Float profile data collected during surface ascents in the Sargasso Sea from 2013-2014.

Website: https://www.bco-dmo.org/dataset/728347
Data Type: Cruise Results
Version: 2
Version Date: 2018-04-17

Project
» Rapid, Autonomous Particle Flux Observations in the Oligotrophic Ocean (RapAutParticleFlux)

Program
» Ocean Carbon and Biogeochemistry (OCB)

Contributors	Affiliation	Role
Estapa, Margaret L.	Skidmore College	Principal Investigator, Contact
Buesseler, Kenneth O.	Woods Hole Oceanographic Institution (WHOI)	Co-Principal Investigator
Ake, Hannah	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
Optical proxy measurements of sinking particle flux and water-column bio-optical profiles were obtained from profiling floats in the Sargasso Sea to expand the number of particle flux observations in the critical and under-sampled “twilight zone”. Particulate organic carbon flux derived from float-based optical sediment trap measurements was validated against fluxes measured directly with co-deployed, drifting neutrally-buoyant, sediment traps during a series of five short cruises before floats were deployed for approximately one year. The data returned by the floats comprise quantitative particle flux observations made at high-enough temporal resolution to interpret in the context of short-term, upper-ocean production events.

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Coverage

Spatial Extent: **N**:34.7787 **E**:-61.1357 **S**:28.3441 **W**:-69.1118
Temporal Extent: 2013-07-06 - 2014-11-24

Dataset Description

Float profile data collected during surface ascent.

Methods & Sampling

Multiple deployments of two Sea-Bird Scientific Navis BGCi floats (numbers F033 and F034) equipped with CTDs, transmissometers, O2 optodes, backscattering (700 nm), fluorescence (chlorophyll, colored dissolved organic matter), and tilt sensors were conducted between July 2013 and November 2014 in conjunction with Bermuda Atlantic Time-series Study cruises. Short-term deployments (1.5 – 3 days) followed by recovery of the floats were conducted during four monthly BATS cruises in July – October 2013 and one cruise in March 2014. Both floats were deployed during the July and August 2013 cruises and float F034 was deployed for the remaining cruises. Each float collected one profile per cruise with the exception of the August 2013 cruise, during which the two floats together collected 13 profiles. During short-term deployments, floats first completed an initial descent and ascent without parking, then completed 1 or 2 more profile cycles with different, consecutive target depths. Following the initial descent/ascent described above, the short-term profile cycles were structured as described below for long-term deployments. In addition to the short-term cruise deployments, F033 profiled continuously from October 2013 until early April 2014, yielding 77 profiles, and F034 profiled continuously from March 2014 until late November 2014, yielding 139 profiles. During these long-term deployments, a typical cycle consisted of 1) the descent to the target park depth, 2) a park phase at the target depth lasting 1.5 – 2.5 days during which measurements are made every 15 minutes, 3) a descent to 1000 dbar, 4) an ascent to the surface during which measurements are made, and 5) a surface telemetry phase, during which a GPS fix is obtained, data are uploaded via Iridium, and instructions for the next cycle are downloaded. During long-term deployments, floats cycled through park phases at 150/200, 300, 500, and 1000 dbar every 7 days, spending 2.5 days at 1000 dbar and 1.5 days at the shallower depths. The sequence of park phase depth at the three shallowest depths was varied between each 7-day cycle over a 21-day period to avoid aliasing in particle flux profiles.

A float firmware error early in the project prevented collection of upper water column data in some of the short-term deployments. This was remedied before long-term deployment of the floats commenced. The floats occasionally performed a reboot during ascent profiles. The affected profiles are missing data for some pressure bins. Colored dissolved organic matter data are not available for float F034 profiles from cruises B295 and B296 due to sensor malfunction.

Profile data were acquired during the ascent to the surface following each park phase acquisition at a sampling rate of 4 dbar below 500 dbar and 2 dbar above 500 dbar.

Data Processing Description

BCO-DMO Data Processing Description:

-Reformatted date to yyyy/mm/dd
-Reformatted column names to comply with BCO-DMO standards.
-Added ISO_DateTime_UTC column.
-Data were originally organized into multiples files and have been consolidated for display here.

