

Raw and derived parameters from a WET Labs C-Star Beam Transmissometer on Biofloat 48 in the subpolar North Atlantic and Iceland Basin in 2008 (NAB 2008 project)

Website: <https://www.bco-dmo.org/dataset/3427>

Version: 08 March 2011

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Project

» [North Atlantic Bloom Experiment 2008](#) (NAB 2008)

Program

» [Ocean Carbon and Biogeochemistry](#) (OCB)

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Dataset Description

Profiles of raw transmittance, particulate attenuation coefficient, and particulate organic carbon.

Data Processing Description

Particulate attenuation coefficient cp (parameter name `beam_cp`): Beam transmissometers from Floats 48 (CST-1063), the R/V Knorr cruise 193 (CST-284 and CST-1090), and the two cruises on the R/V Bjarni Saemundsson (CST-284, CST-1090) were compared and rectified to yield a consistent measurement of transmittance (%) and particulate attenuation coefficient due to particles cp at 652 nm. This analysis allowed the application of a single correlation between cp and particulate organic carbon based on linear regression of cruise CTD measurements and bottle measurements of POC. For more details, see [C-Star_Calibration-NAB08.pdf](#).

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Data Files

File
Biofloat_48_cstar.csv (Comma Separated Values (.csv), 2.21 MB) MD5:20b042efac1b4470a35b0936de7ad83d
Primary data file for dataset ID 3427

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Parameters

Parameter	Description	Units
Cruise_ID	Cruise identifier	dimensionless
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
press	water pressure at measurement	decibars
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
xmiss_raw	Raw 12-bit transmittance	counts
beam_cp	Particulate attenuation coefficient, cp at 652 nm, intercalibrated with Knorr 193-03 transmissometer.	reciprocal meters
POC_cp	Particulate organic carbon (POC) estimated from cp, using relationship determined from Knorr 193-03 cruise.	milligrams per meter cubed
yday	Yearday 2008. Yearday 1 is 2008-01-01:00:00:00Z	dimensionless
mode	0 = down profile 1 = settle 2 = up profile 3 = drift_iso 5 = drift_ml	dimensionless
float_cycle	one float cycle	dimensionless

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Instruments

Dataset-specific Instrument Name	Lagrangian Float
Generic Instrument Name	Lagrangian Float
Dataset-specific Description	The 2008 North Atlantic Bloom Experiment (NAB08) employed a "Lagrangian float", custom built at the University of Washington Applied Physics Laboratory. (D'Asaro, 2003, Performance of Lagrangian Floats, Journal of Atmospheric and Oceanic Technology, Vol. 20, 896-911).
Generic Instrument Description	Built at the University of Washington Applied Physics Laboratory, the Lagrangian Float is not an ARGO float. It is primarily designed to accurately follow the three-dimensional motion of water parcels within the mixed layer, through a combination of neutral buoyancy and high drag provided by a one meter diameter black drogue. Typical buoyancies of a few grams result in vertical velocities relative to the water of a few mm/s, small compared to the cm/s turbulent velocities in the mixed layer. The float's motion within the mixed layer thus closely imitates that of a planktonic organism. The float can also profile vertically. It sends data and receives commands using the Iridium satellite system. The float is designed to accommodate a wide variety of sensors.

Dataset-specific Instrument Name	Wet Labs CSTAR Transmissometer
Generic Instrument Name	WET Labs {Sea-Bird WETLabs} C-Star transmissometer
Generic Instrument Description	The C-Star transmissometer has a novel monolithic housing with a highly integrated opto-electronic design to provide a low cost, compact solution for underwater measurements of beam transmittance. The C-Star is capable of free space measurements or flow-through sampling when used with a pump and optical flow tubes. The sensor can be used in profiling, moored, or underway applications. Available with a 6000 m depth rating. More information on Sea-Bird website: https://www.seabird.com/c-star-transmissometer/product?id=60762467717

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Deployments

Biofloat 48

Website	https://www.bco-dmo.org/deployment/58147
Platform	Biofloat 48
Start Date	2008-04-04
End Date	2008-05-25
Description	See document NAB08Float48SamplingMethodologyV1.pdf for complete information on Biofloat 48's modes, cycles, and sampling intervals for each sensor. BioFloat 48 was a Lagrangian float deployed during cruise B4-2008 of the vessel R/S Bjarni Saemundsson. Processing Description Particulate attenuation coefficient, cp at 652 nm, was intercalibrated with Knorr 193-03 transmissometer. Particulate organic carbon (POC) derived from cp (parameter name POC_cp): A relationship between Ship-based cp (R/V Knorr 193-03) and bottle POC data was used to produce a regression for application to CTD downcast cp. The ship and float WET Labs C-Star beam transmissometers were intercalibrated (see above). Therefore, the same cp-POC regression as used for the R/V Knorr 193-03 cruise can applied to float 48 cp data (parameter name cstar.beamc): $POC (mg C m^{-3}) = cp (m^{-1}) * 408 (mg C m^{-2}) - 10 (mg C m^{-3})$; $r^2 = 0.80$. This relationship is empirical and it should not be applied to the other cruises without independent verification. For more details, see the datasets associated with KN193-03 and POC_cp_bbp_Calibration-NAB08.pdf.

