

CARIACO time series individual CTD profiles from B/O Hermano Gines HG93_CARIACO in the CARIACO basin from 1995-2017 (CARIACO project)

Website: <https://www.bco-dmo.org/dataset/773146>

Data Type: Cruise Results

Version: 1

Version Date: 2019-07-17

Project

» [CARIACO Ocean Time-Series Program](#) (CARIACO)

Programs

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

» [U.S. Joint Global Ocean Flux Study](#) (U.S. JGOFS)

» [Ocean Time-series Sites](#) (Ocean Time-series)

| Contributors | Affiliation | Role |
|--|---|---|
| Muller-Karger, Frank | University of South Florida (USF) | Lead Principal Investigator, Principal Investigator |
| Astor, Yrene | Estacion de Investigaciones Marinas de Margarita (EDIMAR-FLASA) | Co-Principal Investigator |
| Benitez-Nelson, Claudia R. | University of South Carolina | Co-Principal Investigator |
| Buck, Kristen | University of South Florida (USF) | Co-Principal Investigator |
| Fanning, Kent | University of South Florida (USF) | Co-Principal Investigator |
| Scranton, Mary I. | Stony Brook University - MSRC (SUNY-SB MSRC) | Co-Principal Investigator |
| Taylor, Gordon T. | Stony Brook University - MSRC (SUNY-SB MSRC) | Co-Principal Investigator |
| Thunell, Robert C. | University of South Carolina | Co-Principal Investigator |
| Varela, Ramon | Estacion de Investigaciones Marinas de Margarita (EDIMAR-FLASA) | Co-Principal Investigator |
| Capelo, Juan | Estacion de Investigaciones Marinas de Margarita (EDIMAR-FLASA) | Scientist |
| Gutierrez, Javier | Estacion de Investigaciones Marinas de Margarita (EDIMAR-FLASA) | Scientist, Technician |
| Guzman, Laurencia | Estacion de Investigaciones Marinas de Margarita (EDIMAR-FLASA) | Scientist |
| Lorenzoni, Laura | University of South Florida (USF) | Scientist, Contact, Data Manager |
| Montes, Enrique | University of South Florida (USF) | Scientist |
| Rojas, Jaimie | Estacion de Investigaciones Marinas de Margarita (EDIMAR-FLASA) | Scientist |
| Rondon, Anadiuska | Estacion de Investigaciones Marinas de Margarita (EDIMAR-FLASA) | Scientist, Student, Technician |
| Rueda-Roa, Digna | University of South Florida (USF) | Scientist, Contact, Data Manager |
| Arias, Glenda | Estacion de Investigaciones Marinas de Margarita (EDIMAR-FLASA) | Technician |
| Garcia, Jonnathan | Estacion de Investigaciones Marinas de Margarita (EDIMAR-FLASA) | Technician |
| Narvaez, Jesus | Estacion de Investigaciones Marinas de Margarita (EDIMAR-FLASA) | Technician |
| Ojeda, Patricia | Estacion de Investigaciones Marinas de Margarita (EDIMAR-FLASA) | Technician |
| Rosales, Alberto | Estacion de Investigaciones Marinas de Margarita (EDIMAR-FLASA) | Technician |
| Tappa, Eric | University of South Carolina | Technician |
| Biddle, Mathew | Woods Hole Oceanographic Institution (WHOI BCO-DMO) | BCO-DMO Data Manager |

Abstract

This collection of data comprises all the Individual CTD profiles from the Cariaco basin taken as part of the CARIACO Ocean Time-Series Program from November 1995 to January 2017. These include all the CTD profiles taken during the monthly hydrographic cruises at the CARIACO station (10.50° N, 64.67° W), as well as other CTD profiles from extra legs of the monthly cruises, and few spatial cruises collected in and around the Cariaco

basin. CTD's Salinity and Oxygen were calibrated with in-situ measurements (see Methods & Sampling). This dataset is complimentary to the monthly "CTD Composite Profiles" (<https://www.bco-dmo.org/dataset/3092>), and many fields are very similar to that data-base. The difference with that dataset, is that here we present all the CTD casts for each cruise, the CTD profiles are single (not composite), and the salinity and oxygen profiles were calibrated with in-situ measurements, but fluorescence was not calibrated.

