

# Preliminary bottle data from the R/V Atlantic Explorer AE0922 cruise in the North Atlantic, Bermuda BATS region during 2009 (TZEX project)

**Website:** <https://www.bco-dmo.org/dataset/3455>

**Data Type:** Cruise Results

**Version:** 1

**Version Date:** 2011-03-28

## Project

» [Twilight Zone EXplorer](#) (TZEX)

## Program

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

Contributors	Affiliation	Role
<a href="#">Buesseler, Kenneth O.</a>	Woods Hole Oceanographic Institution (WHOI)	Principal Investigator
<a href="#">Lamborg, Carl</a>	Woods Hole Oceanographic Institution (WHOI)	Co-Principal Investigator
<a href="#">Lomas, Michael W.</a>	Bermuda Institute of Ocean Sciences (BIOS)	Co-Principal Investigator
<a href="#">Siegel, David</a>	University of California-Santa Barbara (UCSB-ICESS)	Co-Principal Investigator
<a href="#">Steinberg, Deborah K.</a>	Virginia Institute of Marine Science (VIMS)	Co-Principal Investigator
<a href="#">Valdes, Jim</a>	Woods Hole Oceanographic Institution (WHOI)	Co-Principal Investigator
<a href="#">Zawoosky, Mary</a>	Woods Hole Oceanographic Institution (WHOI)	Contact
<a href="#">Gegg, Stephen R.</a>	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

## Abstract

Preliminary bottle data from the R/V Atlantic Explorer AE0922 cruise in the North Atlantic, Bermuda BATS region during 2009 (TZEX project).

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## Coverage

**Spatial Extent:** N:31.968 E:-63.5028 S:31.2802 W:-64.5665

**Temporal Extent:** 2009-09-20 - 2009-09-29

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## Dataset Description

CTD data at the locations where bottles were tripped.

## Data Processing Description

### BCO-DMO Processing Notes

Generated from original .xls file "AE0908 combined bottle data.xls" contributed by Ken Buesseler.

### BCO-DMO Edits

- All Longitude values signed negative for West
- "nd" (no data) value inserted in blank cells
- Parameter names modified to conform to BCO-DMO convention

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## Data Files

File
<b>CTD_Bottle.csv</b> (Comma Separated Values (.csv), 202.55 KB) MD5:d98492f35cb9966e6052a2420e1e6589
Primary data file for dataset ID 3455

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## Parameters

Parameter	Description	Units
Cast_ID	Cast ID - cruise/cast/bot	integer
Cast_Num	Cast Num	integer
Bot_Num	Bot Num	integer
Date_in	Date in	yyyymmdd
Time_in	Time in	hhmm
Dec_yr_in	Dec yr in	yyyy.xxxxxxx
Julian_day_in	Julian day in	ddd.xxx
Lon_in	Lon in	dec deg
Lat_in	Lat in	dec deg
Date_out	Date out	yyyymmdd
Time_out	Time out	hhmm
Lon_out	Lon out	dec deg
Lat_out	Lat out	dec deg
Bottle_fire_quality_flag	Bottle fire quality flag (1=good/-2=misfire/-3=suspect)	integer
P	P	db
Z	Z	meters
T1	T1	degs C
C1	C1	(tbd)
S1	S1	(tbd)
Oxy1	Oxy1	umol/kg?
BAC	BAC	(tbd)

Fl	Fl	(tbd)
T2	T2	degs C
Sig_t	Sig t	(tbd)
Wet_Salt_1	Wet Salt 1	(tbd)
Wet_Salt_2	Wet Salt 2	(tbd)
Wet_Oxy_1	Wet Oxy 1	umol
Wet_Oxy_2	Wet Oxy 2	umol
Wet_Oxy_3	Wet Oxy 3	umol
Niskin_temp	Niskin temp	degs C
Oxy_anom	Oxy anom	umol
DOC_sd	DOC sd	umol/L
TBD_1	TBD 1	(tbd)
O2	O2	mmol/m3
Salt	Salt	(tbd)
POP	POP	nmol/L
POC	POC	umol/L
PON	PON	umol/L
C_to_N	C to N	mol
Ba	Ba	nmol/L
Th230_avg	230Th avg	fg/l
error	error	(tbd)
Th232_avg	232Th avg	pg/l
TBD_2	TBD 2	(tbd)

