CTD, oxygen, and optical sensor profile measurements from Seagliders 140, 141, 142, and 143 in the subpolar North Atlantic and Iceland Basin in 2008 (NAB 2008 project)

Website: https://www.bco-dmo.org/dataset/3416
Version: 28 March 2011
Version Date: 2011-03-28

Project
» North Atlantic Bloom Experiment 2008 (NAB 2008)

Program
» Ocean Carbon and Biogeochemistry (OCB)

Contributors	Affiliation	Role
Lee, Craig M.	University of Washington (UW APL)	Principal Investigator, Co-Principal Investigator
Cetinic, Ivona	University of Maine	Contact
McKee, Theresa	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Table of Contents

Dataset Description

Full resolution profiles of temperature, potential temperature, salinity, and dissolved oxygen from Seaglider equipped with CTD, oxygen, and optical sensors.

Modification history:

28 March 2011: original Matlab-format data files reformatted for database to include higher accuracy for bbp variables (from four decimal places to six)

Data Processing Description

Latitude and longitude (parameter names lat and lon) were measured at the surface and interpolated when the glider was at depth. Parameter name GPS value id indicates measurements while glider was at the surface (value=1) or interpolated while diving (value=0). No interpolation or smoothing was performed on other data.

Temperature and salinity (parameter names temp and sal): Temperature and salinity data were calculated using pre deployment calibration coefficients. Further correction to temperature and conductivity was applied to NAB08 SG140 dataset based on the R/V Knorr calibration cast. A first-order lag correction was applied to raw measurements of temperature and conductivity (due to temperature latency). For each dive, out of range measurements and spikes (3 interquartile ranges above or below the median in windows of 15 contiguous measurements) were flagged and replaced with NaNs, which were repopulated by linear interpolation. Data were smoothed with an 11-point median filter. Parameters potemp and sigma_0 were calculated from the smoothed temp and sal datasets. For more details, see Seaglider_CTD_Calibration-NAB08.pdf.

Dissolved oxygen, O2 (parameter name O2_cal): Oxygen data from the Aanderaa optode were corrected for time lags in oxygen and temperature. Winkler oxygen bottle data from glider – ship and float-ship calibration profiles, as well as concurrent glider – float profiles were used to determine the appropriate gain and offset. The resulting oxygen has an error of ±2 µmol kg-1. For more details, see Oxygen_glider_float_Calibration-NAB08.pdf.

Particulate backscattering coefficients, bbp (parameter names bbp470, bbp700): Backscattering digital counts were converted to β at 117° by subtracting factory-provided dark counts and multiplying by factory calibration scale factors, modified based on measurements and calculations of Sullivan et al. (subm.) Sensors were calibrated before the experiment and after the experiment. β at 117° was converted to bbp (m-1) by subtracting β of seawater (Zhang et al., 2009) and multiplying by 2πβ (where β = 1.132). Ship-glider calibration profiles were used to produce fully cross calibrated data sets only for bbp at 700 nm (m-1). The other backscattering coefficient (bbp at 470 (m-1)) is calculated using the factory calibrations only since the ship had only one backscatter sensor, i.e., bbp700. For more details, see Backscatter_Calibration-NAB08.pdf.

Particulate organic carbon (POC) derived from bbp(700) (parameter name POC_bbp): The regression to convert ship downcast bbp at 700 nm to POC is:
POC (mg C m-3) = bbp (700)_downcast (m-1) * 35800 (mg C m-2) – 16.2 (mg C m-3); r2 = 0.81.
Because all backscatter sensors were cross calibrated with the ship CTD downcast, this regression was directly applied to glider bbp at 700 nm to compute glider POC. For more details, see KN193-03 BOTTLE metadata and POC_cp_bbp_Calibration-NAB08.pdf.

Chlorophyll fluorescence (parameter names chl_raw): Chlorophyll fluorescence measured by glider ECOPuck BB2F was cross-calibrated with other chlorophyll fluorometers by ship-glider calibration profiles and converted to volts. Dark voltage (median in situ dark voltage = 0.083 volts) was subtracted from cross-calibrated values to obtain chlorophyll fluorescence in volts. The ECOPuck was calibrated before and after the experiment. For more details: Seaglider_chl_Calibration.pdf.

