

# **CARIACO Time-series Data Management**



Cynthia L. Chandler<sup>1</sup>, Molly D. Allison<sup>2</sup>, Robert C. Groman<sup>2</sup>, Theresa McKee<sup>3</sup>, Peter H. Wiebe<sup>2</sup>, and David M. Glover<sup>1</sup> 1 ~ Marine Chemistry and Geochemistry, Woods Hole Oceanographic Institution (WHOI), Woods Hole, MA 2 ~ Biology Department, WHOI 3 ~ Physical Oceanography Department, WHOI

http://bco-dmo.org

# **Abstract**

The Carbon Retention in a Colored Ocean (CARIACO) Time Series site, located off the coast of Venezuela, has been conducting monthly ship-based data collection since November 1995. Because it is impossible to resample environmental data, proper management of those data sets is especially important to realize their full potential, to enable data re-use, and to facilitate integration of data from multiple disciplines and the synthesis of data from time-series collections. In recognition of this, in 2006 the US National Science Foundation funded the Biological and Chemical Oceanography Data Management Office (BCO-DMO) to serve the data management requirements of investigators funded by the NSF's Biological and Chemical Oceanography Sections. BCO-DMO staff members collaborate with investigators ensuring that data are documented, stored, disseminated, and protected long after the research is completed. Highlighting the available CARIACO project data and related biogeochemical data, we describe the capabilities of the BCO-DMO data system: geospatial and text-based data discovery and access systems; recent enhancements to data search tools: data export and download utilities: and strategic use of controlled vocabularies to facilitate data integration and improve interoperability.

See related BCO-DMO poster # 402 in Special Session 30 "Management of Plankton Distribution and Abundance Data"

### BCO-DMO and CARIACO

The Biological and Chemical Oceanography Data Management Office (BCO-DMO) is located at Woods Hole Oceanographic Institution and is funded to serve the data management requirements of investigators funded by the NSF's Biological and Chemical Oceanography Sections and Office of Polar Programs (OPP) Antarctic Sciences (ANT) Organisms & Ecosystems Program. Data managers at BCO-DMO work closely with Laura Lorenzoni, one of the CARIACO project investigators, to create data sets from the data gathered during the monthly cruises aboard the R/V Hermano Gines to the CARIACO time-series site at 10.5° N. 64.67° W. Cruises have been conducted since November 1995 to examine the hydrography, primary production, zooplankton, biogeochemistry and settling flux of particulate material.



Because it is impossible to resample environmental data, proper management of those data sets is especially important to realize their full potential, to enable accurate re-use and to facilitate integration of data from many disciplines

#### We work closely with CARIACO researchers to: generate consistent data products from the research data sets

- collect documentation, including sampling and analytical protocols record sufficient metadata to support accurate reuse of the data
- complement data quality control done by originating investigators
- ensure permanent archive of the data at the US National Oceanographic Data Center

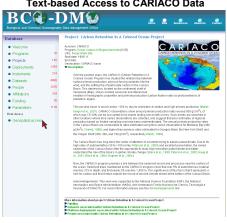
## **Acknowledgments**

The RCO-DMO is funded by the National Science Foundation We acknowledge the work done by each of the original investigators of the CARIACO project who are cited elsewhere in this poster and especially the efforts of Laura Lorenzoni (University of South Florida). The user interfaces to the BCO-DMO data system have been developed in collaboration with Charlton Galvarino (Second Creek Consulting), Julie Allen (Woods Hole Oceanographic Institution) and BCO-DMO

# **Data Discovery**

A variety of interfaces provide access to the data. All are driven by the metadata for each data set recorded in the BCO-DMO database. Documentation describing the who, what, where, when and why of each data set provides essential information used to discover the data in the BCO-DMO system.