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Data Files

File
profile.csv (Comma Separated Values (.csv), 14.70 MB) MD5:85381c15046181a02e4bca40be6e6d67 Primary data file for dataset ID 728347

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Related Publications

Benson, B. B., & Krause, D. (1984). The concentration and isotopic fractionation of oxygen dissolved in freshwater and seawater in equilibrium with the atmosphere1. Limnology and Oceanography, 29(3), 620–632.

doi:10.4319/lo.1984.29.3.0620
General

Bittig, H. C., Fiedler, B., Fietzek, P., & Körtzinger, A. (2015). Pressure Response of Aanderaa and Sea-Bird Oxygen Optodes. Journal of Atmospheric and Oceanic Technology, 32(12), 2305–2317. doi:10.1175/jtech-d-15-0108.1 https://doi.org/10.1175/JTECH-D-15-0108.1
General

Boss, E., & Pegau, W. S. (2001). Relationship of light scattering at an angle in the backward direction to the backscattering coefficient. Applied Optics, 40(30), 5503. doi:10.1364/ao.40.005503 https://doi.org/10.1364/AO.40.005503
General

Briggs, N., Perry, M. J., Cetinić, I., Lee, C., D'Asaro, E., Gray, A. M., & Rehm, E. (2011). High-resolution observations of aggregate flux during a sub-polar North Atlantic spring bloom. Deep Sea Research Part I: Oceanographic Research Papers, 58(10), 1031–1039. doi:10.1016/j.dsr.2011.07.007
Methods

Estapa, M. L., Buesseler, K., Boss, E., & Gerbi, G. (2013). Autonomous, high-resolution observations of particle flux in the oligotrophic ocean. Biogeosciences, 10(8), 5517–5531. doi:10.5194/bg-10-5517-2013
Results

Garcia, H. E., & Gordon, L. I. (1992). Oxygen solubility in seawater: Better fitting equations. Limnology and Oceanography, 37(6), 1307–1312. doi:10.4319/lo.1992.37.6.1307
General

Morgan, P.P., Pender, L., (1993) SEAWATER. MATLAB Central File Exchange. Retrieved August 8, 2017. https://www.mathworks.com/matlabcentral/fileexchange/47595-mixing--mx--oceanographic-toolbox-for-em-apex-float-data
Software

Thierry, V., Bittig, H., Gilbert, D., Kobayashi, T., Kanako, S., & Schmid, C. (2016). Processing Argo oxygen data at the DAC level cookbook (Version 2.2). Ifremer. https://doi.org/10.13155/39795
General

Weiss, R. F., & Price, B. A. (1980). Nitrous oxide solubility in water and seawater. Marine Chemistry, 8(4), 347–359. doi:10.1016/0304-4203(80)90024-9
General

Xing, X., Claustre, H., Boss, E., Roesler, C., Organelli, E., Poteau, A., … D'Ortenzio, F. (2016). Correction of profiles of in-situ chlorophyll fluorometry for the contribution of fluorescence originating from non-algal matter. Limnology and Oceanography: Methods, 15(1), 80–93. doi:10.1002/lom3.10144
General

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Parameters

Parameter	Description	Units
deployment	For short-term deployments (1.5-3 days), the BATS cruise number from which the float was deployed. For long-term deployments, the serial number of the float (F033 or F034).	unitless
date	The UTC date at the completion of the ascent profile; yyyy/mm/dd	unitless
time	The UTC time at the completion of the ascent profile; HH:MM	unitless
pres	Pressure acquired with Sea-Bird Scientific SBE 41CP CTD. This is reported as the instrument output with the factory calibration applied.	dbar