Table of Contents

- [Coverage](#)
 - [Dataset Description](#)
 - [Methods & Sampling](#)
 - [BCO-DMO Processing Description](#)
 - [Data Files](#)
 - [Supplemental Files](#)
 - [Related Publications](#)
 - [Parameters](#)
 - [Instruments](#)
 - [Deployments](#)
 - [Project Information](#)
 - [Program Information](#)
 - [Funding](#)
-

Coverage

Spatial Extent: N:11.3705 E:-64.519 S:10.05 W:-65.5843

Temporal Extent: 1995-11-03 - 2017-01-12

Dataset Description

The CARIACO Ocean Time-Series Program (formerly known as CARbon Retention In A Colored Ocean) started on November 1995 (CAR-001) and ended on January 2017 (CAR-232). Monthly cruises were conducted to the CARIACO station (10.50° N, 64.67° W) onboard the R/V Hermano Ginés of the Fundación La Salle de Ciencias Naturales de Venezuela. During each cruise, a minimum of four hydrocasts were performed to collect a suite of core monthly observations. We conducted separate shallow and deep casts to obtain a better vertical resolution of in-situ Niskin-bottles samples for chemical observations, and for productivity, phytoplankton, and pigment observations.

This collection of data comprises all the Individual CTD profiles from the Cariaco basin taken as part of the CARIACO Ocean Time-Series Program from November 1995 to January 2017. These include all the CTD profiles taken during the monthly hydrographic cruises at the CARIACO station (10.50° N, 64.67° W), as well as other CTD profiles from extra legs of the monthly cruises, and few spatial cruises collected in and around the Cariaco basin. CTD's Salinity and Oxygen were calibrated with in-situ measurements (see Methods & Sampling). This dataset is complimentary to the monthly "CTD Composite Profiles" (<https://www.bco-dmo.org/dataset/3092>), and many fields are very similar to that data-base. The difference with that dataset, is that here we present all the CTD casts for each cruise, the CTD profiles are single (not composite), and the salinity and oxygen profiles were calibrated with in-situ measurements, but fluorescence was not calibrated.

More information can be found in the following web pages:

Web page of the CARIACO Ocean Time-Series Program: <http://imars.usf.edu/cariaco>

General description: <http://www.imars.usf.edu/cariaco>

Methodology: <http://imars.usf.edu/publications/methods-cariaco>

List of publications: <http://imars.usf.edu/view/biblio/803738/year>

Methods & Sampling

During each cruise, a minimum of four hydrocasts were performed to collect a suite of core monthly observations. Additional hydrocasts were performed for specific process studies, in the CARIACO station or in extra stations. We conducted separate shallow and deep casts to obtain better vertical resolution for chemical observations, and for productivity and pigment observations. Water was collected with a SeaBird rosette

equipped with 12 (8 liter) teflon-coated Niskin bottles (bottle springs were also teflon-coated) at 20 depths between the surface and 1310 m. The rosette housed the CTD, which collected continuous profiles of temperature and salinity (SBE-19, SBE-25). The CTD also had an SBE-43 oxygen probe, and a Wetlabs ECO fluorometer outfitted for chlorophyll- a estimates. A C-Star transmissometer (660 nm, Wetlabs) was also part of the instrument suite. Beam attenuation measurements were added to the time series on its 11th month, originally using a SeaTech transmissometer. The rosette was controlled with a SeaBird deck unit via conducting cable, but alternatively has been actuated automatically based on pressure recordings via an Autofire Module (SBE AFM) when breaks in cable conductivity have occurred.

Between November 1995 and September 1996, three separate SBE-19 CTDs were used in repeated casts until a reliable salinity profile was obtained below the oxycline. The SBE-19 model CTDs frequently failed to provide reliable conductivity values below the oxycline in the Cariaco Basin. Starting in September 1996, the SBE-19 CTDs were replaced by an SBE-25 CTD, which provided extremely accurate and reliable data in anoxic waters.

All CTDs were calibrated at the Sea-Bird factory once per year. The accuracy of the pressure sensor is 3.5 m and has a resolution of 0.7 m. The temperatures accuracy is 0.002°C with a resolution of 0.0003°C. The conductivity accuracy is 0.003 mmho/cm with a resolution of 0.0004 mmho/cm.