[table of contents | back to top]

Data Files

File
GliderProfiles.csv (Comma Separated Values (.csv), 394.02 MB) MD5:cfa7d3fd762a8da3b356631ce19446fc Primary data file for dataset ID 3416

[table of contents | back to top]

Parameters

Parameter	Description	Units
dive_id	dive identification number	dimensionless
Glider_ID	Seaglider instrument identifier	dimensionless
GPS_id	GPS value id; measurement taken while on surface (value=1) or interpolated while diving (value=0)	integer
date	date (GMT) start of sampling	YYYYMMDD
julian_day_yr0	time when sample was taken in decimal days since Jan-0-0000 (Matlab)	dimensionless
latitude	latitude	decimal degrees
longitude	longitude	decimal degrees
start_date	date sampling begins	YYYYMMDD
start_time	time sampling begins	HHMM
end_date	date sampling ends	YYYYMMDD
end_time	time sampling ends	HHMM
depth	depth at which sample was taken	meters
temp	Temperature	degrees Celsius
potemp	Potential Temperature	degrees Celsius
sal	Salinity	dimensionless
sigma_0	water potential density minus 1000	kilograms/meter^3
O2_cal	dissolved oxygen concentration measured from Aanderaa Optode 3830 oxygen sensor; intercalibrated with KN1930 O2 measurements concentration; calibrated with Winkler O2 throughout cruise	micromol/kilogram
POC_bbp	particulate organic carbon from bbp(700); based on POC and bbp(700) measurements from KN19303	milligrams/meter^3
bbp470	particulate backscattering coefficient at 470 nm; bbp(470) from ECOPuck BB2F;based on factory calibrations	reciprocal meter
bbp532	particulate backscattering coefficient at 532 nm; bbp(532) from ECOPuck BBFL2; based on factory calibrations	reciprocal meter
bbp700	particulate backscattering coefficient at 700 nm; bbp(700) from ECOPuck BB2F; intercalibrated with KN19303 bbp(700) measurements	reciprocal meter
chl_raw	chlorophyll fluorescence (raw output minus dark counts)	volts
chl_2_raw	chlorophyll fluorescence from ECOPuck BBFL2; intercalibrated with KN19303 chlorophyll fluorescence; dark counts subtracted	volts
CDOM	colored dissolved material fluorescence (CDOM) from ECOPuck BBFL2; based on factory calibration	ppb quinine sulfate

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	Aanderaa Oxygen Optodes
Generic Instrument Name	Aanderaa Oxygen Optodes
Generic Instrument Description	Aanderaa Oxygen Optodes are instrument for monitoring oxygen in the environment. For instrument information see the Aanderaa Oxygen Optodes Product Brochure.

Dataset-specific Instrument Name	Druck PCDR 4020 pressure sensor
Generic Instrument Name	Druck PDCR 4020 pressure sensor
Generic Instrument Description	The PDCR 4000 Series provides a complete range of mV output pressure transducers offering advanced levels of measurement accuracy stability and flexibility from a standard production device.

Dataset-specific Instrument Name	Seaglider
Generic Instrument Name	Seaglider
Generic Instrument Description	The Seaglider is an autonomous underwater vehicle developed through a collaboration between The Applied Physics Laboratory -University of Washington and the University of Washington School of Oceanography. These small, free-swimming vehicles can gather conductivity-temperature-depth (CTD) data from the ocean for months at a time and transmit it to shore in near-real time via satellite data telemetry. Seagliders make oceanographic measurements traditionally collected by research vessels or moored instruments. They can survey along a transect, profile at a fixed location, and can be commanded to alter their sampling strategies throughout a mission.

Dataset-specific Instrument Name	Wet Labs ECO Puck BB2F-VMG
Generic Instrument Name	Wet Labs ECO Puck BB2F-VMG
Generic Instrument Description	The ECO BB measures scattering at 117 degrees, the angle determined as a minimum convergence point for variations in the volume scattering function (VSF) induced by suspended materials and water itself. As a result, the signal measured by this meter is less determined by the type and size of the materials in the water and is more directly correlated to the concentration of the materials. Conversely, the meter provides unparalleled accuracy for any single-angle measurement in determining the optical backscattering coefficient: an important parameter for remote sensing and in many in-water bio-optical applications.

[table of contents | back to top]

