Discrete bottle samples collected at the Bermuda Atlantic Time-series Study (BATS) site in the Sargasso Sea from October 1988 through December 2024

Website: https://www.bco-dmo.org/dataset/3782
Data Type: Cruise Results
Version: 8
Version Date: 2025-06-27

Project
» Bermuda Atlantic Time-series Study (BATS)

Programs
» Ocean Carbon and Biogeochemistry (OCB)
» U.S. Joint Global Ocean Flux Study (U.S. JGOFS)
» Ocean Time-series Sites (Ocean Time-series)

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Abstract
Data presented here are discrete bottle samples from the Bermuda Atlantic Time-series Study (BATS) site located 80 km SE of Bermuda (31°40N, 64°10W) in the Sargasso Sea for October 1988 (cruise 10001) through December 2024 (cruise 10422). Measurements were collected from the core monthly BATS cruises and the near-biweekly (depending on ship availability) BATS Bloom cruises during February through April. The sample parameter list has been mostly consistent for the full time-series record and includes: salinity, dissolved oxygen, dissolved inorganic carbon, alkalinity, nutrients (nitrate + nitrite, nitrite, phosphate, silicate), particulate organics (carbon, nitrogen, phosphorous), particulate silicate, total organic carbon and nitrogen, total dissolved phosphorus, bacterial enumeration, and flow cytometry counts of picoplankton. The HPLC derived phytoplankton pigment data which are collected synoptically with many of the above parameters are reported in a separate dataset.

Table of Contents

Coverage

Location: Bermuda Atlantic Time-series Study (BATS) site located 80 km SE of Bermuda (31°40N, 64°10W) in the Sargasso Sea
Spatial Extent: **N**:35.667 **E**:-60.447 **S**:24.759 **W**:-66.169
Temporal Extent: 1988-10-20 - 2024-12-18

Dataset Description

Discrete bottle data collected at the Bermuda Atlantic Time Time-series Study site in the Sargasso Sea during BATS cruises #1 (October 1988) through #422 (December 2024).

Methods & Sampling

Water samples were collected at the Bermuda Atlantic Time-series Study (BATS) site located 80 km southeast of Bermuda (31°40N, 64°10W) in the Sargasso Sea. Measurements were collected monthly and often biweekly during the core monthly BATS cruises and the BATS Bloom cruises (Feb to April) following the methods of Knap et al. (1997).

All bottle fires are included in this dataset, even those that do not have any BATS core parameters, to be of use with other measurements and studies.

Niskin bottles were deployed and accompanying CTD measurements were taken at the depths of water sample collection. Sample parameters include salinity, dissolved oxygen, dissolved inorganic carbon, alkalinity, nutrients (nitrate + nitrite, nitrite, phosphate, silicate), particulate organics (carbon, nitrogen, phosphorous), particulate silicate, total organic carbon and total nitrogen, total dissolved phosphorous, bacterial enumeration, and flow cytometry counts of picoplankton. The HPLC derived phytoplankton pigment data which are collected synoptically with many of the above parameters are reported separately (see https://www.bco-dmo.org/dataset/893521)

Ship information
Research was conducted on many research vessels including:

- R/V Weatherbird I (cruises 1,2,8,9,10,11,12 and 13)
- R/V Cape Henlopen (cruises 3,4,5,6 and 7)
- R/V Cape Hatteras (cruises 33,52,52a,53,53a,54,54a,55,55a and 56,195,196,196a 208,208a,209)
- R/V Weatherbird II (all other cruises through 207)
- R/V Oceanus (cruise 242)
- R/V Endeavor (cruise 331, 422)
- R/V Atlantic Explorer (cruises 210 through 241, and 243 onwards except those mentioned above)

Numerous chief scientists: Tony Knap, Rachel Dow, Anthony Michaels, Kjell Gundersen, Rodney Johnson, Ann Close, Deborah Steinberg, Paul Lethaby, Julian Mitchell, Vivienne Lochhead, Deborah Lomas, Steven Bell, Jonathan Whitefield, Gwyn Evans, James Sadler, Samuel Monk, Samuel Stevens, Afonso Goncalves, Matt Enright, Fernando Pacheco, Zac Anderson, Claire Medley, and Dominic Smith.