Discrete Salinity

Continuous salinity profiles were calculated from the CTD measurements. Discrete salinity samples were analyzed using a Guildline Portasal 8410 salinometer standardized with IAPSO Standard Seawater, with a precision of better than ± 0.003 and a resolution of 0.0003 mS/cm at 15° C and 35 psu, the accuracy was ± 0.003 at the same set point temperature as standardization and within -2° and +4°C of ambient. These salinity values were used to check, and when necessary calibrate, the CTD salinity profiles.

Discrete Oxygen

Continuous dissolved oxygen (O₂) profiles were obtained with a SBE-43 Dissolved Oxygen Sensor coupled to the SBE-25 CTD. Discrete oxygen samples were collected in duplicate using glass-stoppered bottles and analyzed by Winkler titration (Strickland and Parsons, 1972, as modified by Aminot, 1983). The analytical precision for discrete oxygen analysis was ± 3 mM, based on analysis of duplicate samples, with a detection limit of 5 mM. The in-situ oxygen values were used to check, and when necessary calibrate, the CTD oxygen profiles.

A detailed log for each cruise with sensors used, calibrations, malfunctions, etc. can be found in the supplemental document [Cruise Data Acquisition Report](#).

BCO-DMO Processing Description

- concatenated all raw cnv files together.
- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions
- added station information from additional List_CTD_Casts.xlsx file.
- removed duplicate files C92_1_4(1).cnv and C93_1_0(1).cnv.

[[table of contents](#) | [back to top](#)]

Data Files

| File |
|---|
| ctd_ind.csv (Comma Separated Values (.csv), 454.54 MB) MD5:4ebe472459b5e6cab7365504dc437648 |
| Primary data file for dataset ID 773146 |

[[table of contents](#) | [back to top](#)]

Supplemental Files

File

Cruise Data Acquisition Report

filename: Cruise_data_aquisition_report.xlsx

(Octet Stream, 58.33 KB)

MD5:c724109309a10df4ad0652338f6c116c

Detailed log for each cruise. This includes information about eddies, intrusions, other anomalies, sensors used, and malfunctions.

[[table of contents](#) | [back to top](#)]

Related Publications

Aminot, A., & Chaussepied, M. (1983). Manuel des analyses chimiques en milieu marin (No. 551.464 AMI). *Methods*

Breland, J. A., & Byrne, R. H. (1993). Spectrophotometric procedures for determination of sea water alkalinity using bromocresol green. *Deep Sea Research Part I: Oceanographic Research Papers*, 40(3), 629–641.

doi:10.1016/0967-0637(93)90149-w [https://doi.org/10.1016/0967-0637\(93\)90149-W](https://doi.org/10.1016/0967-0637(93)90149-W)

Methods

Byrne, R. H., & Breland, J. A. (1989). High precision multiwavelength pH determinations in seawater using cresol red. *Deep Sea Research Part A. Oceanographic Research Papers*, 36(5), 803–810. doi:[10.1016/0198-0149\(89\)90152-0](https://doi.org/10.1016/0198-0149(89)90152-0)

[10.1016/0198-0149\(89\)90152-0](https://doi.org/10.1016/0198-0149(89)90152-0)

Methods

Carpenter, E. J., & Lively, J. S. (1980). Review of estimates of algal growth using ¹⁴C tracer techniques. In *Primary productivity in the sea* (pp. 161-178). Springer, Boston, MA.

Methods

GIESKES, W. W. C., & VAN BENNEKOM, A. J. (1973). Unreliability of the ¹⁴C method for estimating primary productivity in eutrophic Dutch coastal waters. *Limnology and Oceanography*, 18(3), 494–495.

doi:[10.4319/lo.1973.18.3.0494](https://doi.org/10.4319/lo.1973.18.3.0494)

Methods

Gordon, L. I., J. C. Jennings, JR, A. A. Ross, and J. M. Krest. (1994). A suggested protocol for continuous flow analysis of seawater nutrients (phosphate, nitrate, nitrite, and silicic acid) in the WOCE Hydrographic Program and the Joint Global Ocean Fluxes Study. WHP Office Report 91-1. Revision 1, Nov. 1994. WOCE Hydrographic Program Office, Woods Hole, MA.