Deployments

SG140

Website	https://www.bco-dmo.org/deployment/58148
Platform	Seaglider 140
Start Date	2008-04-04
End Date	2008-06-28
Description	Starting position: 58.999, -20.507 (according to Seaglider Tracks dataset) **Methods & Sampling** NAB08 Seaglider 140 data are reported for following sensors: Seabird Electronics GliderAPL unpumped conductivity and temperature sensor pair; Druck PCDR 4020, pressure sensor; Aanderaa Oxygen Optode 3830; WET Labs ECOPuck BB2F-VMG with chlorophyll fluorescence excitation at 470 nm and emission at 695 nm, and volume scattering function at 117° for two wavelengths (470 and 700 nm). This sensor initially was turned off below 600 m, but after 11 May 2008 was turned on from surface to 900 m. Calibration casts: During NAB08 special emphasis was given to intercalibration of instruments to enable data collected on different platforms to be used interchangeably, with the ship-deployed sensors used as the standard. A number of ship CTD profiles on all cruises (B4-2008, KN193-03, B9-2008 and B10-2008) were done simultaneously in proximity of a glider or float; data collected on these "calibration casts" was used for cross calibration of different sensors. For more details, see various calibration reports: CTD_seaglider_calibration-NAB08.pdf Oxygen_glider_float_Calibration-NAB08.pdf Seaglider_chl_Calibration.pdf Backscatter_Calibration-NAB08.pdf **Processing Description** Latitude and longitude were measured at the surface and interpolated when the glider was at depth. Parameter name GPS value id indicates measurements while glider was at the surface (value=1) or interpolated while diving (value=0). No interpolation or smoothing was performed on other data. Temperature and salinity: Temperature and salinity data were calculated using pre deployment calibration coefficients. Further correction to temperature and conductivity was applied to NAB08 SG140 dataset based on the R/V Knorr calibration cast. A first-order lag correction was applied to raw measurements of temperature and conductivity (due to temperature latency). For each dive, out of range measurements and spikes (3 interquartile ranges above or below the median in windows of 15 contiguous measurements) were flagged and replaced with NaNs, which were repopulated by linear interpolation. Data were smoothed with an 11-point median filter. Parameters potemp and sigma_0 were calculated from the smoothed temp and sal datasets. For more details, see CTD_seaglider_calibration-NAB08.pdf. Dissolved oxygen, O2: Oxygen data from the Aanderaa optode were corrected for time lags in oxygen and temperature. Winkler oxygen bottle data from glider – ship and float-ship calibration profiles, as well as concurrent glider – float profiles were used to determine the appropriate gain and offset. The resulting oxygen has an error of ±2 µmol kg-1. For more details, see Oxygen_glider_float_Calibration-NAB08.pdf. Particulate backscattering coefficients, bbp (parameter names bbp470, bbp700): Backscattering digital counts were converted to β at 117° by subtracting factory-provided dark counts and multiplying by factory calibration scale factors, modified based on measurements and calculations of Sullivan et al. (subm.) Sensors were calibrated before the experiment and after the experiment. β at 117° was converted to bbp (m-1) by subtracting β of seawater (Zhang et al., 2009) and multiplying by 2πβ (where β = 1.132). Ship-glider calibration profiles were used to produce fully cross calibrated data sets only for bbp at 700 nm (m-1). The other backscattering coefficient (bbp at 470 (m-1)) is calculated using the factory calibrations only since the ship had only one backscatter sensor, i.e., bbp700. For more details, see Backscatter_Calibration-NAB08.pdf. Particulate organic carbon (POC) derived from bbp(700) (parameter name POC_bbp): The regression to convert ship downcast bbp at 700 nm to POC is: POC (mg C m-3) = bbp (700)_downcast (m-1) * 35800 (mg C m-2) – 16.2 (mg C m-3); r2 = 0.81. Because all backscatter sensors were cross calibrated with the ship CTD downcast, this regression was directly applied to glider bbp at 700 nm to compute glider POC. For more details, see KN193-03 BOTTLE metadata and POC_cp_bbp_Calibration-NAB08.pdf. Chlorophyll fluorescence (parameter names chl_raw): Chlorophyll fluorescence measured by glider ECOPuck BB2F was cross-calibrated with other chlorophyll fluorometers by ship-glider calibration profiles and converted to volts. Dark voltage (median in situ dark voltage = 0.083 volts) was subtracted from cross-calibrated values to obtain chlorophyll fluorescence in volts. The ECOPuck was calibrated before and after the experiment. For more details: Seaglider_chl_Calibration.pdf.