Please see the Supplemental Files section for a listing of the cruises and associated measurements specific to this version of the BATS bottle data (bats_bottle_release_v008_update.txt)

Data Processing Description

Chapter 3 of the BATS methods manual has details about the steps taken to process and correct the data from the oceanographic sensors. Briefly, temperatures (when the bottles were fired) are extracted from the SeaBird Electronics (SBE) .asc files. Bottle data for each cast is then corrected using static drift/slope corrections based on SBE calibrations.

BCO-DMO Processing Description

- Imported data from source file "bats_bottle_v008.txt" into the BCO-DMO data system. Data file imported using missing data identifiers "NA" and -999.
- Imported data from file "bats_bottle_qcmask_v008" into BCO-DMO system. This file is quality flags for the bottle data measurements.
- The 'bottle' and 'mask' files were joined using the keys of bottle ID, date, and time.
- Converted latitude and longitude to decimal degrees.
- Added columns for Cruise type, Cruise number, Cast number, and Bottle number based on the bottle ID
- Zero padded the time column values and then combined with the yyyymmdd time column.
- Converted date and time to ISO8601 format
- Modified parameter (column) names to conform with BCO-DMO naming conventions. The only allowed characters are A-Z,a-z,0-9, and underscores. No spaces, hyphens, commas, parentheses, or Greek letters.

Problem Description

Note: Prior to BATS 121, DON was reported rather than TN

[table of contents | back to top]

Data Files

File	
3782_v8_bats_bottle.csv	(Comma Separated Values (.csv), 16.35 MB) MD5:4e816bf79e3c0ec3c13cd73dcb14219c
BATS bottle data version v008 with quality flags. Primary data file for dataset ID 3782, version 8	

[table of contents | back to top]

Supplemental Files

File	
BATS bottle update file filename: bats_bottle_release_v008_update.txt	(Plain Text, 1.17 KB) MD5:58dedd159b92b76d74ee76ab2d9b1442
BATS discrete bottle data version v008 update file. ASCII file listing changes in current version (v008) from previous versions.	

[table of contents | back to top]

Related Publications

BATS (1997). (technical report). Sampling Methods for the Suite of Measurements Routinely Collected for the Bermuda Atlantic Time-series Study. Retrieved from: http://www.bios.edu/uploads/BATS_report_methods.pdf
Methods

BATS (2023). Protocols for the Bermuda Atlantic Time-series Study Core Measurements. Bermuda Institute of Ocean Sciences, 142 pp.
Methods

Bermuda Atlantic Time-series Study Methods (online at https://bats.bios.edu/about/cruise-information/)
Methods

Knap, A.H., Michaels, A.F., Steinberg, D.K., Bahr, F., Bates, N.R., Bell, S., Countway, P., Close, A.R., Doyle, A.P., Dow, R.L., Howse, F.A., Gundersen, K., Johnson, R.J., Kelly, R., Little, R., Orcutt, K., Parsons, R., Rathburn, C., Sanderson, M. and Stone, S. (1997) BATS Methods Manual, Version 4 Woods Hole, MA, US. U.S. JGOFS Planning Office 136pp. http://eprints.soton.ac.uk/id/eprint/361194
Methods

[table of contents | back to top]

Related Datasets

IsRelatedTo

Bates, N., Johnson, R. J., Lethaby, P. J., Medley, C., Smith, D., Stuart, E., May, R., Derbyshire, L. (2025) **HPLC and fluorometric derived phytoplankton pigment concentrations from seawater collected at the Bermuda Atlantic Time-series Study (BATS) site from October 1988 through December 2024.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 8) Version Date 2025-06-20 doi:10.26008/1912/bco-dmo.893521.8 [view at BCO-DMO]

[table of contents | back to top]

Parameters

Parameter	Description	Units
ISO_DateTime_UTC	Date and Time in ISO8601 standard format	unitless
Bottle_ID	Unique bottle ID which identifies cruise type, cruise, cast, and Niskin bottle number	unitless
Latitude	Latitude	decimal degrees
Longitude	Longitude (West is negative)	decimal degrees
Vessel	Research vessel used for sampling	unitless
Cruise_ID	Cruise ID where first digit indicates cruise type followed by cruise number	unitless