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## Instruments

<b>Dataset-specific Instrument Name</b>	CTD Sea-Bird SBE 911plus
<b>Generic Instrument Name</b>	CTD Sea-Bird SBE 911plus
<b>Generic Instrument Description</b>	The Sea-Bird SBE 911 plus is a type of CTD instrument package for continuous measurement of conductivity, temperature and pressure. The SBE 911 plus includes the SBE 9plus Underwater Unit and the SBE 11plus Deck Unit (for real-time readout using conductive wire) for deployment from a vessel. The combination of the SBE 9 plus and SBE 11 plus is called a SBE 911 plus. The SBE 9 plus uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 plus and SBE 4). The SBE 9 plus CTD can be configured with up to eight auxiliary sensors to measure other parameters including dissolved oxygen, pH, turbidity, fluorescence, light (PAR), light transmission, etc.). more information from Sea-Bird Electronics

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## Deployments

### AE0922

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/58658">https://www.bco-dmo.org/deployment/58658</a>
<b>Platform</b>	R/V Atlantic Explorer
<b>Start Date</b>	2009-09-20
<b>End Date</b>	2009-09-29
<b>Description</b>	Until 26 November 2012 this cruise was identified by BIOS and R2R as AE-X0908. On 26 November 2012, the cruise ID was corrected by BIOS and R2R to be the new cruise ID AE0922. This change was also made at BCO-DMO on 26 November 2012. Original cruise data are available from the NSF R2R data catalog

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## Project Information

### Twilight Zone EXplorer (TZEX)

**Website:** <http://cafethorium.whoi.edu/website/projects/tzex.html>

**Coverage:** Bermuda, North Atlantic, BATS

## Carbon Flux Through the Twilight Zone - New Tools to Measure Change

Building upon the success of the VERTIGO project, we continue to work to improve our understanding of how materials travel from the surface to the deep ocean. This pathway is called the "Biological Pump" which refers to the combined activities that lead to a quick pathway for plant and animal debris (molts, fecal pellets, loose aggregated material) to sink as marine "snow" or a particle into the deep ocean. In the open ocean, this cycle is largely a biological one, though in some settings, transport of material delivered by dust may matter (e.g. TENATSO - Cape Verde time series project).

The "twilight zone" is a region of low light below the ocean's sunlit surface "euphotic" zone, and above the deep ocean boundary (around 1000m or 3000 feet). It is in this mysterious layer where most of the sinking particles of the world's ocean are consumed by the animals that live at depth.

In a new project starting in late 2006, we are designing an autonomous vehicle called the "Twilight Zone EXplorer" (TZEX) to sample the ocean particle flux and make remote measurements in the twilight zone. Beginning in 2007, we will be starting to sample on a monthly basis at Bermuda, as part of the [BATS \(Bermuda Atlantic Time-Series\)](#) program using our existing particle flux collectors, the Neutrally Buoyant Sediment trap.

The biological pump and processes regulating the flux of particles in the ocean. Carbon dioxide fixed during photosynthesis by phytoplankton in the upper ocean can be transferred below the surface mixed layer via three major processes: i) passive sinking of particles, ii) physical mixing of particulate and dissolved organic matter (DOM), and iii) active transport by zooplankton vertical migration. The sinking flux includes senescent phytoplankton, zooplankton fecal pellets, molts and mucous feeding-webs (e.g., larvacean houses) and aggregates of these materials. The sinking particle flux decreases with depth as aggregates are fragmented into smaller, non-sinking particles, decomposed by bacteria, and consumed and respired by zooplankton. This remineralization returns carbon and nutrients to dissolved forms. The structure of the planktonic community affects the composition and the sinking rates of particles. Particle size, form, density, and the content of biogenic minerals affect sinking and remineralization rates.

## Funding

The TZEX project is funded as part of the NSF Carbon and Water in the Earth System crosscutting solicitation aimed at closing significant gaps in our understanding of the complex relationships between and within the

global water and carbon cycles.

NSF link: [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=13651&org=OCE](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13651&org=OCE)

## References:

Dehairs, F., A. de Brauwere, M. Elskens, U. Bathmann, S. Becquevort, S. Blain, P. Boyd, K. Buesseler, E. Buitenhuis, M. Gehlen, G. Herndl, C. Klass, R. Lampitt, D. Lefevre, U. Passow, H. Plous, F. Primeau, L. Stemmann and T. Trull (2008). [Controls on Organic Carbon Export and Twilight Zone Remineralization: An Overview of the EUROCEANS Workshop](#). *Oceanography*, 21(3): 92-95.

Dehairs, F., A. de Brauwere and M. Elskens (2008). [Organic Carbon in the Ocean's Twilight Zone](#). *EOS, Transactions American Geophysical Union*, 89 (38): doi:10.1029/2008EO380004.

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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.

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## Funding

Funding Source	Award
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-0628416</a>

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