temp	Temperature acquired with Sea-Bird Scientific SBE 41CP CTD. This is reported as the instrument output with the factory calibration applied.	Celsius
sal	Salinity acquired with Sea-Bird Scientific SBE 41CP CTD. This is reported as the instrument output with the factory calibration applied.	PSU
optode_therm_v	Oxygen sensor thermistor raw voltage; Acquired with Sea-Bird Scientific SBE 63 Optical Dissolved Oxygen Sensor. This is the raw sensor output.	volts
optode_temp	Temperature at dissolved oxygen sensor; Acquired with Sea-Bird Scientific SBE 63 Optical Dissolved Oxygen Sensor. Temperature at the dissolved oxygen sensor was calculated from the raw SBE 63 thermistor voltage by applying the factory calibration: L = ln (100000 * thermistor voltage / (3.3 - thermistor voltage)) Temperature [deg C] = 1 / (TA0 + TA1*L + TA2*L2 + TA3*L3) - 273.15 See https://www.bco-dmo.org/dataset/728371 for calibration coefficients.	Celsius
oxy_phase	Oxygen sensor raw phase; Acquired with Sea-Bird Scientific SBE 63 Optical Dissolved Oxygen Sensor. This is the raw sensor output.	usec
oxygen	Dissolved oxygen; Acquired with Sea-Bird Scientific SBE 63 Optical Dissolved Oxygen Sensor. Dissolved oxygen concentration [umol/kg] was calculated and corrected for salinity and pressure effects according to the 2016 Argo recommendations for processing of dissolved oxygen data (Thierry et al. 2016). As per these recommendations, an initial pressure correction was made to the raw measured oxygen phase delay Phi [usec] according to Bittig et al. 2015: Phi adj = Phi raw + Pcoef1 * P / 1000 where Pcoef1 = 0.115 usec and P [dbar] is the collocated SBE 41CP CTD pressure measurement. The adjusted oxygen phase delay [usec] was then converted to voltage by applying the factory conversion: V = Phiadj / 39.457071 Uncorrected dissolved oxygen concentration [mL/L] was calculated by applying the factory calibration: Oxygen_uncorr [mL/L] = {(A0 + A1*T + A2*V2) / (B0 + B1*V) - 1.0} / (C0 + C1*T + C2*T2) where T is SBE 63 temperature [deg C] and V is adjusted SBE 63 phase delay [V]. The oxygen calibration coefficients (A0, A1, A2, B0, B1, C0, C1, C2) are provided in Table 1. Dissolved oxygen concentration [mL/L] was then corrected for salinity and pressure effects according to the 2016 Argo recommendations. Oxygen_corr [mL/L] = Oxygenun corr [mL/L] * Scorr * Pcorr where Scorr = A(T,S,Spreset) * exp(S*(SolB0 + SolB1*Ts + SolB2*Ts2 + SolB3*Ts3) + SolC0*S2) A(T,S,Spreset) = (1013.25 - pH2O(T,Spreset)) / (1013.25	umol/kg