Cruise_type	Cruise type (BATS core, BATS Bloom A, or BATS Bloom B)	unitless
Cruise_num	Cruise number	unitless
Cast_num	Cast number; 1-80=CTD casts, 81-99=Hydrocasts (i.e. 83 = Data from Hydrocast number 3	unitless
Bottle_num	Bottle number of sample	unitless
QF_bottle	Quality flag for Niskin or Go-Flo bottles (-3 =suspect, 1=unverified, 2=verified/acceptable)	unitless
Depth	Depth	meters (m)
QF_Depth	Quality flag for depth (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
Temperature	Temperature in ITS-90 standard	degrees Celsius (°C)
QF_Temp	Quality flag for Temperature (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
CTD_Salinity	CTD Salinity on PSS-78 scale	dimensionless
QF_CTD_Sal	Quality flag for CTD salinity (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
Salinity	Salinity-1 measurement on PSS-78 scale	dimensionless
QF_Salinity	Quality flag for Salinity-1 (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
Sigma_theta	Sigma-theta measurement	kilograms per cubic meter (kg/m^3)
QF_Sigma_theta	Quality flag for sigma-theta measurement (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
Oxygen_1	Oxygen-1	micromoles per kilogram (umol/kg)
QF_Oxygen	Quality flag for Oxygen-1 measurement (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless

CO2	Dissolved inorganic carbon	micromoles per kilogram (umol/kg)
QF_DIC	Quality flag for dissolved inorganic carbon (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
Alkalinity	Alkalinity	microequivalents
QF_Alk	Quality flag for Alkalinity (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
NO3_plus_NO2	Nitrate plus nitrite (NO3+NO2)	micromoles per kilogram (umol/kg)
QF_NO3_NO2	Quality flag for nitrate plus nitrite (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
NO2	Nitrite	micromoles per kilogram (umol/kg)
QF_NO2	Quality flag for nitrite (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
PO4	Phosphate	micromoles per kilogram (umol/kg)
QF_PO4	Quality flag for phosphate (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
Silicate	Silicate	micromoles per kilogram (umol/kg)
QF_Silicate	Quality flag for silicate (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
POC	Particulate Organic Carbon	micrograms per kilogram (ug/kg)
QF_POC	Quality flag for particulate organic carbon (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
PON	Particulate Organic Nitrogen	micrograms per kilogram (ug/kg)
QF_PON	Quality flag for particulate organic nitrogen (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
TOC	Total Organic Carbon	micromoles per kilogram (umol/kg)

QF_TOC	Quality flag for total organic carbon (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
TN	Total Nitrogen (prior to BATS 121, DON is reported instead of TN)	micromoles per kilogram (umol/kg)
QF_TN	Quality flag for total nitrogen (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
Bact_Enum	Bacteria enumeration	cells times 10^8 per kilogram
QF_Bact_enum	Quality flag for bacterial enumeration (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
POP	Particulate Organic Phosphorus	micromoles per kilogram (umol/kg)
QF_POP	Quality flag for particulate organic phosphorus (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
TDP	Total Dissolved Phosphorus	nanomoles per kilogram (nmol/kg)
QF_TDP	Quality flag for total dissolved phosphorus (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
SRP	Low-level phosphorus (soluble reactive phosphorus)	nanomoles per kilogram (nmol/kg)
QF_LLP_SRP	Quality flag for low-level phosphorus (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
Bio_Si	Particulate biogenic silica	micromoles per kilogram (umol/kg)
QF_bio_Si	Quality flag for particulate biogenic silica (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
Litho_Si	Particulate lithogenic silica	micromoles per kilogram (umol/kg)
QF_litho_Si	Quality flag for lithogenic silica (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
Prochlorococcus	Prochlorococcus	cells per milliliter (cells/mL)

QF_Prochloro	Quality flag for prochlorococcus (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
Synechococcus	Synechococcus	cells per milliliter (cells/mL)
QF_Synecho	Quality flag for synechococcus (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
Picoeukaryotes	Picoeukaryotes	cells per milliliter (cells/mL)
QF_Picoeuk	Quality flag for picoeukaryotes (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
Nanoeukaryotes	Nanoeukaryotes	cells per milliliter (cells/mL)
QF_Nanoeuk	Quality flag for nanoeukaryotes (1= unverified, 2= verified acceptable, 3= questionable, 4= bad, 9= no data)	unitless
yyyymmdd	Date in year, month, day	unitless
time	Time in hour, min	unitless
decimal_year	Decimal Year	unitless

[table of contents | back to top]

Instruments

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

Dataset-specific Instrument Name	Olympus AX70 Fluoresence Microscope
Generic Instrument Name	Fluorescence Microscope
Dataset-specific Description	Bacterial enumeration methods include DAPI stained Epifluoresence Microscopy / Olympus AX70
Generic Instrument Description	Instruments that generate enlarged images of samples using the phenomena of fluorescence and phosphorescence instead of, or in addition to, reflection and absorption of visible light. Includes conventional and inverted instruments.

