

# CTD profile data from R/V Endeavor cruise EN496 in July 2011 in the Gulf of Mexico (GoMX - N2 Fixation project)

**Website:** <https://www.bco-dmo.org/dataset/4064>

**Version:** 04 April 2013

**Version Date:** 2013-04-04

## Project

» [Nitrogen fixation, nutrient supply and biological production in the Gulf of Mexico](#) (GoMX - N2 Fixation)

## Programs

» [Gulf of Mexico - Deepwater Horizon Oil Spill](#) (GoMX - DHOS)

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

Contributors	Affiliation	Role
<a href="#">Montoya, Joseph</a>	Georgia Institute of Technology (GA Tech)	Principal Investigator, Contact
<a href="#">Gegg, Stephen R.</a>	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

## Table of Contents

- [Dataset Description](#)
  - [Data Processing Description](#)
- [Data Files](#)
- [Parameters](#)
- [Instruments](#)
- [Deployments](#)
- [Project Information](#)
- [Program Information](#)
- [Funding](#)

## Dataset Description

CTD profile data - EN496

## Data Processing Description

### BCO-DMO Processing Notes

Original file: "EN496-profiles.xls.zip" contributed by Joseph Montoya

- Header records generated

- Parameter names edited to conform to BCO-DMO parameter naming conventions

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

## Data Files

File
<b>CTD_Profiles_EN496.csv</b> (Comma Separated Values (.csv), 9.17 MB) MD5:878f99f0c22956411a61497afe5e4c95
Primary data file for dataset ID 4064

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

## Parameters

Parameter	Description	Units
CruiseId	Cruise Id	text
Op_Number	Operation Number	xxx.xx
Stn	Station Number (First 3 digits of Op_Number)	dimensionless
Evt	Event Number (Last digits after decimal point of Op_Number)	dimensionless
Date_Local	Date Local	YYYYMMDD
Time_Local	Time Local	HHMM
ISO_DateTime_UTC	Date/Time UTC	YYYY-MM-DDTHH:MM:SS.00Z
Latitude	Latitude (South is negative)	decimal degrees
Longitude	Longitude (West is negative)	decimal degrees
Lease_Block	Lease Block	text
Operation	Operation	text
Seq_Number	Sequence Number	dimensionless
BCO_DMO_Note	BCO-DMO Data Manager note relating to CTD Profile data	text
Notes	Activity and Comments	text
PrDM	Pressure	decibars
T0	Temp 0 - ITS-90	Degrees Celsius
Xmiss	Beam Transmission	percentage
Par	PAR - Photosynthetically Available [Active] Radiation	(tbd)
FIECO_AFL	fIECO-AFL: Fluorescence Wetlab ECO-AFL/FL	Mg/m <sup>3</sup>
Spar	SPAR - Surficial Photosynthetically Available [Active] Radiation	(tbd)
DepSM	Depth	meters
Sal00	Salinity 0	PSU
Sigma_E00	Density 0 - sigma-theta	Kg/m <sup>3</sup>
Sbeox0	Oxygen 0 SBE 43	Mg/l
Potemp0	Potential Temperature	Degrees Celsius
Gpa	Gpa	(tbd)

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

---

## Instruments

<b>Dataset-specific Instrument Name</b>	Benthos model PSA-916
<b>Generic Instrument Name</b>	Altimeter
<b>Dataset-specific Description</b>	Benthos model PSA-916
<b>Generic Instrument Description</b>	An instrument that measures height above a fixed surface. The data can be used to map ocean-surface topography and generate gridded surface height fields.

<b>Dataset-specific Instrument Name</b>	CTD Sea-Bird SBE 911plus
<b>Generic Instrument Name</b>	CTD Sea-Bird SBE 911plus
<b>Dataset-specific Description</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

<b>Dataset-specific Instrument Name</b>	Wet Labs WETStar flow through
<b>Generic Instrument Name</b>	Fluorometer
<b>Dataset-specific Description</b>	Wet Labs WETStar flow through
<b>Generic Instrument Description</b>	A fluorometer or fluorimeter is a device used to measure parameters of fluorescence: its intensity and wavelength distribution of emission spectrum after excitation by a certain spectrum of light. The instrument is designed to measure the amount of stimulated electromagnetic radiation produced by pulses of electromagnetic radiation emitted into a water sample or in situ.