#### **Text-based Access to CARIACO Data**



# Data Access and Display

### Online Directory Listing of CARIACO Data

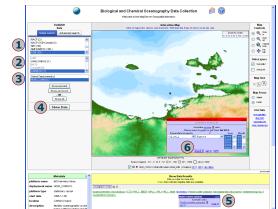
that any such use w presentation, report attached to data use without prior written	ere are intended solely for a ill properly acknowledge the thesis or publication should will be strictly honored. Use	scholarly use by the academic and scientific community, with the express enginetring Investigator, Awone wishing to use portions of this date out do contact the originating PL it is operated that all extraonary countesies see or reproduction of any material herein for any commercial purpose is pt 0940. The complete octation, usage, and copyright information is available.	llection in a and privileges robibited
	Investigator	Description and Documentation	
Data INVENTORY	CARIACO 1000	Composite data product inventory, including all expected	contributions
INVENTORY CTD	CARIACO 1800 CARIACO PIS	Composite data product inventory, including all expected CARIACO time series composite CTD profiles	contributions
INVENTORY CTD Hiskin bettle	CARIACO 1860 CARIACO PIS CARIACO PIN	Composite data product inventory, including all expected CARIACO time series composite CTD profiles CARIACO time series Hiskin bottle daja	contributions
INVENTORY CTD Niskin bottle HDLC_MDL	CARIACO IMO CARIACO PIS CARIACO PIS Muller-Karger et al	Composite data product inventory, including all expected CANIACO time series composite CTD profiles CANIACO time series Hiskin bottle data CANIACO time series HEA, BUILD pigment	
INVENTORY CTD Nickin bottle HPLC_MPL HPLC_HOTE	CARIACO IMO CARIACO FIS CARIACO FIS Muller-Karger et al Muller-Karger et al	Composite data product inventory, including all expected CARLAGO time series composite CTD profiles CARLAGO time series Missin bettle data CARLAGO time series MSE MSLC pignost als (2006) CARLAGO time series MSC tab MSC pisoth data (1998)	
INVENTORY CTD Niskin_bottle HDPLC_MDL HDPLC_Hote HDPLC_Hote	CARIACO IMO CARIACO PIS CARIACO PIS Huller-Karger et al Huller-Karger et al	Composite data product inventory, including all expected GARIAGO Line series composite CTD profiles GARIAGO Line series Highlin bettle day CARIAGO Line series Highlin bettle day CARIAGO Line series Highlin day (1996) GARIAGO Line series Highlin day (1996)	Select to displ
INVENTORY CTD Miskin bottle HUPLC_MDL HUPLC_MOLE HUPLC_MOSE BischemMicrobio	CARIACO IMO CARIACO FIS CARIACO FIS Muller-Karger et al Muller-Karger et al	Comparite data product inventory, including all sepected GAPIACO time series composite CTD profiles GAPIACO time series composite CTD profiles GAPIACO time series Wiskin bettle data GAPIACO time series WISK INC Dipment Data (2006) GAPIACO time series WISK INC Dipment data (1978) GAPIACO time series WISK MUSC pipment data (1978) GAPIACO time series WISKIN MUSC pipment data (1978) GAPIACO time series WISKIN MUSC pipment data (1978)	
INVENTORY CTD Niskin_bottle HDPLC_MDL HDPLC_Hote HDPLC_Hote	CARIACO IMO CARIACO PIS CARIACO PIS Muller-Karger et al Muller-Karger et al Muller-Karger at al Scranton and Taylor	Composite data product inventory, including all expected GARIAGO Line series composite CTD profiles GARIAGO Line series Highlin bettle day CARIAGO Line series Highlin bettle day CARIAGO Line series Highlin day (1996) GARIAGO Line series Highlin day (1996)	Select to displ

#### **Data Set Documentation Metadata**

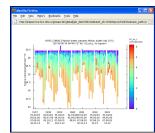


# Geospatial MapServer for Data Discovery Access and Display

The Geospatial MapServer, shown below, provides data discovery (steps 1-4), data access (step 5) and data display (step 6: 'graph it' that generates the graph below and to the right or 'get it' to generate the data listing below. far right).



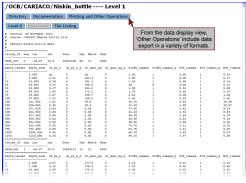
Locate the data of interest using the geospatial interface, then create 'quick-view' plots or listings.



	FRE CHARGO:			
IG93_CARRACO Binkin bottle namplen Binkin_bottle (lat 16.5) (16-30-96-16-67-97-79)				
Year-Month	CO_INUL (militeraliter)	Signa-t (diograms/seter*3)		
1997-05	5.00	24.9063		
1997-05	nei	25.0272		
1997-05	3.57	25.4982		
1997-05	3.58	25.6318		
1997-05	3.49	25.7462		
1997-05	3.07	25.9671		
1997-05	2.95	25.9292		
1997-05	2.94	26.0901		
1997-05	3.07	29.1390		
1997-05	2.85	26.1966		
1997-05	1.97	26.2690		
1997-05	1.73	26.2950		
1997-05	1.19	26.3292		
1997-05	0.83	26.3490		
1997-05	0.30	26.3600		
1997-05	0.09	26.3746		
1997-05	0.00	25.3942		
1997-05	0.00	26.3961		
1997-05	0.00	20.4050		
1997-05	0.00	26.4121		
1997-05	0.00	26.4221		
1997-05	nel	26.4362		
1997-05	nel	26.4432		
1997-05	nd	26.4367		
1997-05	nd	25.4246		
1997-09	6.66	23.3241		
1997-09	4.91	23.6401		

# **Data Export**

### **Data Listing**



Data can be exported in a variety of user selected formats including comma or tab-separated values Matlab, NetCDF, or Ocean Data View and then read into the display or analysis application of choice.

**Example of CARIACO** Niskin bottle data exported from BCO-DMO and opened in Ocean Data View