Dataset-specific Instrument Name	Niskin bottle
Generic Instrument Name	Niskin bottle
Generic Instrument Description	A Niskin bottle (a next generation water sampler based on the Nansen bottle) is a cylindrical, non-metallic water collection device with stoppers at both ends. The bottles can be attached individually on a hydrowire or deployed in 12, 24, or 36 bottle Rosette systems mounted on a frame and combined with a CTD. Niskin bottles are used to collect discrete water samples for a range of measurements including pigments, nutrients, plankton, etc.

[table of contents | back to top]

Deployments

BATS_cruises

Website	https://www.bco-dmo.org/deployment/58883
Platform	Multiple Vessels
Report	http://bats.bios.edu/bats-data/
Start Date	1988-10-20
Description	Bermuda Institute of Ocean Science established the Bermuda Atlantic Time-series Study with the objective of acquiring diverse and detailed time-series data. BATS makes monthly measurements of important hydrographic, biological and chemical parameters throughout the water column at the BATS Study Site, located at 31 40N, 64 10W.

[table of contents | back to top]

Project Information

Bermuda Atlantic Time-series Study (BATS)

Website: http://bats.bios.edu

Coverage: Northwest Sargasso Sea at 31 deg 40' N, 64 deg 10' W

A full description of the BATS research program (including links to the processed BATS data) is available from

A full description of the BATS research program (including links to the processed BATS data) is available from the BATS Web site (see above for Project URL/ Project Website links). Any data contributed from selected ancillary projects are listed (linked) in the 'Datasets Collection' section below.

Collaborative Research: The Bermuda Atlantic Time-series Study: Sustained Biogeochemical, Ecosystem and Ocean Change Observations and Linkages in the North Atlantic (Years 36-40) *(Awards OCE-2241455, OCE-2241456 and OCE-2241457)*
NSF award abstract

Long-term observations of ocean physics, biology, and chemistry across decades provide a powerful lens for understanding the response of the oceans to environmental change. This award will continue the Bermuda Atlantic Time-series Study (BATS) research program, which began in 1988, for another five years. Observations at the BATS site provide crucial information for understanding the ocean?s role in the global climate system and the response of the ocean carbon system and marine ecosystems to climate perturbations. The research goals of the BATS program continue to be to improve our understanding of the time-varying components of the ocean carbon cycle and related elements of interest (such as nitrogen, phosphorus, and silica) and to identify the physical, chemical, and ecosystem properties responsible for this variability. The BATS program has substantial broader impacts, contributing to the field of ocean sciences by providing high-quality ocean observations and a framework in which other researchers can conceive and test hypotheses. In addition, the recent acquisition of the Bermuda Institute of Ocean Sciences by the Global Futures Laboratory of Arizona State University provides new avenues for educational opportunities and innovation.

In the subtropical gyre of the North Atlantic Ocean, warming, salinification, deoxygenation, ocean ecosystem changes, and acidification have accelerated their rate of change. Fundamental questions and challenges remain about understanding present and future ocean function, prediction, and modelling. An overarching question for the BATS program is: Will ocean biogeochemistry and ecosystem functioning continue to change in response to the acceleration of ocean warming, salinification, stratification, deoxygenation and acidification? With this question in mind, the sustained goals for the BATS program are: 1. Quantify the role of ocean-atmosphere coupling and climate variability on air-sea exchange of carbon dioxide (CO2) and carbon export to the ocean interior; 2. Document trends and controls of the following: (a) the interannual to decadal scale variability in carbon and nutrient cycles and their coupling in the surface and deep ocean via the Redfield Ratio paradigm; and, (b) biological community structure in the oligotrophic North Atlantic Ocean in response to low-frequency climate variability; 3. Quantify the response of planktonic and microbial community structure and function and impact on biogeochemical cycles (including new and export productivity) to variability in surface fluxes (e.g., heat, freshwater and momentum) and physical processes (e.g., mesoscale eddies, Rossby Waves, internal waves); 4. Facilitate development, calibration and validation of next-generation oceanographic sensors, tools and technologies; 5. Generate datasets that can be used by empiricists and modelers to test new hypotheses about North Atlantic Ocean biogeochemistry and ecosystem functioning; 6. Use BATS cruise, infrastructure, laboratory and analytical expertise, and data to improve education and training programs for BATS staff, STEM-literate students, and future oceanographers.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

Please see the BATS Web site (http://bats.bios.edu) for additional information.