<b>Dataset-specific Instrument Name</b>	Biospherical Instruments models QSP200L/QSR-240
<b>Generic Instrument Name</b>	Photosynthetically Available Radiation Sensor
<b>Dataset-specific Description</b>	Biospherical Instruments models QSP200L/QSR-240
<b>Generic Instrument Description</b>	A PAR sensor measures photosynthetically available (or active) radiation. The sensor measures photon flux density (photons per second per square meter) within the visible wavelength range (typically 400 to 700 nanometers). PAR gives an indication of the total energy available to plants for photosynthesis. This instrument name is used when specific type, make and model are not known.

<b>Dataset-specific Instrument Name</b>	SBE 43 Dissolved Oxygen Sensor
<b>Generic Instrument Name</b>	Sea-Bird SBE 43 Dissolved Oxygen Sensor
<b>Dataset-specific Description</b>	SBE 43 Dissolved Oxygen Sensor
<b>Generic Instrument Description</b>	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

<b>Dataset-specific Instrument Name</b>	Sea-Bird SBE-3 Temperature Sensor
<b>Generic Instrument Name</b>	Sea-Bird SBE-3 Temperature Sensor
<b>Dataset-specific Description</b>	SBE model 3
<b>Generic Instrument Description</b>	The SBE-3 is a slow response, frequency output temperature sensor manufactured by Sea-Bird Electronics, Inc. (Bellevue, Washington, USA). It has an initial accuracy of +/- 0.001 degrees Celsius with a stability of +/- 0.002 degrees Celsius per year and measures seawater temperature in the range of -5.0 to +35 degrees Celsius. more information from Sea-Bird Electronics

<b>Dataset-specific Instrument Name</b>	Sea-Bird SBE-4 Conductivity Sensor
<b>Generic Instrument Name</b>	Sea-Bird SBE-4 Conductivity Sensor
<b>Dataset-specific Description</b>	SBE model 4
<b>Generic Instrument Description</b>	The Sea-Bird SBE-4 conductivity sensor is a modular, self-contained instrument that measures conductivity from 0 to 7 Siemens/meter. The sensors (Version 2; S/N 2000 and higher) have electrically isolated power circuits and optically coupled outputs to eliminate any possibility of noise and corrosion caused by ground loops. The sensing element is a cylindrical, flow-through, borosilicate glass cell with three internal platinum electrodes. Because the outer electrodes are connected together, electric fields are confined inside the cell, making the measured resistance (and instrument calibration) independent of calibration bath size or proximity to protective cages or other objects.

<b>Dataset-specific Instrument Name</b>	Wet Labs C-Star 25-cm
<b>Generic Instrument Name</b>	Transmissometer
<b>Dataset-specific Description</b>	Wet Labs C-Star 25-cm
<b>Generic Instrument Description</b>	A transmissometer measures the beam attenuation coefficient of the lightsource over the instrument's path-length. This instrument designation is used when specific manufacturer, make and model are not known.

<b>Dataset-specific Instrument Name</b>	Wet Labs ECO-AFL/FL Fluorometer
<b>Generic Instrument Name</b>	Wet Labs ECO-AFL/FL Fluorometer
<b>Dataset-specific Description</b>	Wet Labs ECO Chlorophyll Fluorometer
<b>Generic Instrument Description</b>	The Environmental Characterization Optics (ECO) series of single channel fluorometers delivers both high resolution and wide ranges across the entire line of parameters using 14 bit digital processing. The ECO series excels in biological monitoring and dye trace studies. The potted optics block results in long term stability of the instrument and the optional anti-biofouling technology delivers truly long term field measurements. more information from Wet Labs

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

## Deployments

EN496

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/58932">https://www.bco-dmo.org/deployment/58932</a>
<b>Platform</b>	R/V Endeavor
<b>Start Date</b>	2011-07-02
<b>End Date</b>	2011-07-27
<b>Description</b>	Original data are available from the NSF R2R data catalog