	- pH2O(T,S)) pH2O = 1013.25 * exp(D0 + D1*(100 / (T + 273.15)) + D2*ln((T + 273.15) / 100) + D3*S) Spreset = 0 TS = ln [(298.15 - T) / (273.15 + T)] T and S are the collocated temperature and salinity measurements from the SBE 41CP CTD, respectively. Salinity correction coefficients are from Benson and Krause 1984 (SolB0 = -6.24523e-3, SolB1 = -7.37614e-3, SolB2 = -1.03410e-3, SolB3 = -8.17083e-3, SolC0 = -4.88682e-7) and pH2O coefficients are from Weiss and Price 1980 (D0 = 24.4543, D1 = -67.4509, D2 = -4.8489, D3 = -5.44e-4). The pressure correction factor Pcorr is calculated as outlined in Bittig et al. 2015 as Pcorr = 1 + (Pcoef2 * T + Pcoef3) * P / 1000 with Pcoef2 = 0.00022 and Pcoef3 = 0.0419. Dissolved oxygen concentration [mL/L] was converted to dissolved oxygen concentration [umol/kg]: Oxygen [umol/kg] = Oxygen [mL/L] * (44.6596 umol/mL) / (ρTheta/1000) where ρθ is the potential density of seawater [kg/m3] at zero pressure and the potential temperature calculated from collocated SBE 41CP CTD salinity, temperature, and pressure measurements using the pden function in the SEAWATER Matlab library (Morgan and Pender 1993). The value of 44.6596 umol/mL is derived from the molar volume of oxygen gas at standard temperature and pressure, 22.3916 L/mole (e.g., García and Gordon 1992). See https://www.bco-dmo.org/dataset/728371 for calibration coefficients.	
oxygen_cal	Calibrated dissolved oxygen; The dissolved oxygen concentrations calculated above were corrected to dissolved oxygen concentrations measured by Winkler titration of bottle samples collected during concurrent Bermuda Atlantic Time-series Study cruises (available at http://www.bco-dmo.org/project/2124 or http://bats.bios.edu). Linear regression yields the relationship: oxygen_cal [umol/kg] = oxygen [umol/kg] * 1.0331 – 6.9976; R2 = 0.97. See https://www.bco-dmo.org/dataset/728371 for bottle calibration data.	umol/kg
chl	Chlorophyll-a; Acquired with WET Labs MCOMS Chlorophyll Fluorometer (excitation 470 nm/emission 695 nm). A dark offset was subtracted from the raw sensor counts and the result was multiplied by a factory-determined scale factor to obtain fluorometric chlorophyll-a concentration [ug/L]. The dark offset was computed separately for each sensor as the mean of the deep-water minima measured during all profiles between July and September 2013 at BATS (https://www.bco-dmo.org/dataset/728371). Chl [ug/L] = Scale Factor * (Output - Dark Counts)	ug/L

chl_corr	Corrected chlorophyll-a; The fluorometric chlorophyll-a values derived above were further corrected by removing the deep-water dependence of chlorophyll fluorescence on fluorescent colored dissolved organic matter (CDOM; see below) and a small residual deep-water sensor offset. The method of Xing et al. (2017) was applied. Briefly chlorophyll fluorescence in deep water was assumed to originate entirely from a combination of the above factors the dependence of the measured chlorophyll fluorescence on CDOM was determined through linear regression and the regression parameters were used to correct the entire chlorophyll profile. Profiles shallower than 200 m were corrected using the regression parameters of the subsequent float profile.	ug/L
chl_cal	Calibrated chlorophyll-a; Corrected fluorometric chlorophyll-a concentrations (chl_corr derived above) were calibrated to chlorophyll-a concentrations measured by HPLC of bottle samples collected during concurrent Bermuda Atlantic Time-series Study cruises (available at http://www.bco-dmo.org/project/2124 or http://bats.bios.edu). Linear regression yields the relationship: chl_cal [µ=ug/L] = chl [ug/L] * 0.4756 + 0.0064; R2 = 0.92. See https://www.bco-dmo.org/dataset/728371 for bottle calibration data.	ug/L
bbp700	Particulate backscattering coefficient bbp (700nm); Acquired with WET Labs MCOMS Scattering Meter with 700-nm wavelength and in-water centroid angle of 150 deg. See Table 3 in paper. The particulate volume scattering coefficient βp was calculated as βp(150 deg,700 nm) [m-1 sr-1] = Scale Factor * (Output – Dark Counts) using a factory-determined scale factor and a dark offset, computed separately for each sensor as the mean of the deep-water minima measured during all profiles between July and September 2013 at BATS (https://www.bco-dmo.org/dataset/728371). Particulate backscattering coefficient, bbp(λ) [m-1], is estimated as bbp = 2πχβp(150 deg) χ = 1.13 for 150 deg (from Boss and Pegau 2001).	m -1
bbp700_corr	Corrected particulate backscattering coefficient bbp (700nm); Depth profiles of particulate backscattering coefficient bbp(700 nm) were despiked using a running median filter (Briggs et al. 2011). Due to the size of the median filter window the initial and final six data points in each profile could not be despiked and appear as NaN. Park phase bbp(700 nm) data were not despiked because they were collected at a nominally constant depth. Despiked profile phase bbp(700 nm) and raw park phase bbp(700 nm) were further corrected by a float-specific deep-water offset. The minimum bbp(700 nm) measured during the long-term deployments was determined for each float (-2.0488e-04 m-1 for F033; -1.1139e-04 m-1 for F034) and subtracted from the bbp(700 nm) values derived above.	m -1