SG141

Website	https://www.bco-dmo.org/deployment/58149
Platform	Seaglider 141
Start Date	2008-04-04
End Date	2008-06-27
Description	Starting position: 59.010, -20.501 (according to Seaglider Tracks dataset) **Methods & Sampling** NAB08 Seaglider 141 data are reported for following sensors: Seabird Electronics GliderAPL unpumped conductivity and temperature sensor pair; Druck PCDR 4020, pressure sensor; Aanderaa Oxygen Optode 3830; WET Labs ECOPuck BB2F-VMG with chlorophyll fluorescence excitation at 470 nm and emission at 695 nm, and volume scattering function at 117° for two wavelengths (470 and 700 nm). This sensor initially was turned off below 600 m, but after 11 May 2008 was turned on from surface to 900 m; WET Labs ECOPuck BBFL2-VMT with chlorophyll fluorescence excitation at 470 nm and emission at 695 nm, CDOM (colored dissolved organic material) fluorescence with excitation at 370 nm and emission at 460 nm, and volume scattering function at 117° for 532 nm. This sensor was turned off 11 May 2008 to conserve energy. Calibration casts: During NAB08 special emphasis was given to intercalibration of instruments to enable data collected on different platforms to be used interchangeably, with the ship-deployed sensors used as the standard. A number of ship CTD profiles on all cruises (B4-2008, KN193-03, B9-2008 and B10-2008) were done simultaneously in proximity of a glider or float; data collected on these "calibration casts" was used for cross calibration of different sensors. For more details, see various calibration reports (Seaglider_CTD_Calibration-NAB08.pdf, Oxygen_glider_float_Calibration-NAB08.pdf, Seaglider_chl_Calibration.pdf, Backscatter_Calibration-NAB08.pdf) **Processing Description** Latitude and longitude (parameter names lat and lon) were measured at the surface and interpolated when the glider was at depth. Parameter name GPS value id indicates measurements while glider was at the surface (value=1) or interpolated while diving (value=0). No interpolation or smoothing was performed on other data. Temperature and salinity (parameter names temp and sal): Temperature and salinity data were calculated using post deployment calibration coefficients. A first-order lag correction was applied to raw measurements of temperature and conductivity (due to temperature latency). For each dive, out of range measurements and spikes (3 interquartile ranges above or below the median in windows of 15 contiguous measurements) were flagged and replaced with NaNs, which were repopulated by linear interpolation. Data were smoothed with an 11-point median filter. Parameters potemp and sigma_0 were calculated from the smoothed temp and sal datasets. For more details, see Seaglider_CTD_Calibration-NAB08.pdf. Dissolved oxygen, O2 (parameter name O2_cal): Oxygen data from the Aanderaa optode were corrected for time lags in oxygen and temperature. Winkler oxygen bottle data from glider – ship and float-ship calibration profiles, as well as concurrent glider – float profiles were used to determine the appropriate gain and offset. The resulting oxygen has an error of ±2 µmol kg-1. For more details, see Oxygen_glider_float_Calibration-NAB08.pdf. Particulate backscattering coefficients, bbp (parameter names bbp470, bbp700): Backscattering digital counts were converted to β at 117° by subtracting factory-provided dark counts and multiplying by factory calibration scale factors, modified based on measurements and calculations of Sullivan et al. (subm.) Sensors were calibrated before the experiment and after the experiment. β at 117° was converted to bbp (m-1) by subtracting β of seawater (Zhang et al., 2009) and multiplying by 2πβ (where β = 1.132). Ship-glider calibration profiles were used to produce fully cross calibrated data sets only for bbp at 700 nm (m-1). The other backscattering coefficient (bbp at 470 (m-1)) is calculated using the factory calibrations only since the ship had only one backscatter sensor, i.e., bbp700. For more details, see Backscatter_Calibration-NAB08.pdf. Particulate organic carbon (POC) derived from bbp(700) (parameter name POC_bbp): The regression to convert ship downcast bbp at 700 nm to POC is: POC (mg C m-3) = bbp (700)_downcast (m-1) * 35800 (mg C m-2) – 16.2 (mg C m-3); r2 = 0.81. Because all backscatter sensors were cross-calibrated with the ship CTD downcast, this regression was directly applied to glider bbp at 700 nm to compute glider POC. For more details, see KN193-03 BOTTLE metadata and POC_cp_bbp_Calibration-NAB08.pdf. Chlorophyll fluorescence (parameter names chl_raw and chl_2_raw): Chlorophyll fluorescence measured by glider ECOPuck BB2F was cross-calibrated with other chlorophyll fluorometers by ship-glider calibration profiles and converted to volts. Dark voltage (median in situ dark voltage = 0.083 volts) was subtracted from cross-calibrated values to obtain chlorophyll fluorescence in volts (parameter name chl_raw). The same cross-calibration was done for secondary chlorophyll fluorometer (BBFL2), and the same dark voltage was subtracted to obtain chlorophyll fluorescence in volts (parameter name chl_2_raw). Both ECOPucks were calibrated before and after the experiment. For more details: Seaglider_chl_Calibration.pdf. CDOM fluorescence (parameter name CDOM): CDOM is reported as ppb quinine sulfate, dissolved in in 0.5 M H_2SO_4 (Belzile et al., 2006) using factory calibration (dark counts subtracted and scale factor applied). The sensor was calibrated before and after the experiment.