Related Research

Holm-Hansen, O., & Riemann, B. (1978). Chlorophyll a Determination: Improvements in Methodology. *Oikos*, 30(3), 438. doi:[10.2307/3543338](https://doi.org/10.2307/3543338)

Methods

Holm-Hansen, O., Lorenzen, C. J., Holmes, R. W., & Strickland, J. D. H. (1965). Fluorometric Determination of Chlorophyll. *ICES Journal of Marine Science*, 30(1), 3–15. doi:[10.1093/icesjms/30.1.3](https://doi.org/10.1093/icesjms/30.1.3)

Methods

Intergovernmental Oceanographic Commission. (1994). Protocols for the Joint Global Ocean Flux Study (JGOFS) Core Measurements. <https://hdl.handle.net/11329/220>

Methods

Koroleff, F. (1968). Determination of total phosphorus in natural waters by means of persulfate oxidation.

Methods

Liu, X., Patsavas, M. C., & Byrne, R. H. (2011). Purification and Characterization of meta-Cresol Purple for Spectrophotometric Seawater pH Measurements. *Environmental Science & Technology*, 45(11), 4862–4868.

doi:[10.1021/es200665d](https://doi.org/10.1021/es200665d)

Methods

Lorenzen, C. J. (1966). A method for the continuous measurement of in vivo chlorophyll concentration. *Deep Sea Research and Oceanographic Abstracts*, 13(2), 223–227. doi:[10.1016/0011-7471\(66\)91102-8](https://doi.org/10.1016/0011-7471(66)91102-8)

Methods

Muller-Karger, F. (1984). Lower trophic level studies in the marginal sea-ice zone (Doctoral dissertation).

Methods

Nielsen, E. S. (1952). The Use of Radio-active Carbon (¹⁴C) for Measuring Organic Production in the Sea. *ICES Journal of Marine Science*, 18(2), 117–140. doi:[10.1093/icesjms/18.2.117](https://doi.org/10.1093/icesjms/18.2.117)

Methods

Peterson, B. J. (1980). Aquatic primary productivity and the ¹⁴C-CO₂ method: a history of the productivity problem. Annual review of ecology and systematics, 11(1), 359-385.

Methods

Robert-Baldo, G. L., Morris, M. J., & Byrne, R. H. (1985). Spectrophotometric determination of seawater pH using phenol red. Analytical Chemistry, 57(13), 2564-2567. doi:[10.1021/ac00290a030](https://doi.org/10.1021/ac00290a030)

Methods

Solórzano, L., & Sharp, J. H. (1980). Determination of total dissolved phosphorus and particulate phosphorus in natural waters1. Limnology and Oceanography, 25(4), 754-758. doi:[10.4319/lo.1980.25.4.0754](https://doi.org/10.4319/lo.1980.25.4.0754)

Methods

Strickland, J. D. H. and Parsons, T. R. (1972). A Practical Hand Book of Seawater Analysis. Fisheries Research Board of Canada Bulletin 157, 2nd Edition, 310 p.

Methods

Van Heukelem, L., & Thomas, C. S. (2001). Computer-assisted high-performance liquid chromatography method development with applications to the isolation and analysis of phytoplankton pigments. Journal of Chromatography A, 910(1), 31-49. doi:[10.1016/s0378-4347\(00\)00603-4](https://doi.org/10.1016/s0378-4347(00)00603-4)

Methods

Wright, S. W. (1997). Evaluation of methods and solvents for pigment extraction. Phytoplankton pigments in oceanography, 261-282.

Methods

Yao, W., Liu, X., & Byrne, R. H. (2007). Impurities in indicators used for spectrophotometric seawater pH measurements: Assessment and remedies. Marine Chemistry, 107(2), 167-172.

doi:[10.1016/j.marchem.2007.06.012](https://doi.org/10.1016/j.marchem.2007.06.012)

Methods

Yentsch, C. S., & Menzel, D. W. (1963). A method for the determination of phytoplankton chlorophyll and phaeophytin by fluorescence. Deep Sea Research and Oceanographic Abstracts, 10(3), 221-231.

doi:[10.1016/0011-7471\(63\)90358-9](https://doi.org/10.1016/0011-7471(63)90358-9)

Methods

[[table of contents](#) | [back to top](#)]