POC_bbp	Particulate organic carbon derived from bbp (700 nm); The relationship between corrected bbp(700 nm) measured by the float backscatter sensor (bbp700_corr derived above) and POC concentrations measured in bottle samples collected during concurrent Bermuda Atlantic Time-series Study cruises (available at http://www.bco-dmo.org/project/2124 or http://bats.bios.edu) was utilized to predict POC concentration from corrected bbp(700 nm) for all float samples. Linear regression yields the relationship: POC [mg/m3] = bbp(700 nm) [m-1] * 32020.0874 + 0.2973; R2 = 0.86. See https://www.bco-dmo.org/dataset/728371 for bottle calibration data.	mg/meters cubed
cdom	Colored dissolved organic matter; Acquired with WET Labs MCOMS CDOM Fluorometer (excitation 370 nm/emission 460 nm). A dark offset was subtracted from the raw sensor counts and the result was multiplied by a factory-determined scale factor to obtain colored dissolved organic matter concentration [ppb]. The dark offset was computed separately for each sensor as the mean of the surface minima (0 – 20 dbar) measured during all profiles between July and September 2013 at BATS (https://www.bco-dmo.org/dataset/728371).	ppb
trans_counts	Transmissometer raw counts; Acquired with WET Labs c-ROVER 2000 transmissometer with 650-nm wavelength and 0.25-m pathlength. This is reported as the raw sensor output in counts.	count
beam_c	Uncorrected particulate beam attenuation coefficient cp (650 nm); Acquired with WET Labs c-ROVER 2000 transmissometer with 650-nm wavelength and 0.25-m pathlength. Transmittance is calculated as: Transmittance = (Signal - Dark) / (Cal Signal - Dark) Signal = raw output in counts Dark = counts with beam blocked, factory supplied Cal Signal = counts with Milli-Q water in sensor path, acquired prior to deployment (https://www.bco-dmo.org/dataset/728371) The beam attenuation coefficient is calculated as: cp,uncorr(650 nm) = -ln (transmittance) / pathlength [m] No correction for drift of the sensor over time (for instance, due to bio-fouling, see Estapa et al. 2013) has been applied.	m -1
tilt	The maximum tilt value recorded during each sampling interval.	degrees
azimuth	The uncalibrated compass heading of the float.	degrees
ISO_DateTime_UTC	ISO formatted DateTime; UTC	unitless

float_id	The serial number of the float (F033 or F034).	unitless
prof_num	Number of float profile cycle.	unitless
lat	Latitude	decimal degrees
lon	Longitude	decimal degrees

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Instruments

Dataset-specific Instrument Name	SBE 41CP CTD
Generic Instrument Name	CTD Sea-Bird
Dataset-specific Description	Used for sampling
Generic Instrument Description	A Conductivity, Temperature, Depth (CTD) sensor package from SeaBird Electronics. This instrument designation is used when specific make and model are not known or when a more specific term is not available in the BCO-DMO vocabulary. Refer to the dataset-specific metadata for more information about the specific CTD used. More information from: http://www.seabird.com/

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

Dataset-specific Instrument Name	WET Labs MCOMS Scattering Meter
Generic Instrument Name	Optical Backscatter Sensor
Dataset-specific Description	Used to measure backscatter

Dataset-specific Instrument Name	O2 optode
Generic Instrument Name	Oxygen Sensor
Dataset-specific Description	Used to sample dissolved oxygen, Sea-Bird Scientific Navis BGCi floats (numbers F033 and F034)
Generic Instrument Description	An electronic device that measures the proportion of oxygen (O2) in the gas or liquid being analyzed

Dataset-specific Instrument Name	Transmissometers
Generic Instrument Name	Transmissometer
Dataset-specific Description	Equipped on Sea-Bird Scientific Navis BGCi floats (numbers F033 and F034)
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.