SG142

Website	https://www.bco-dmo.org/deployment/58150
Platform	Seaglider 142
Start Date	2008-04-04
End Date	2008-06-24
Description	Starting position: 58.994, -20.484 (according to Seaglider Tracks dataset) **Methods & Sampling** NAB08 Seaglider 142 data are reported for following sensors: Seabird Electronics GliderAPL unpumped conductivity and temperature sensor pair; Druck PCDR 4020, pressure sensor; Aanderaa Oxygen Optode 3830; WET Labs ECOPuck BB2F-VMG with chlorophyll fluorescence excitation at 470 nm and emission at 695 nm, and volume scattering function at 117° for two wavelengths (470 and 700 nm). This sensor initially was turned off below 600 m, but after 11 May 2008 was turned on from surface to 900 m; WET Labs ECOPuck BBFL2-VMT with chlorophyll fluorescence excitation at 470 nm and emission at 695 nm, CDOM (colored dissolved organic material) fluorescence with excitation at 370 nm and emission at 460 nm, and volume scattering function at 117° for 532 nm. This sensor was turned off 11 May 2008 to conserve energy. Calibration casts: During NAB08 special emphasis was given to intercalibration of instruments to enable data collected on different platforms to be used interchangeably, with the ship-deployed sensors used as the standard. A number of ship CTD profiles on all cruises (B4-2008, KN193-03, B9-2008 and B10-2008) were done simultaneously in proximity of a glider or float; data collected on these "calibration casts" was used for cross calibration of different sensors. For more details, see various calibration reports (Seaglider_CTD_Calibration-NAB08.pdf, Oxygen_glider_float_Calibration-NAB08.pdf, Seaglider_chl_Calibration.pdf, Backscatter_Calibration-NAB08.pdf) **Processing Description** Latitude and longitude (parameter names lat and lon) were measured at the surface and interpolated when the glider was at depth. Parameter name GPS value id indicates measurements while glider was at the surface (value=1) or interpolated while diving (value=0). No interpolation or smoothing was performed on other data. Temperature and salinity (parameter names temp and sal): Temperature and salinity data were calculated using pre deployment calibration coefficients. A first-order lag correction was applied to raw measurements of temperature and conductivity (due to temperature latency). For each dive, out of range measurements and spikes (3 interquartile ranges above or below the median in windows of 15 contiguous measurements) were flagged and replaced with NaNs, which were repopulated by linear interpolation. Data were smoothed with an 11-point median filter. Parameters potemp and sigma_0 were calculated from the smoothed temp and sal datasets. For more details, see Seaglider_CTD_Calibration-NAB08.pdf. Dissolved oxygen, O2 (parameter name O2_cal): Oxygen data from the Aanderaa optode were corrected for time lags in oxygen and temperature. Winkler oxygen bottle data from glider – ship and float-ship calibration profiles, as well as concurrent glider – float profiles were used to determine the appropriate gain and offset. The resulting oxygen has an error of ±2 µmol kg-1. For more details, see Oxygen_glider_float_Calibration-NAB08.pdf. Particulate backscattering coefficients, bbp (parameter names bbp470, bbp532, bbp700): Backscattering digital counts were converted to β at 117° by subtracting factory-provided dark counts and multiplying by factory calibration scale factors, modified based on measurements and calculations of Sullivan et al. (subm.) Sensors were calibrated before the experiment and after the experiment. β at 117° was converted to bbp (m-1) by subtracting β of seawater (Zhang et al., 2009) and multiplying by 2πβ (where β = 1.132). Ship-glider calibration profiles were used to produce fully cross calibrated data sets only for bbp at 700 nm (m-1). The other backscattering coefficient (bbp at 470 (m-1)) is calculated using the factory calibrations only since the ship had only one backscatter sensor, i.e., bbp700. For more details, see Backscatter_Calibration-NAB08.pdf. Particulate organic carbon (POC) derived from bbp(700) (parameter name POC_bbp): The regression to convert ship downcast bbp at 700 nm to POC is: POC (mg C m-3) = bbp (700)_downcast (m-1) * 35800 (mg C m-2) – 16.2 (mg C m-3); r2 = 0.81. Because all backscatter sensors were cross calibrated with the ship CTD downcast, this regression was directly applied to glider bbp at 700 nm to compute glider POC. For more details, see KN193-03 BOTTLE metadata and POC_cp_bbp_Calibration-NAB08.pdf. Chlorophyll fluorescence (parameter names chl_raw and chl_2_raw): Chlorophyll fluorescence measured by glider ECOPuck BB2F was cross-calibrated with other chlorophyll fluorometers by ship-glider calibration profiles and converted to volts. Dark voltage (median in situ dark voltage = 0.083 volts) was subtracted from cross-calibrated values to obtain chlorophyll fluorescence in volts (parameter name chl_raw). The same cross-calibration was done for secondary chlorophyll fluorometer (BBFL2), and the same dark voltage was subtracted to obtain chlorophyll fluorescence in volts (parameter name chl_2_raw). Both ECOPucks were calibrated before the experiment. For more details: Seaglider_chl_Calibration.pdf. CDOM fluorescence (parameter name CDOM): CDOM is reported as ppb quinine sulfate, dissolved in in 0.5 M H_2SO_4 (Belzile et al., 2006) using factory calibration (dark counts subtracted and scale factor applied). The sensor was calibrated before the experiment.