Parameters

| Parameter | Description | Units |
|---------------|--|--------------------------------------|
| DEPTH | depth salt water | meters (m) |
| DESCENT_RATE | Descent Rate | meters per second (m/s) |
| E | stability | rad ² /m |
| E10_neg8 | stability | 10 ⁻⁸ rad ² /m |
| FileName | name of the original file from which the data was extracted | unitless |
| LATITUDE | latitude from the CTD header with positive values indicating North | decimal_degrees |
| LONGITUDE | longitude from the CTD header with positive values indicating East | decimal_degrees |
| N | buoyancy frequency | cycles per hour (cycles/h) |
| N2 | buoyancy frequency | rad ² /s ² |
| POTEMPERATURE | potential temperature; ITS-90 | degrees Celsius (C) |
| PRES | Pressure | decibars (db) |
| TEMP | Temperature ITS-90 | degrees Celsius (C) |
| bat | Beam Attenuation | per meter (1/m) |

| | | |
|-------------|--------------------------------------|--|
| c0S_m | Conductivity | Seimens per meter (S/m) |
| c0mS_cm | conductivity | milliSiemens per centimeter (mS/cm) |
| c0uS_cm | Conductivity | microSiemens per centimeter (uS/cm) |
| fIC | Fluorescence; Chelsea Aqua 3 Chl Con | micrograms per liver (ug/L) |
| fIECO_AFL | Fluorescence; Wetlab ECO-AFL/FL | miligrams per meter cubed (mg/m ³) |
| fIS | Fluorescence; Seatech | unknown |
| flag | flag | unitless |
| navg | number of scans averaged | count |
| nbf | number of bottles fired | count |
| nbin | number of scans per bin | count |
| oxC | Oxygen Current; Beckman/YSI | microAngstroms (uA) |
| oxML_L | Oxygen; Beckman/YSI | milliliter per liter (mL/L) |
| oxMg_L | oxygen | miligrams per liter (mg/L) |
| oxMm_Kg | Oxygen; Beckman/YSI | micromole per kilogram (umol/kg) |
| oxT | oxygen temperature | degrees Celsius (C) |
| oxTC | Oxygen Temperature; Beckman/YSI | degrees Celsius (C) |
| oxsatML_L | Oxygen Saturation | milliliters per liter (mL/L) |
| oxsatMg_L | Oxygen Saturation | miligrams per liter (mg/L) |
| oxsatMm_Kg | Oxygen Saturation; Weiss | micromole/kilogram (umol/kg) |
| par | PAR/Irradiance; Biospherical/Licor | unknown |
| sal00 | Salinity | practical salinity units (PSU) |
| sbeox0ML_L | Oxygen; SBE 43 | milliliter per liter (mL/L) |
| sbeox0Mg_L | Oxygen; SBE 43 | miligram per liter (mg/L) |
| sbeox0Mm_Kg | Oxygen; SBE 43 | micromole per kilogram (umol/Kg) |
| sbeox0Mm_L | Oxygen; SBE 43 | micromole per liter (umol/L) |
| sbeox0PS | Oxygen; SBE 43 | percent saturation (% saturation) |
| sbeox0V | Oxygen Voltage; SBE 43 | voltage |
| scan | scan count | count |

| | | |
|-----------------|---|--|
| sigma_t00 | Density sigma t | kilograms per meter cubed (Kg/m ³) |
| sigma_e00 | density sigma theta | kilograms per meter cubed (Kg/m ³) |
| xmiss | Beam Transmission; Chelsea/Seatech/Wetlab CStar | percent |
| CruiseID | identifier for the cruise | unitless |
| Cruise_no | identifier for the cruise | unitless |
| Leg | identifier for the leg | unitless |
| Cast | identifier for the cast | unitless |
| CastName | synonym for the cast nam | unitless |
| year_localT | year in local time | unitless |
| month_localT | month in local time | unitless |
| day_localT | day in local time | unitless |
| hour_localT | hour in local time | unitless |
| min_localT | minute in local time | unitless |
| Date_Time_Local | date and time in ISO format for local time zone | unitless |
| Date_Time_GMT | date and time in ISO format for GMT | yyyy-MM-dd'T'HH:mm:ss |
| Depth_min | minimum depth pressue at station | decibars (db) |
| Depth_max | maximum depth pressure at station | decibars (db) |
| StationID | identifier for the station | unitless |
| LAT | latitude of the cast with positive values indicating North | decimal degrees |
| LON | longitude of the cast with positive values indicating East | decimal degrees |
| Notes | Additional comments about the cast. The note CARIACO Default station signifies that the coordinates were approximated using the default CARIACO station coordinates | unitless |

