

# Dissolved oxygen concentration and oxygen saturation from an Aanderaa 3835 Optode oxygen sensor on Biofloat 48 in the subpolar North Atlantic and Iceland Basin in 2008 (NAB 2008 project)

Website: <https://www.bco-dmo.org/dataset/3426>

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## Project

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

## Program

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

Contributors	Affiliation	Role
<a href="#">D'Asaro, Eric</a>	University of Washington (UW APL)	Principal Investigator
<a href="#">Rehm, Eric</a>	University of Washington (UW APL)	Contact
<a href="#">McKee, Theresa</a>	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

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## Dataset Description

Full-resolution dissolved oxygen concentration and oxygen saturation from Aanderaa 3835 Optode oxygen sensor.

## Data Processing Description

Dissolved oxygen (parameter names O2\_cal): The Seabird SBE-43 oxygen sensor and the Aanderra Optode on float 48 both require calibration and removal of various sensor errors. The Optode is poorly calibrated in terms of dissolved oxygen, temperature and pressure. During times of low flow and a closed drogue, it can have biases exceeding 10  $\mu\text{mol/kg}$ , probably due to oxygen consumption by the float. The SBE-43 exhibits mode-variable biases due to our attempts to reduce pumping energy. By inter-comparing these sensors and comparing them with the Winkler bottle samples from the R/V Knorr and SBE-43 sensor taken on calibration casts during R/V Knorr cruise 193-03, adjustments were developed to bring both float 48 oxygen sensors and the R/V Knorr CTD SBE-43 sensor into agreement and into absolute calibration to an accuracy of better than 2  $\mu\text{mol/kg}$ . These corrections are applied to the float data. The best float 48 oxygen data was obtained from the SBE-43 in all float modes and the Optode in down and drift modes. The Optode data from settle and up mode still contains systematic errors. For more details, see [Oxygen\\_Calibration-NAB08.pdf](#).

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## Data Files

File
<b>Biofloat_48_optode_O2.csv</b> (Comma Separated Values (.csv), 6.55 MB) MD5:434dda75de988bea44cb690de7f381df
Primary data file for dataset ID 3426

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## Parameters

Parameter	Description	Units
Cruise_ID	Cruise identifier	dimensionless
float_cycle	index counting float cycles	dimensionless
mode	0 = down profile 1 = settle 2 = up profile 3 = drift_iso 5 = drift_ml	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 <sup>3</sup>
O2_cal	Dissolved oxygen concentration from Aanderaa 3835 Optode oxygen sensor that was cross-calibrated with ship SBE 43 sensor and Winkler O2 during Knorr 193-03 cruise.	micromol per kilogram
O2sat	Oxygen saturation value, computed from temperature and salinity (Garcia & Gordon 1992)	micromol per kilogram
yrday	Yearday 2008. Yearday 1 is 2008-01-01:00:00:00Z	dimensionless

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## Instruments

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

<b>Dataset-specific Instrument Name</b>	Lagrangian Float
<b>Generic Instrument Name</b>	Lagrangian Float
<b>Dataset-specific Description</b>	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).
<b>Generic Instrument Description</b>	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

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/58147">https://www.bco-dmo.org/deployment/58147</a>
<b>Platform</b>	Biofloat 48
<b>Start Date</b>	2008-04-04
<b>End Date</b>	2008-05-25
<b>Description</b>	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. <b>Processing Description</b> Dissolved oxygen (O2_cal) was cross-calibrated with RV Knorr's SBE43 sensor and Winkler oxygen during KN193-03. Oxygen saturation value (O2sat) was computed using temperature and salinity (Garcia and Gordon, 1992.)