List of References (PDF)

[table of contents | back to top]

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.

U.S. Joint Global Ocean Flux Study (U.S. JGOFS)

Website: http://usjgofs.whoi.edu/

Coverage: Global

The United States Joint Global Ocean Flux Study was a national component of international JGOFS and an integral part of global climate change research.

The U.S. launched the Joint Global Ocean Flux Study (JGOFS) in the late 1980s to study the ocean carbon cycle. An ambitious goal was set to understand the controls on the concentrations and fluxes of carbon and associated nutrients in the ocean. A new field of ocean biogeochemistry emerged with an emphasis on quality measurements of carbon system parameters and interdisciplinary field studies of the biological, chemical and physical process which control the ocean carbon cycle. As we studied ocean biogeochemistry, we learned that our simple views of carbon uptake and transport were severely limited, and a new "wave" of ocean science was born. U.S. JGOFS has been supported primarily by the U.S. National Science Foundation in collaboration with the National Oceanic and Atmospheric Administration, the National Aeronautics and Space Administration, the Department of Energy and the Office of Naval Research. U.S. JGOFS, ended in 2005 with the conclusion of the Synthesis and Modeling Project (SMP).

Ocean Time-series Sites (Ocean Time-series)

Coverage: Bermuda, Cariaco Basin, Hawaii

Program description text taken from Chapter 1: Introduction from the **Global Intercomparability in a Changing Ocean: An International Time-Series Methods Workshop** report published following the workshop held November 28-30, 2012 at the Bermuda Institute of Ocean Sciences. The full report is available from the workshop Web site hosted by US OCB: http://www.whoi.edu/website/TS-workshop/home

Decades of research have demonstrated that the ocean varies across a range of time scales, with anthropogenic forcing contributing an added layer of complexity. In a growing effort to distinguish between natural and human-induced earth system variability, sustained ocean time-series measurements have taken on a renewed importance. Shipboard biogeochemical time-series represent one of the most valuable tools scientists have to characterize and quantify ocean carbon fluxes and biogeochemical processes and their links

to changing climate (Karl, 2010; Chavez et al., 2011; Church et al., 2013). They provide the oceanographic community with the long, temporally resolved datasets needed to characterize ocean climate, biogeochemistry, and ecosystem change.

The temporal scale of shifts in marine ecosystem variations in response to climate change are on the order of several decades. The long-term, consistent and comprehensive monitoring programs conducted by time-series sites are essential to understand large-scale atmosphere-ocean interactions that occur on interannual to decadal time scales. Ocean time-series represent one of the most valuable tools scientists have to characterize and quantify ocean carbon fluxes and biogeochemical processes and their links to changing climate.

Launched in the late 1980s, the US JGOFS (Joint Global Ocean Flux Study; http://usjgofs.whoi.edu) research program initiated two time-series measurement programs at Hawaii and Bermuda (HOT and BATS, respectively) to measure key oceanographic measurements in oligotrophic waters. Begun in 1995 as part of the US JGOFS Synthesis and Modeling Project, the CARIACO Ocean Time-Series (formerly known as the CArbon Retention In A Colored Ocean) Program has studied the relationship between surface primary production, physical forcing variables like the wind, and the settling flux of particulate carbon in the Cariaco Basin.

The objective of these time-series effort is to provide well-sampled seasonal resolution of biogeochemical variability at a limited number of ocean observatories, provide support and background measurements for process-oriented research, as well as test and validate observations for biogeochemical models. Since their creation, the BATS, CARIACO and HOT time-series site data have been available for use by a large community of researchers.

Data from those three US funded, ship-based, time-series sites can be accessed at each site directly or by selecting the site name from the Projects section below.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0752366
NSF Division of Ocean Sciences (NSF OCE)	OCE-1756105
NSF Division of Ocean Sciences (NSF OCE)	OCE-2241455

[table of contents | back to top]