[[table of contents](#) | [back to top](#)]

Instruments

| | |
|---|--|
| Dataset-specific Instrument Name | SBE-25 |
| Generic Instrument Name | CTD Sea-Bird 25 |
| Dataset-specific Description | SBE-25 |
| Generic Instrument Description | The Sea-Bird SBE 25 SEALOGGER CTD is battery powered and is typically used to record data in memory, eliminating the need for a large vessel, electrical sea cable, and on-board computer. All SBE 25s can also operate in real-time, transmitting data via an opto-isolated RS-232 serial port. Temperature and conductivity are measured by the SBE 3F Temperature sensor and SBE 4 Conductivity sensor (same as those used on the premium SBE 9plus CTD). The SBE 25 also includes the SBE 5P (plastic) or 5T (titanium) Submersible Pump and TC Duct. The pump-controlled, TC-ducted flow configuration significantly reduces salinity spiking caused by ship heave, and in calm waters allows slower descent rates for improved resolution of water column features. Pressure is measured by the modular SBE 29 Temperature Compensated Strain-Gauge Pressure sensor (available in eight depth ranges to suit the operating depth requirement). The SBE 25's modular design makes it easy to configure in the field for a wide range of auxiliary sensors, including optional dissolved oxygen (SBE 43), pH (SBE 18 or SBE 27), fluorescence, transmissivity, PAR, and optical backscatter sensors. More information from Sea-Bird Electronics: http://www.seabird.com . |

| | |
|---|---|
| Dataset-specific Instrument Name | SBE-19 |
| Generic Instrument Name | CTD Sea-Bird SEACAT 19 |
| Dataset-specific Description | SBE-19 |
| Generic Instrument Description | The Sea-Bird SBE 19 SEACAT Recorder measures conductivity, temperature, and pressure (depth). The SEACAT is self-powered and self-contained and can be deployed in profiling or moored mode. The SBE 19 SEACAT was replaced in 2001 by the 19plus. more information from Sea-Bird Electronics |

| | |
|---|---|
| Dataset-specific Instrument Name | Sea Tech Fluorometer |
| Generic Instrument Name | Sea Tech Fluorometer |
| Generic Instrument Description | The Sea Tech chlorophyll-a fluorometer has internally selectable settings to adjust for different ranges of chlorophyll concentration, and is designed to measure chlorophyll-a fluorescence in situ. The instrument is stable with time and temperature and uses specially selected optical filters enabling accurate measurements of chlorophyll a. It can be deployed in moored or profiling mode. This instrument designation is used when specific make and model are not known. The Sea Tech Fluorometer was manufactured by Sea Tech, Inc. (Corvallis, OR, USA). |

| | |
|---|--|
| Dataset-specific Instrument Name | SBE 43 Dissolved Oxygen Sensor |
| Generic Instrument Name | Sea-Bird SBE 43 Dissolved Oxygen Sensor |
| Generic Instrument Description | The Sea-Bird SBE 43 dissolved oxygen sensor is a redesign of the Clark polarographic membrane type of dissolved oxygen sensors. more information from Sea-Bird Electronics |

| | |
|---|---|
| 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 |

[[table of contents](#) | [back to top](#)]

Deployments

HG93_CARIACO

| | |
|--------------------|--|
| Website | https://www.bco-dmo.org/deployment/57845 |
| Platform | B/O Hermano Gines |
| Start Date | 1995-11-08 |
| Description | Monthly oceanographic cruises to the CARIACO station (10.5 degrees N, 64.67 degrees W) have been conducted since November 1995 to examine the hydrography, primary production, and settling flux of particulate material. The research vessel is the 75-foot B/O (Barco Oceanografico) Hermano Gines of the Fundación La Salle de Ciencias Naturales (FLASA) located on Margarita Island, Venezuela. Water is collected using a rosette ensemble equipped with twelve 8-liter bottles and a CTD (conductivity-temperature-depth meter); the CTD also has an oxygen sensor, a fluorometer for chlorophyll-a estimates, and a transmissometer. Data are read out real-time on a computer screen on board the ship as the rosette ensemble is lowered to approximately 1,380 m, the bottom of the Cariaco Basin. Water samples are analyzed for various parameters including phytoplankton biomass, dissolved and particulate nutrient and carbon concentration, primary productivity rates and total bacterial production. |

