # name 5 = wetStar: Fluorescence, Wetlab Wetstar [mg/m^3] # name 6 = dz/dtM: Descent Rate [m/s] # name 7 = ph: pH # name 8 = par: PAR/Irradiance, Biospherical/Licor # name 9 = sal00: Salinity [PSU] # name 10 = sbeox0Mm/Kg: Oxygen, SBE 43 [umol/Kg] # name 11 = sbeox0Mg/L: Oxygen, SBE 43 [mg/l] # name 12 = wetCDOM: Fluorescence, Wetlab CDOM [mg/m^3] # name 13 = spar: SPAR/Surface Irradiance # name 14 = latitude: Latitude [deg] # name 15 = longitude: Longitude [deg] # name 16 = scan: Scan Count # name 17 = flag: 0.000e+00 # span 0 = 0.887, 246.098 # span 1 = 3.7189, 11.3031 # span 2 = 57.628329, 72.769934 # span 3 = 97.868, 102.520 # span 4 = -1.1122, 84.8835 # span 5 = -1.2166, 6.2484 # span 6 = -0.976, 0.785 # span 7 = -2.543, 9.482 # span 8 = 3.3008e+00, 9.9990e+03 # span 9 = 0.0436, 0.0481 # span 10 = -64.048, 408.770 # span 11 = -2.04880, 13.08024 # span 12 = -2.7360, 5.8755 # span 13 = 1.9636e+03, 1.9878e+03 # span 14 = 47.06550, 47.06692 # span 15 = -91.42518, -91.42074 # span 16 = 1, 26205 # span 17 = 0.0000e+00, 0.0000e+00 # interval = seconds: 0.0416667 # start_time = Sep 16 2008 12:00:10 # bad_flag = -9.990e-29 # sensor 0 = Frequency 0 temperature, 2723, 30 Jan 2008 # sensor 1 = Frequency 1 conductivity, 2271, 29 Jan 2008, cpcor = -9.5700e-08 # sensor 2 = Frequency 2 pressure, 756869, 17-Feb-04 # sensor 3 = Extrnl Volt 0 Oxygen, SBE, primary, 0471, 5 Mar 2008 # sensor 4 = Extrnl Volt 1 WET Labs, CDOM # sensor 5 = Extrnl Volt 2 pH, 270135, 26 Feb 2008 # sensor 6 = Extrnl Volt 3 oxidation reduction potential, 270135, 26 Feb 2008 # sensor 7 = Extrnl Volt 4 transmissometer, primary, CST-268PR, 27 Feb 2007 # sensor 8 = Extrnl Volt 5 WET Labs, WETStar fluorometer, 11 Mar 2008 # sensor 9 = Extrnl Volt 6 altimeter # sensor 10 = Extrnl Volt 7 irradiance (PAR), primary, 4554, 8 Feb 2007 # sensor 11 = Extrnl Volt 9 surface irradiance (SPAR), degrees = 0.0 # datcnv_date = Sep 18 2008 05:35:04, 5.37e # datcnv_in = C:SeasaveRawCTD_2008Cargo 6CD1_1.dat C:SeasaveRawCTD_2008Cargo 6CD1_1.CON # datcnv_skipover = 0 # file_type = ascii *END*

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Project Information

Primary Production and Grazing Dynamics In the Ultra-Oligotrophic Waters of Lake Superior (CARGO)

Website: http://www.tc.umn.edu/~stern007/

Coverage: Lake Superior

PRIMARY PRODUCTION AND GRAZING DYNAMICS IN THE ULTRA-OLIGOTROPHIC WATERS OF LAKE SUPERIOR ("CARGO" which stands for CArbon Gain and lOss)

All higher organisms including fish ultimately rely on carbon fixed by primary production for their growth. A major gap in our understanding of Lake Superior lies in a highly incomplete knowledge of the rates primary production and grazing in the lake's waters. This data gap impedes the progress of scientific understanding of the lake on many fronts. Primary production is the foundation for all food webs and is a large, perhaps the largest, term in the lake's carbon cycle. Over the years, there have been but a small handful of investigators who have measured primary production in this, Earth's largest lake by area. Attempts to construct comprehensive carbon budgets using literature values for major terms such as DOC import, sedimentation, etc. indicate a large imbalance in the C cycle in the lake. According to current best estimates, organic carbon disappears at much faster rate (14-40, Cotner et al. 2005) or (13-81, Urban et al. 2005) than its rate of input (5.3 Tg/y, Cotner et al. 2004) or (3-8 Tg/y, Urban et al. 2005) (all values in Tg/y). The budget is out of balance by a factor of about 2 to 27. Unless the lake is metabolizing vast quantities of old, "fossilized" carbon (implausible), current out-of-balance budgets must be wrong, meaning we do not have good estimates for one or more of these fundamental processes in the lake.

Of the possible terms in the carbon budget of the lake, a focus on primary production is appropriate because of the large magnitude of this term plus the dearth of actual measurements that have been performed and the many untested assumptions that lurk behind those few measurements. At the same time, a major loss of particulate organic carbon has been almost entirely ignored until now. That loss is the grazing rate, the rate of consumption of lake particles (including bacteria and algae) by living organisms in the water column. As Banse (2002) has described for the oceans, though physical mixing and sinking contribute to the dynamics of phytoplankton and other small planktonic organisms, it is principally production and grazing which determine dynamics. To a first approximation, the rate of change of phytoplankton is equal to the difference between production and grazing.

This project comprises a two-year study that will focus on primary production and grazing in the world's largest lake by area. Primary production will be measured using 14C additions to shipboard incubations using a photosynthetron device. P-I curves plus other data will be used as input for numerical models of areal production. Production numbers so obtained will be compared to in situ incubations. Grazing assays will be based on the dilution series methods developed by Landry and Hassett (1982) and since employed by many others, including myself and my students; this method provides an overall measure of in situ particle turnover.

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Program Information

Laurentian Great Lakes Ecosystem Studies (Laurentian Great Lakes Ecosystem Studies)

Website: http://www.tc.umn.edu/~stern007/

Coverage: Laurentian Great Lakes

A series of studies concerned with the chemistry and biology of the Laurentian Great Lakes. These different studies share a focus on the dynamics of organic pools of carbon, nitrogen and phosphorus, and the stoichiometric linkages among these elements. At different times, work also has focused on trace metal dynamics and interactions with biota, the rates of primary production and herbivory, rates and patterns of primary productivity, and the century-long, steady trend of increasing nitrate in Earth's largest lake by area. Microbial populations have been investigated and linked to these chemical properties.

This Program was created by BCO-DMO staff to bring various Laurentian Great Lakes Research projects under one umbrella for improved discovery and access.

Dates: 1998 - 2014

Funding: NSF/OCE and Minnesota Sea Grant

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Funding

Funding Source	Award
Minnesota Sea Grant (MN Sea Grant)	unknown CARGO MN Sea Grant

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