

Hyperspectral upwelling radiance (Lu) profiles from a Trios ARC sensor on the Biofloat 48 in the subpolar North Atlantic and Iceland Basin in 2008 (NAB 2008 project)

Website: <https://www.bco-dmo.org/dataset/3436>

Version: 15 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 hyperspectral upwelling plane radiance $L_u(\lambda)$ where $\lambda = 320-950$ nanometers acquired with TriOS ARC optical sensor. 256 channels.

Data Processing Description

In situ hyperspectral downwelling plane irradiance $E_d(\lambda)$ and hyperspectral upwelling radiance $L_u(\lambda)$, parameter names E_d and L_u , respectively): The TriOS ACC E_d sensor measured hyperspectral downwelling plane irradiance from 320-950 nm. The TriOS ARC L_u sensor measured upwelling radiance from 320-950 nm. Both sensors sampled at ~ 3.3 nm spectral resolution and 0.3 nm spectral accuracy. From the raw 12 bit digital values, calibrated irradiance $E_d(\lambda)$ ($W\ m^{-2}\ nm^{-1}$) and radiance $L_u(\lambda)$ ($W\ m^{-2}\ sr^{-1}nm^{-1}$) was computed from the ACC and ARC sensors, respectively, using pre-cruise factory calibration coefficients and the equations provided by TriOS (TriOS 2004). ACC E_d and ARC L_u sensor measurement wavelengths are not identical; no spectral interpolation has been performed. Two data quality parameters are available: tilt and qflag. The parameter "tilt" indicates the tilt of the sensor (and float) in degrees from vertical, while qflag indicates data quality: 1 = acceptable, 0 = biofouling suspect. The ACC E_d sensor appears to be biofouled during days 120 - 142; while no biofouling correction has been applied to the radiometric data, qflag is set to zero during this time. Shading of the ACC ($E_d(\lambda)$) by the top-mounted CTD, GPS and Argos antennas, ring supports is possible; effects of this shading have not been quantified but will appear as variability in the measurements rather than bias. The effects of self-shading due to the 1 m square drogue deployed during drift mode have not yet been quantified. For more details, see Radiometry_and_PAR_Calibration-NAB08.pdf.

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Data Files

File
Biofloat_48_Lu.csv (Comma Separated Values (.csv), 335.04 MB) MD5:459f7c6da508fc76fb81de2d2d69ad58
Primary data file for dataset ID 3436

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Parameters

Parameter	Description	Units
Cruise_ID	Cruise identifier	dimensionless
float_cycle	index counting float cycles	dimensionless
profile_mode	integer defining current cycle of profiling mode	integer
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
yday	Yearday 2008. Yearday 1 is 2008-01-01:00:00Z	dimensionless
wavelength	Calibrated wavelength (256 channels), with measurements valid from 320-950 nm. Wavelengths outside this range contain dark pixel data for measuring dark current. Spectral resolution is ~3.3 nanometers (instrument: TriOS ACC)	nanometers
Lu	Hyperspectral upwelling plane radiance Lu	watts per meter squared per nanometer per steradian

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Instruments

Dataset-specific Instrument Name	Hyperspectral Radiometer TriOS ARC
Generic Instrument Name	Hyperspectral Radiometer TriOS ARC
Generic Instrument Description	TriOS ARC Hyperspectral Radiometer Sensor

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.

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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.

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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.

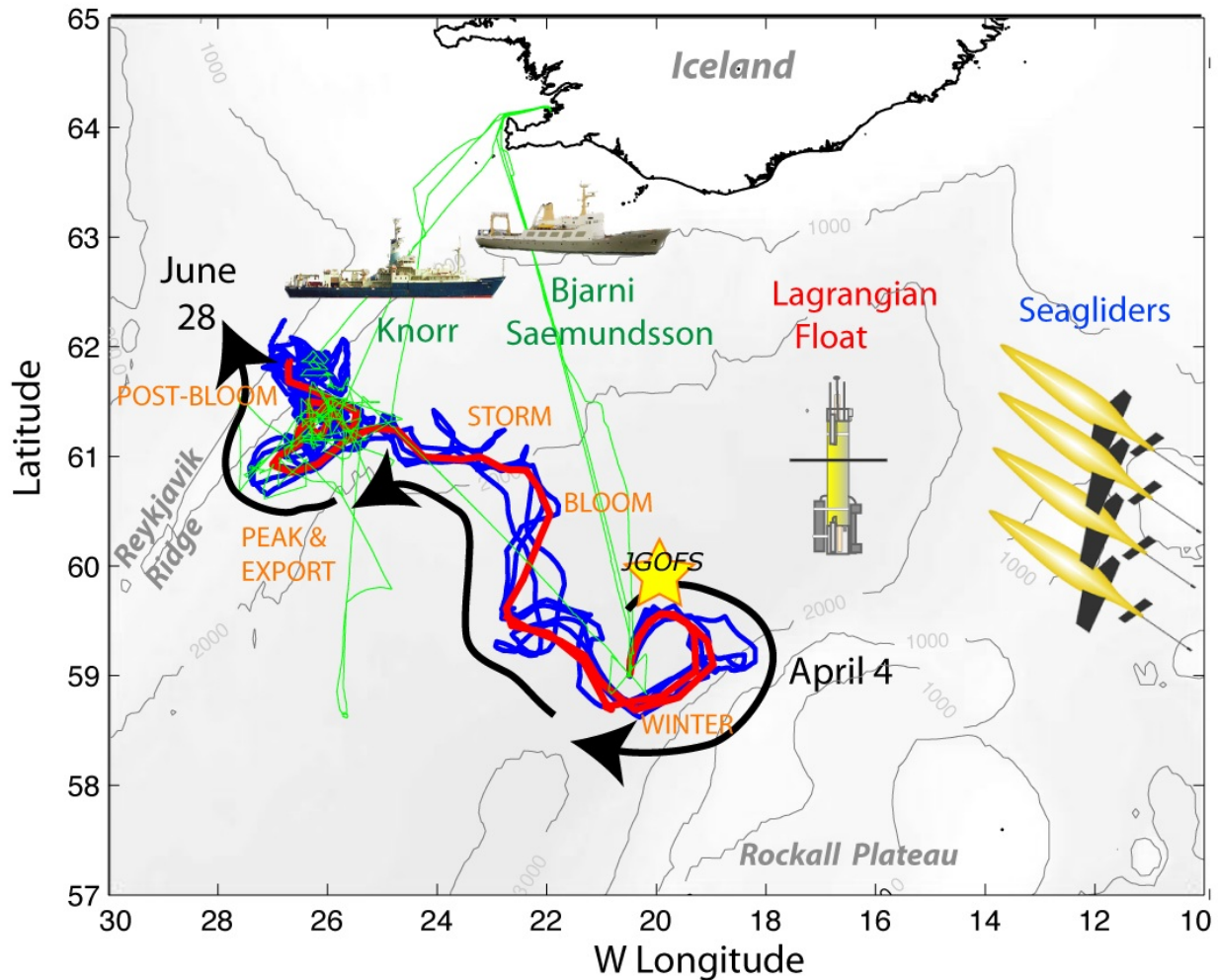
In 2008, a coordinated deployment of 1 float, 4 Seagliders and 2 research vessels sampled the evolution of the North Atlantic spring bloom along and surrounding the nearly Lagrangian path followed by the float. The autonomous measurements were continuous through the experimental period, and included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