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Deployments

AE1315

Website	https://www.bco-dmo.org/deployment/729072
Platform	R/V Atlantic Explorer
Report	http://ezid.cdlib.org/id/doi:10.7284/903354
Start Date	2013-07-06
End Date	2013-07-12
Description	BATS cruise

AE1318

Website	https://www.bco-dmo.org/deployment/729047
Platform	R/V Atlantic Explorer
Report	http://ezid.cdlib.org/id/doi:10.7284/903360
Start Date	2013-08-01
End Date	2013-08-10
Description	BATS cruise

AE1320

Website	https://www.bco-dmo.org/deployment/729045
Platform	R/V Atlantic Explorer
Report	http://ezid.cdlib.org/id/doi:10.7284/903281
Start Date	2013-09-15
End Date	2013-09-21
Description	BATS cruise

AE1323

Website	https://www.bco-dmo.org/deployment/729043
Platform	R/V Atlantic Explorer
Report	http://ezid.cdlib.org/id/doi:10.7284/903370
Start Date	2013-10-18
End Date	2013-10-23
Description	BATs cruise

AE1402

Website	https://www.bco-dmo.org/deployment/729041
Platform	R/V Atlantic Explorer
Report	http://ezid.cdlib.org/id/doi:10.7284/903364
Start Date	2014-03-04
End Date	2014-03-08
Description	BATS cruise

F033

Website	https://www.bco-dmo.org/deployment/733318
Platform	shoreside SargassoSea
Start Date	2013-11-18
End Date	2014-04-01
Description	Long-term float deployment F033.

F034

Website	https://www.bco-dmo.org/deployment/733387
Platform	shoreside SargassoSea
Start Date	2014-04-11
End Date	2014-11-25
Description	Long-term float deployment F034

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Project Information

Rapid, Autonomous Particle Flux Observations in the Oligotrophic Ocean (RapAutParticleFlux)

Coverage: Sargasso Sea

Particles settling into the deep ocean remove carbon and biologically-important trace elements from sunlit, productive surface waters and from contact with the atmosphere over short timescales. A shifting balance among physical, chemical, and biological processes determines the ultimate fate of most particles at depths between 100 and 1,000 m, where fluxes are hardest to measure. Our challenge is to expand the number of particle flux observations in the critical "twilight zone", something that has proven elusive with ship-based “snapshots” that have lengths of, at most, a few weeks. Here, we propose an optical, transmissometer-based method to make particle flux observations from autonomous, biogeochemical profiling floats. Novel developments in data interpretation, sensor operation, and platform control now allow flux measurements at hourly resolution and give us observational access to the water-column processes driving particle flux over short timescales. The sensors and float platforms that we propose to use are simple, robust, and commercially-available, making them immediately compatible with community-scale efforts to implement other float-based biogeochemical measurements.

We have two main goals: First, we will *quantify particulate organic carbon (POC) flux using float-based optical measurements* by validating our observations against fluxes measured directly with neutrally-buoyant, drifting sediment traps. Second, we will *evaluate the contribution of rapid export events to total POC fluxes in the oligotrophic ocean* by using a biogeochemical profiling float to collect nearly-continuous, depth-resolved flux measurements and coupled, water-column bio-optical profiles.

To achieve these goals, we will implement a work plan consisting of 1) a set of laboratory-based sensor calibration experiments to determine detection limits and evaluate sensitivity to particle size; 2) a series of four sediment trap and biogeochemical float co-deployments during which we will collect POC flux and field calibration data; and 3) a long-term sampling and analysis period (approximately 1 year) during which data will be returned by satellite from the biogeochemical float. We will conduct calibration fieldwork in conjunction with monthly Bermuda Atlantic Time-series Study (BATS) cruises, taking advantage of the timeseries measurements and the context provided by the 25-year record of POC flux at that site. The data returned by the float will comprise the first quantitative particle flux observations made at high-enough temporal resolution to interpret in the context of short-term, upper-ocean production events.

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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.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1406552

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