## Project Information

### North Atlantic Bloom Experiment 2008 (NAB 2008)

**Coverage:** North Atlantic, 60 &deg; 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.

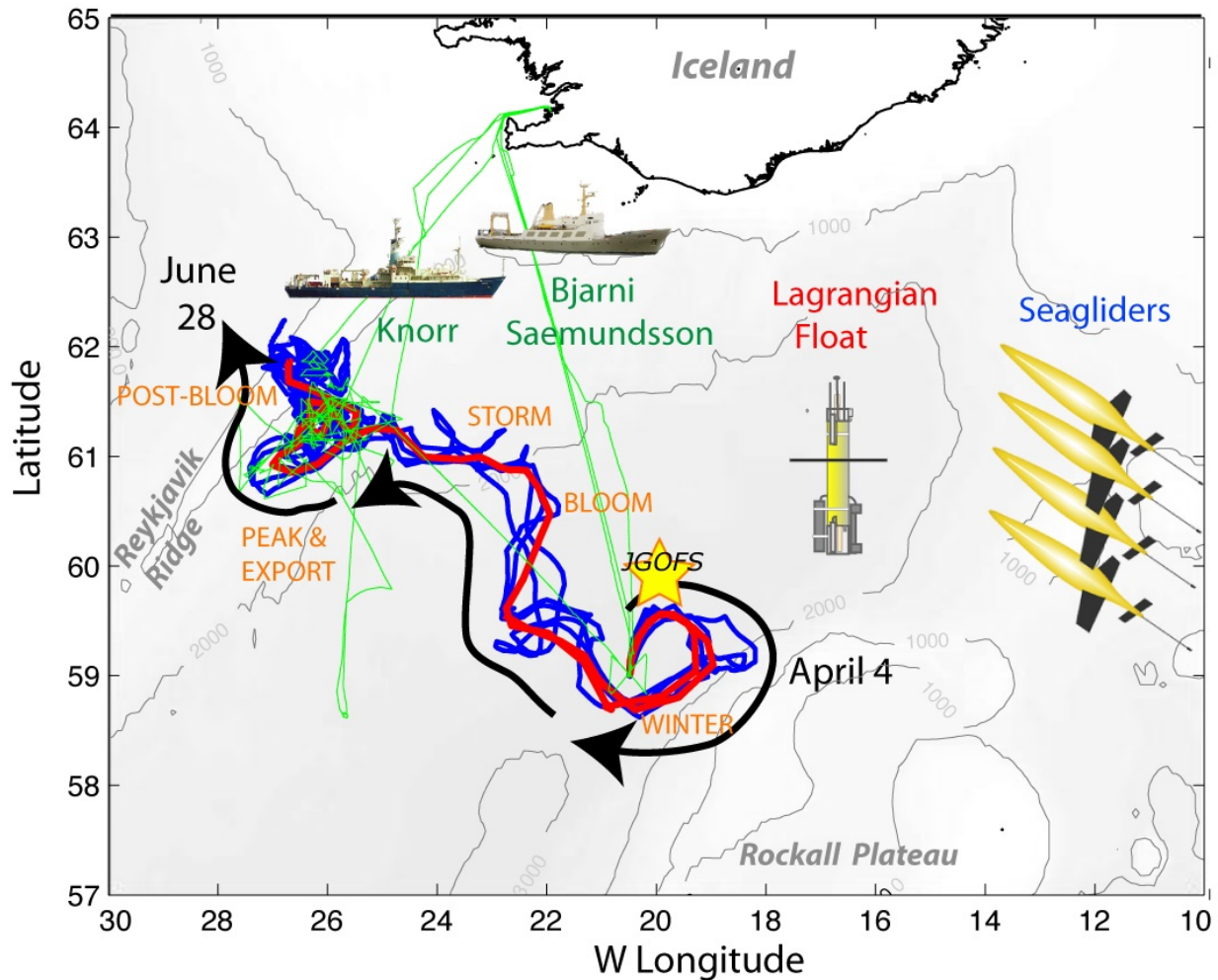
In 2008, a coordinated deployment of 1 float, 4 Seagliders and 2 research vessels sampled the evolution of the North Atlantic spring bloom along and surrounding the nearby Lagrangian path followed by the float. The autonomous measurements were continuous through the experimental period, and included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

## Funding

Funding Source	Award
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-0628107</a>
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-0628379</a>