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

---

## Project Information

### **Nitrogen fixation, nutrient supply and biological production in the Gulf of Mexico (GoMX - N2 Fixation)**

**Coverage:** Northern Gulf of Mexico

#### **From the NSF proposal abstract**

This project will study the interplay of physical, chemical, and biological factors in supplying nitrogen, an essential nutrient, to temperate coastal and offshore waters of the Gulf of Mexico. The Gulf is an economically important but understudied marginal sea with major commercial and recreational fisheries as well as extensive fossil fuel deposits. Diazotrophic (N<sub>2</sub>-fixing) cyanobacteria bloom regularly in offshore and coastal waters of the Gulf and the limited data suggest that they contribute significant quantities of both nitrogen and carbon to the pelagic food web. These diazotrophs may play also a critical role in supplying N to other organisms, including the ichthyotoxic red tide dinoflagellate *Karenia brevis*. Despite its importance, little is currently known of the factors that promote N<sub>2</sub>-fixation in the Gulf or the relative significance of different physical and biological processes in creating conditions that favor N limitation in the water column. The Gulf of Mexico is strongly influenced by both riverine inputs and advective processes, providing an excellent model system for studying nutrient dynamics, physical forcing of productivity, terrestrial-oceanic linkages, and the potential impact of land use and climate change on marine ecosystems.

The relatively small basin of the Gulf of Mexico provides an opportunity to quantify and study interactions among physical, chemical, and biological processes relevant to a broad range of other coastal and oceanic systems. Land-use and climate change are likely to affect the circulation and hydrography of the Gulf, as well as the magnitude and nature of riverine inputs, all with uncertain impacts on the biogeochemistry of the Gulf of Mexico. This research will provide timely insights into these processes and will generate a baseline of understanding for evaluating and predicting the impact of future land use and climate changes in the system. This project will make an important contribution to our understanding of the factors that regulate N<sub>2</sub>-fixation and its role in supporting the biota in temperate waters. The following specific goals are included in the work:

1. Identify the major diazotroph groups in the Gulf of Mexico and characterize their distribution and activity in different regions and water masses.
2. Quantify the impact of advective processes, mesoscale features, and riverine inputs on nutrient limitation and N<sub>2</sub>-fixation in the Gulf, and evaluate the controls on N<sub>2</sub>-fixation and the degree of spatial and temporal niche differentiation among diazotroph assemblages in different regions affected by these processes.
3. Use satellite data and physical models to scale up our measurements spatially and to evaluate the regional significance of N<sub>2</sub>-fixation in the Gulf of Mexico. The researchers will also use a coupled physical/biological model to explore variability in the physical forcing and the potential impact of likely land use and climate change scenarios in altering nutrient dynamics and N<sub>2</sub>-fixation in the Gulf of Mexico.

The investigators and their institutions have a strong commitment to undergraduate and graduate education. This project includes support for graduate students, a technician, and undergraduates. In addition to peer-reviewed papers and websites, workshops aimed at K-12 teachers, and a program involving high school teachers in research will be used to disseminate the results of this project broadly in the local community. The investigators are committed to increasing the diversity of the ocean science community and are active in recruiting and training efforts at their institutions.

## **Program Information**

### **Gulf of Mexico - Deepwater Horizon Oil Spill (GoMX - DHOS)**

**Coverage:** Northern Gulf of Mexico

### **Grants for Rapid Response Research (RAPID)**

The RAPID funding mechanism is used for proposals having a severe urgency with regard to availability of, or access to data, facilities or specialized equipment, including quick-response research on natural or anthropogenic disasters and similar unanticipated events.

### **GOM - Broader Impacts**

The need to understand the impact of this largest oil spill to date on ecosystems and biochemical cycling is self evident. The consequences of the disaster and accompanying clean up measures (e.g. the distribution of dispersants) need to be evaluated to guide further mediating measures and to develop and improve responses to similar disasters in the future. Would it be advantageous if such oil aggregates sink, or should it rather remain suspended? Possibly measures can be developed to enhance sinking or suspension (e.g. addition of ballast minerals) once we understand their current formation and fate. Understanding the particle dynamics following the input of large amounts of oil and dispersants into the water is a prerequisite to develop response strategies for now and in the future.

### **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.

---

## Funding

Funding Source	Award
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-0928495</a>

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