

PROJECT NAME	Carbon Retention in a Colored Ocean
ACRONYM	CARIACO
STUDY REGION	-
PRINCIPAL INVESTIGATOR	Dr Frank Muller-Karger
DURATION	January 1, 1995 - September 30, 2013
PROJECT WEBSITE	Link to project website
LOICZ PROJECT DATABASE	Click here for more project information



PROJECT DESCRIPTION

The Cariaco Basin, while located immediately off the coast and within the continental shelf of Venezuela, is an anoxic, 1,400 m deep basin whose sediments serve as a natural recorder of climate variability.

The CARIACO program was initiated in November 1995 with funding from the US National Science Foundation and the Venezuelan CONICIT. The primary objective is to study the relationship between surface biogeochemical processes and the vertical fluxes of carbon and nutrients in a continental margin setting influenced by seasonal upwelling.

In CARIACO we seek to address carbon and nutrient fluxes at a tropical continental margin ecosystem since these systems have generally been neglected in global studies. We also take advantage of the quiescent and anoxic nature of deeper waters in this basin, which effectively serves as a natural sediment trap. In this system, large-scale processes influence surface water-column characteristics and in turn lead to the formation of varved sediments within the anoxic deeper waters of the basin. The data are being collected at a time series station located at 10° 30' N and 64° 40' W on a monthly basis aboard R/V Hermano Ginés".

The project started on November 1995 and is currently funded through 2001. 1) Type of observational data: Every month, core measurements are made where we record continuous profiles of temperature, salinity, oxygen, beam attenuation coefficients, and fluorescence using a CTD. We also take discrete samples for chlorophyll, particle absorption, phytoplankton taxonomy, HPLC pigment, dissolved organic carbon (DOC), particulate organic carbon (POC), pH, alkalinity, bacteria, discrete oxygen and salinity, and nutrients. The University of South Carolina (USC; Robert Thunell) and State University of New York (SUNY; Mary Scranton and Gordon Taylor) also participates in the Program.

The USC component is responsible of the sediment trap recovery/redeployment cruises using in May and November of each year. Traps are deployed at four depths, and each trap integrate flux over 13 consecutive two-week periods. The SUNY component measures bacteria! numbers, bacteria! production, bacterial respiration (as acetate uptake) and :chemosynthesis throughout the oxic and anoxic zones of the water column. We also make a series of bio-optical measurements.

These include measurement of spectral particulate absorption coefficients (detrital and phytoplankton pigment), spectra! measurements of colored DOC 3bsorption coefficients, MICROTOPS atmospheric optical! depth at SeaWiFS bands, sky and sea-state photographs, subsurface reflectance using a submersible PRR-600 unit (SeaWiFS bands) from Biospherical nc and hyperspectral surface reflectance using a Spectrascan hand-held scanner. Meteorological data (winds) and tidal! excursions are measured at Margarita Island(Punta de Piedras), Cumana, La Guaira, and Carupano along the Venezuelan coast. 2) The variables and or processes to be studied: We are studying meteorological and upper ocean hydrographic conditions and how they affect primary)production, dissolved inorganic carbon, CO2 fugacity, bacterial productivity and respiration, and vertical particle fluxes.

We have used sediment trap and bacterial measurements to evaluate the extent to which Water column regeneration rates of POC in this anoxic basin compared with those observed in the open)ocean. Nith the bio-optical data, we have also established the infrastructure to validate satellite data products from space, with support from NASA and CONICIT.3) The spatial and temporal scales: We have obtained monthly data

from dedicated cruises since November 1995, allowing us to assess the short term and seasonal changes in the various parameters listed above. We also sampled through the 1998-1999 ENSO episode, and are now assessing the effect on local vertical fluxes in the southeastern Caribbean Sea . 4)

The application of data products: CARIACO will help to interpret large-scale patterns observed along the continental margin near CARIACO. It will help link the detailed sediment flux, phytoplankton biomass, and primary production observations obtained at the CARIACO station with bio-optical measurements supported by NASA's SIMBIOS project.

Through this effort, CARIACO will help assess the role of continental margins in the global oceanic carbon budget. SIMBIOS is the SeaWiFS calibration and validation project managed from the Goddard Space Flight Center.

SIMBIOS has also provided the opportunity to conduct two cruises per year to the nearby Orinoco River plume and delta. Therefore, CARIACO also serves as an important component of the NASA strategy for validating international ocean color sensors.

THE PROJECT RELATES TO THE FOLLOWING PRIORITY TOPICS AND SCIENTIFIC THEMES

Priority Topics:

2 - Assess and predict impact of environmental change on coastal ecosystems

Scientific Themes:

4 - Biogeochemical Cycles in Coastal and Shelf Waters