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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.

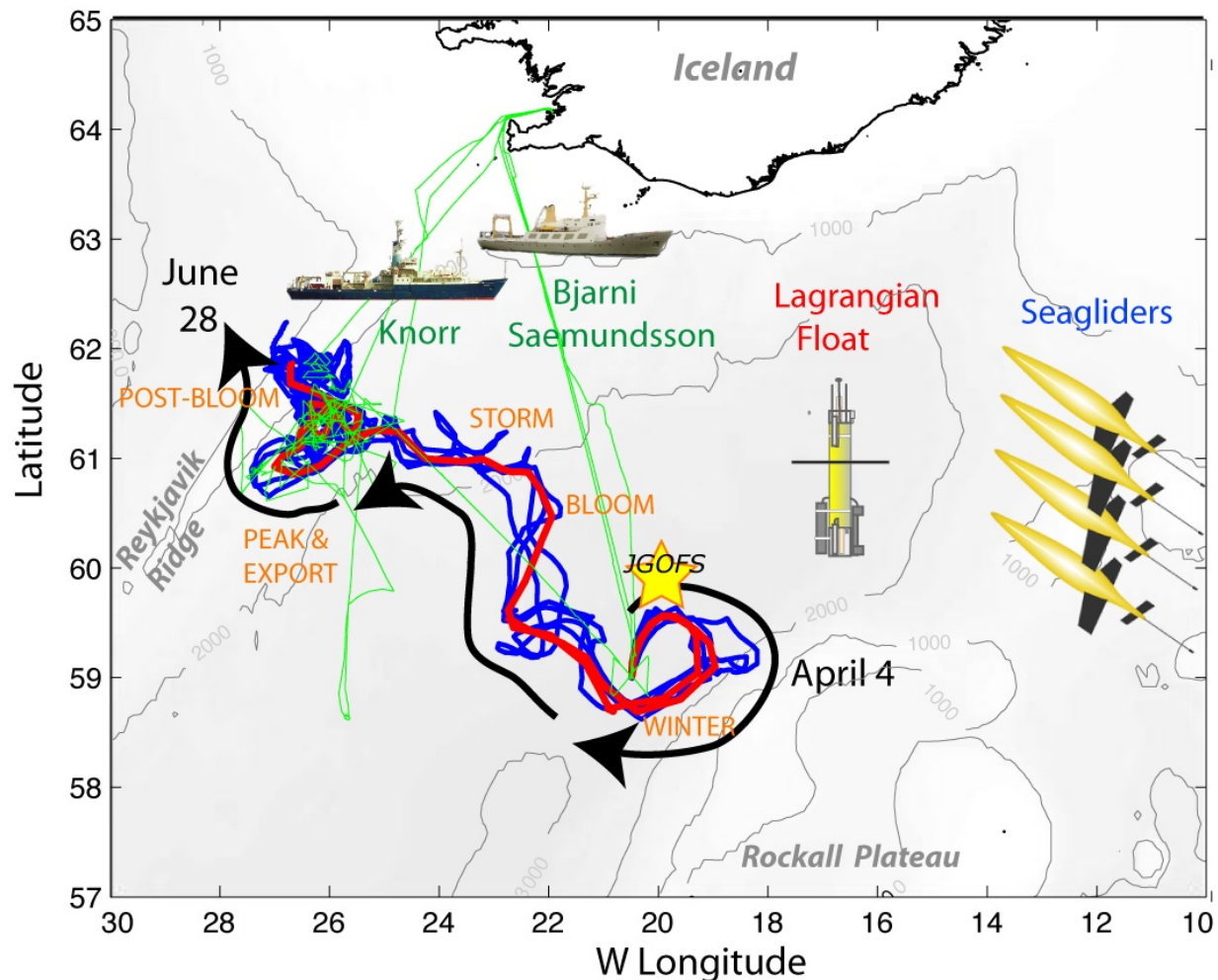
In 2008, a coordinated deployment of 1 float, 4 Seagliders and 2 research vessels sampled the evolution of the North Atlantic spring bloom along and surrounding the nearly Lagrangian path followed by the float. The autonomous measurements were continuous through the experimental period, and included 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

[NAB08 preprints](#)

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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-0628107
NSF Division of Ocean Sciences (NSF OCE)	OCE-0628379

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