SG143

Website	https://www.bco-dmo.org/deployment/58151
Platform	Seaglider 143
Start Date	2008-04-04
End Date	2008-06-03
Description	Starting position: 59.005, -20.511 (according to Seaglider Tracks dataset) **Methods & Sampling** NAB08 Seaglider 143 data are reported for following sensors: Seabird Electronics GliderAPL unpumped conductivity and temperature sensor pair; Druck PCDR 4020, pressure sensor; Aanderaa Oxygen Optode 3830; WET Labs ECOPuck BB2F-VMG with chlorophyll fluorescence excitation at 470 nm and emission at 695 nm, and volume scattering function at 117° for two wavelengths (470 and 700 nm). This sensor initially was turned off below 600 m, but after 11 May 2008 was turned on from surface to 900 m; WET Labs ECOPuck BBFL2-VMT with chlorophyll fluorescence excitation at 470 nm and emission at 695 nm, CDOM (colored dissolved organic material) fluorescence with excitation at 370 nm and emission at 460 nm, and volume scattering function at 117° for 532 nm. This sensor was turned off 11 May 2008 to conserve energy. Calibration casts: During NAB08 special emphasis was given to intercalibration of instruments to enable data collected on different platforms to be used interchangeably, with the ship-deployed sensors used as the standard. A number of ship CTD profiles on all cruises (B4-2008, KN193-03, B9-2008 and B10-2008) were done simultaneously in proximity of a glider or float; data collected on these "calibration casts" was used for cross calibration of different sensors. For more details, see various calibration reports (Seaglider_CTD_Calibration-NAB08.pdf, Oxygen_glider_float_Calibration-NAB08.pdf, Seaglider_chl_Calibration.pdf, Backscatter_Calibration-NAB08.pdf) Glider NAB08 SG143, although recovered on 06/03/2008, stopped acquiring data on 05/25/2008. **Processing Description** Latitude and longitude were measured at the surface and interpolated when the glider was at depth. Parameter name GPS value id indicates measurements while glider was at the surface (value=1) or interpolated while diving (value=0). No interpolation or smoothing was performed on other data. Temperature and salinity: Temperature and salinity data were calculated using pre deployment calibration coefficients. A first-order lag correction was applied to raw measurements of temperature and conductivity (due to temperature latency). For each dive, out of range measurements and spikes (3 interquartile ranges above or below the median in windows of 15 contiguous measurements) were flagged and replaced with NaNs, which were repopulated by linear interpolation. Data were smoothed with an 11-point median filter. Parameters potemp and sigma_0 were calculated from the smoothed temp and sal datasets. For more details, see Seaglider_CTD_Calibration-NAB08.pdf. Dissolved oxygen, O2: Oxygen data from the Aanderaa optode were corrected for time lags in oxygen and temperature. Winkler oxygen bottle data from glider – ship and float-ship calibration profiles, as well as concurrent glider – float profiles were used to determine the appropriate gain and offset. The resulting oxygen has an error of ±2 µmol kg-1. For more details, see Oxygen_glider_float_Calibration-NAB08.pdf. Particulate backscattering coefficients, bbp (parameter names bbp470, bbp532, bbp700):Backscattering digital counts were converted to β at 117° by subtracting factory-provided dark counts and multiplying by factory calibration scale factors, modified based on measurements and calculations of Sullivan et al. (subm.) Sensors were calibrated before the experiment and after the experiment. β at 117° was converted to bbp (m-1) by subtracting β of seawater (Zhang et al., 2009) and multiplying by 2πβ (where β = 1.132). Ship-glider calibration profiles were used to produce fully cross calibrated data sets only for bbp at 700 nm (m-1). The other backscattering coefficient (bbp at 470 (m-1)) is calculated using the factory calibrations only since the ship had only one backscatter sensor, i.e., bbp700. For more details, see Backscatter_Calibration-NAB08.pdf. Particulate organic carbon (POC) derived from bbp(700) (parameter name POC_bbp): The regression to convert ship downcast bbp at 700 nm to POC is: POC (mg C m-3) = bbp (700)_downcast (m-1) * 35800 (mg C m-2) – 16.2 (mg C m-3); r2 = 0.81. Because all backscatter sensors were cross calibrated with the ship CTD downcast, this regression was directly applied to glider bbp at 700 nm to compute glider POC. For more details, see KN193-03 BOTTLE metadata and POC_cp_bbp_Calibration-NAB08.pdf. Chlorophyll fluorescence: Chlorophyll fluorescence measured by glider ECOPuck BB2F was cross-calibrated with other chlorophyll fluorometers by ship-glider calibration profiles and converted to volts. Dark voltage (median in situ dark voltage = 0.083 volts) was subtracted from cross-calibrated values to obtain chlorophyll fluorescence in volts (parameter name chl_raw). The same cross-calibration was done for secondary chlorophyll fluorometer (BBFL2), and the same dark voltage was subtracted to obtain chlorophyll fluorescence in volts (parameter name chl_2_raw). Both ECOPucks were calibrated before and after the experiment. For more details: Seaglider_chl_Calibration.pdf. CDOM fluorescence: CDOM is reported as ppb quinine sulfate, dissolved in in 0.5 M H2SO4 (Belzile et al., 2006) using factory calibration (dark counts subtracted and scale factor applied). The sensor was calibrated before and after the experiment.