[[table of contents](#) | [back to top](#)]

Project Information

CARIACO Ocean Time-Series Program (CARIACO)

Website: <http://www.imars.usf.edu/CAR/index.html>

Coverage: CARIACO basin

Since 1995, 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. This depression, located on the continental shelf of Venezuela (Map), shows marked seasonal and interannual variation in hydrographic properties and primary production (carbon fixation rates by photosynthesis of planktonic algae).

This peculiar basin is anoxic below ~250 m, due its restricted circulation and high primary production ([Muller-Karger et al., 2001](#)). CARIACO observations show annual primary production rates exceed 500 gC/m²y, of which over 15-20% can be accounted for by events lasting one month or less. Such events are observed in other locations where time series observations are collected, and suggest that prior estimates of regional production based on limited sampling may have been underestimated. The annual primary production rates in the Cariaco Basin are comparable to rates estimated using time series observations for Monterey Bay (460 gC/m²y; [Chavez, 1996](#)), and higher than previous rates estimated for Georges Bank, the New York Shelf, and the Oregon Shelf (380, 300, and 190 gC/m²y, respectively; [Walsh, 1988](#)).

The Cariaco Basin has long been the center of attention of scientists trying to explain paleoclimate. Due to its high rates of sedimentation (30 to >100 cm/ky; [Peterson et al., 2000](#)) and excellent preservation, the varved sediments of the Cariaco Basin offer the opportunity to study high resolution paleoclimate and better understand the role of the tropics in global climate change ([Black et al., 1999](#); [Peterson et al., 2000](#); [Haug et al., 2001](#); [Black et al., 2004](#); [Hughen et al., 2004](#)).

Now, the CARIACO program provides a link between the sediment record and processes near the surface of the ocean. Sediment traps maintained by the CARIACO program show that over 5% of autochthonous material reaches 275 m depth, and that nearly 2% reaches 1,400 m. The significance of this flux is that it represents a sink for carbon and that it helps explain the record of ancient climate stored at the bottom of the Cariaco Basin.

Acknowledgements: This work was supported by the National Science Foundation (NSF), the National Aeronautics and Space Administration (NASA), and Venezuela's Fondo Nacional de Ciencia, Tecnología e Innovación (FONACIT). For more information please see this [Acknowledgements](#) link.

[[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 |
|---|---|
| Fondo Nacional de Ciencia, Tecnología e Innovación of Venezuela (FONACIT) | unknown CARIACO FONACIT |
| NSF Division of Ocean Sciences (NSF OCE) | OCE-9401537 |
| NSF Division of Ocean Sciences (NSF OCE) | OCE-9729697 |
| NSF Division of Ocean Sciences (NSF OCE) | OCE-0326268 |
| NSF Division of Ocean Sciences (NSF OCE) | OCE-9216626 |
| NSF Division of Ocean Sciences (NSF OCE) | OCE-9711318 |
| National Aeronautics & Space Administration (NASA) | NAS5-97128 |
| NSF Division of Ocean Sciences (NSF OCE) | OCE-9415790 |
| NSF Division of Ocean Sciences (NSF OCE) | OCE-9729284 |
| National Aeronautics & Space Administration (NASA) | NAG5-6448 |
| NSF Division of Ocean Sciences (NSF OCE) | OCE-0963028 |
| NSF Division of Ocean Sciences (NSF OCE) | OCE-0752139 |
| Fondo Nacional de Ciencia, Tecnología e Innovación of Venezuela (FONACIT) | 96280221 |
| NSF Division of Ocean Sciences (NSF OCE) | unknown CARIACO NSF OCE |
| NSF Division of Ocean Sciences (NSF OCE) | OCE-0326313 |
| National Aeronautics & Space Administration (NASA) | NNX14AP62A |

[[table of contents](#) | [back to top](#)]