[table of contents | back to top]

Project Information

North Atlantic Bloom Experiment 2008 (NAB 2008)

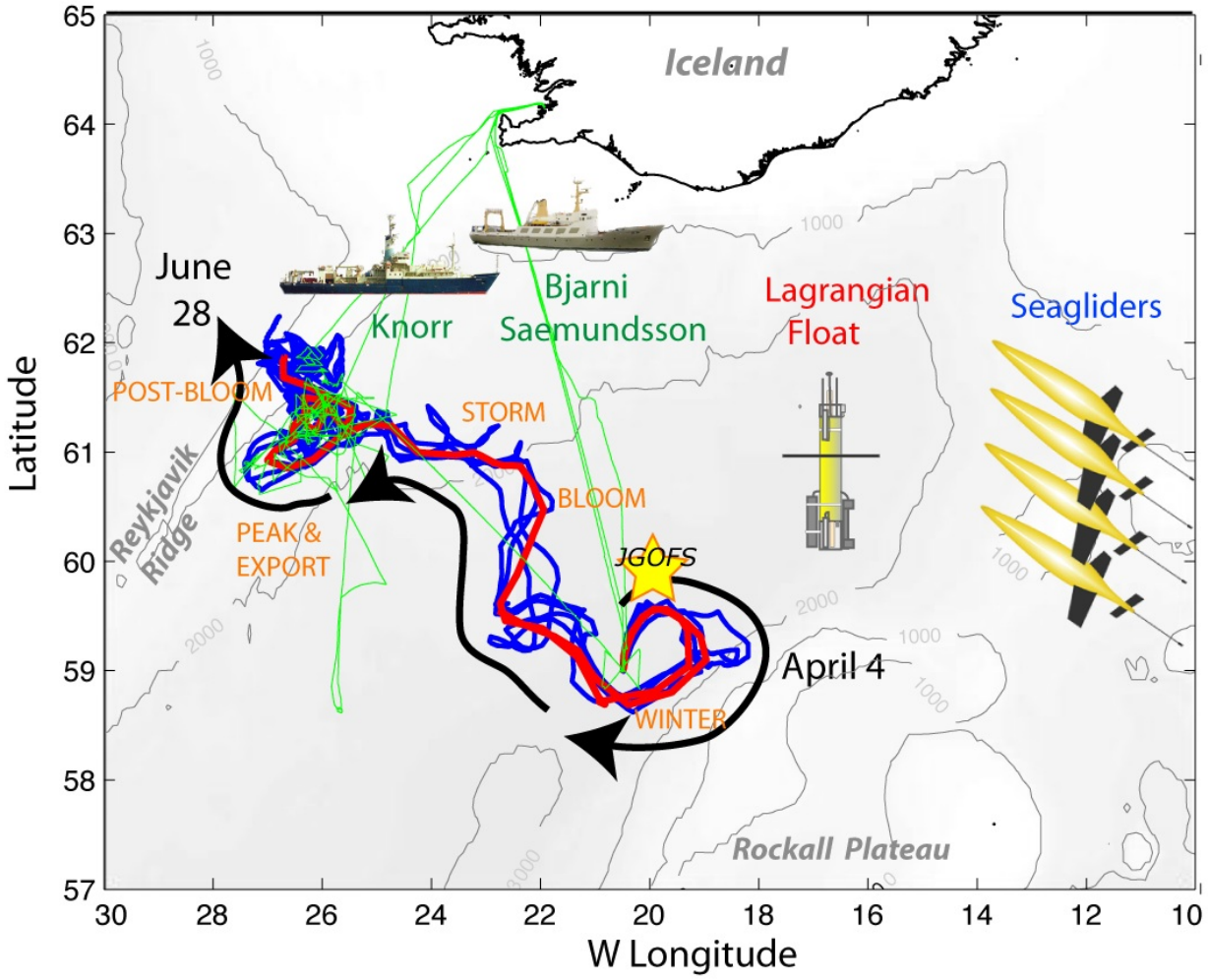
Coverage: North Atlantic, 60 ° North

NAB2008 was a process experiment designed to study an important component of the oceanic carbon system - the North Atlantic spring bloom. The phytoplankton bloom occurring each spring in the North Atlantic, drives the uptake of carbon dioxide and is an important component of the biological pump (Bagniewski et al., 2010). Previous studies in this region have shown the importance of small temporal and spatial scales, i.e. ecosystem patchiness, during the bloom, but were restricted by the limitations of ship-based sampling. Recent advances in autonomous platforms and sensors presented an opportunity to study this important event in a new way. In addition to deployment of a diverse suite of *in situ* sampling devices, NAB2008 was also a test-bed for developing the strategies and knowledge needed to successfully use new methods to drive the next generation of ocean observations.

In 2008, a coordinated deployment of 1 float, 4 Seagliders and 2 research vessels sampled the evolution of the North Atlantic spring bloom along and surrounding the nearly Lagrangian path followed by the float. The autonomous measurements were continuous through the experimental period, and included CTD, chlorophyll fluorescence, optical backscatter, and oxygen on all platforms; and nitrate, optical attenuation, and various radiance measurements on the float. Velocities were determined from the vehicle motion, with the float extending to a depth of 230 meters and gliders to 1,000 meters. The autonomous vehicles were deployed, rescued, and recovered on three cruises of the Icelandic vessel Bjarni Saemundsson. A 21-day cruise of the R/V Knorr conducted more detailed measurements during the peak of the bloom in May. The R/V Knorr sampling program included optical profiles, ADCP data and analysis of water samples for nutrients, particulate organic carbon, pigments, micro-plankton composition, complemented by guest investigator analyses. Data from both ships were used to calibrate and validate the autonomous measurements.

References:
Bagniewski, W., Fennel, K., Perry, M. J., and D'Asaro, E. A. (2010) Optimizing models of the North Atlantic spring bloom using physical, chemical and bio-optical observations from a Lagrangian float, Biogeosciences Discuss., 7, pp. 8477-8520, doi:10.5194/bgd-7-8477-2010

Click on image to view full size



[table of contents | back to top]

Program Information

Ocean Carbon and Biogeochemistry (OCB)

Website: http://us-ocb.org/

Coverage: Global

The Ocean Carbon and Biogeochemistry (OCB) program focuses on the ocean's role as a component of the global Earth system, bringing together research in geochemistry, ocean physics, and ecology that inform on and advance our understanding of ocean biogeochemistry. The overall program goals are to promote, plan, and coordinate collaborative, multidisciplinary research opportunities within the U.S. research community and with international partners. Important OCB-related activities currently include: the Ocean Carbon and Climate Change (OCCC) and the North American Carbon Program (NACP); U.S. contributions to IMBER, SOLAS, CARBOOCEAN; and numerous U.S. single-investigator and medium-size research projects funded by U.S. federal agencies including NASA, NOAA, and NSF.

The scientific mission of OCB is to study the evolving role of the ocean in the global carbon cycle, in the face of environmental variability and change through studies of marine biogeochemical cycles and associated ecosystems.

The overarching OCB science themes include improved understanding and prediction of: 1) oceanic uptake and release of atmospheric CO2 and other greenhouse gases and 2) environmental sensitivities of biogeochemical cycles, marine ecosystems, and interactions between the two.

The OCB Research Priorities (updated January 2012) include: ocean acidification; terrestrial/coastal carbon fluxes and exchanges; climate sensitivities of and change in ecosystem structure and associated impacts on biogeochemical cycles; mesopelagic ecological and biogeochemical interactions; benthic-pelagic feedbacks on biogeochemical cycles; ocean carbon uptake and storage; and expanding low-oxygen conditions in the coastal and open oceans.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0628107
NSF Division of Ocean Sciences (NSF OCE)	OCE-0628379

[table of contents | back to top]