CTD data from R/V Atlantis cruise AT18-02 in the Gulf of Mexico Macondo wellhead area in Nov-Dec 2010 (DWH_Deep_Microbes project)

Website: https://www.bco-dmo.org/dataset/3728
Data Type: Cruise Results
Version: 1
Version Date: 2012-09-24

Project
» RAPID Deepwater Horizon Oil Spill: Deep pelagic and benthic impacts of the oil spill (DWH_Deep_Microbes)

Program
» Gulf of Mexico - Deepwater Horizon Oil Spill (GoMX - DHOS)

Contributors	Affiliation	Role
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Abstract
CTD data from R/V Atlantis cruise AT18-02 in the Gulf of Mexico Macondo wellhead area in Nov-Dec 2010.

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Coverage

Spatial Extent: **N**:28.8525 **E**:-88.3097 **S**:27.3668 **W**:-90.5683
Temporal Extent: 2010-11-26 - 2010-12-02

Dataset Description

CTD data from cruise AT18-02 in the Gulf of Mexico (November 26, 2010 to December 2, 2010).

Methods & Sampling

All CTD sensors were calibrated by U Miami or WHOI technicians prior to sailing except the CDOM sensor, which was obtained directly from WETLABS by collaborator V. Asper. That instrument was calibrated by Wetlabs. CTD casts in the vicinity of the Macondo Wellhead were complicated by the presence of oil on the sea surface. A saltwater hose was used to spray the sea surface, parting the oil to create a clean area for the CTD to be dropped through; a similar procedure was used for deployment and recovery.

Header information from Sea-Bird SBE 9 data files:
Software Version Seasave V 7.20f

Temperature SN = 4195; Conductivity SN = 2670
Number of Bytes Per Scan = 37; Number of Voltage Words = 4
Number of Scans Averaged by the Deck Unit = 1
units = specified

Station 9 (casts 19 and 20):
name 0 = latitude: Latitude [deg]
name 1 = longitude: Longitude [deg]
name 2 = timeS: Time, Elapsed [seconds]
name 3 = prDM: Pressure, Digiquartz [db]
name 4 = depSM: Depth [salt water, m]
name 5 = t090C: Temperature [ITS-90, deg C]
name 6 = t190C: Temperature, 2 [ITS-90, deg C]
name 7 = c0S/m: Conductivity [S/m]
name 8 = c1S/m: Conductivity, 2 [S/m]
name 9 = sal00: Salinity, Practical [PSU]
name 10 = sal11: Salinity, Practical, 2 [PSU]
name 11 = density00: Density [density, Kg/m^3]
name 12 = density11: Density, 2 [density, Kg/m^3]
name 13 = avgsvCM: Average Sound Velocity [Chen-Millero, m/s]
name 14 = sbeox0V: Oxygen raw, SBE 43 [V]
name 15 = sbeox0Mm/Kg: Oxygen, SBE 43 [umol/Kg]
name 16 = oxsatMm/Kg: Oxygen Saturation, Weiss [umol/Kg]
name 17 = xmiss: Beam Transmission, Chelsea/Seatech/WET Labs CStar [%]
name 18 = potemp090C: Potential Temperature [ITS-90, deg C]
name 19 = potemp190C: Potential Temperature, 2 [ITS-90, deg C]
name 20 = flECO-AFL: Fluorescence, WET Labs ECO-AFL/FL [mg/m^3]
name 21 = turbWETntu0: Turbidity, WET Labs ECO [NTU]
name 22 = wetCDOM: Fluorescence, WET Labs CDOM [mg/m^3]
name 23 = flCUVA: Fluorescence, Chelsea UV Aquatracka [ug/l]
name 24 = flScufa: Fluorescence, Turner SCUFA [ppb]
name 25 = altM: Altimeter [m]
name 26 = nbf: Bottles Fired
name 27 = modError: Modulo Error Count
interval = decibars: 1; bad_flag = -9.990e-29; Sensors count=13

Cast 21:
name 0 = scan: Scan Count
name 1 = latitude: Latitude [deg]
name 2 = longitude: Longitude [deg]
name 3 = nbf: Bottles Fired
name 4 = depSM: Depth [salt water, m]
name 5 = t090C: Temperature [ITS-90, deg C]
name 6 = t190C: Temperature, 2 [ITS-90, deg C]
name 7 = sal00: Salinity, Practical [PSU]
name 8 = sal11: Salinity, Practical, 2 [PSU]
name 9 = sbeox0Mg/L: Oxygen, SBE 43 [mg/l]
name 10 = sbeox0PS: Oxygen, SBE 43 [% saturation]
name 11 = density00: Density [density, Kg/m^3]
name 12 = sigma-é00: Density [sigma-theta, Kg/m^3]
name 13 = bat: Beam Attenuation, Chelsea/Seatech/WET Labs CStar [1/m]
name 14 = xmiss: Beam Transmission, Chelsea/Seatech/WET Labs CStar [%]
name 15 = flECO-AFL: Fluorescence, WET Labs ECO-AFL/FL [mg/m^3]
name 16 = wetCDOM: Fluorescence, WET Labs CDOM [mg/m^3]
name 17 = flCUVA: Fluorescence, Chelsea UV Aquatracka [ug/l]
name 18 = prDM: Pressure, Digiquartz [db]
name 19 = turbWETntu0: Turbidity, WET Labs ECO [NTU]
name 20 = flag: 0.000e+00
interval = seconds: 0.0416667; bad_flag = -9.990e-29; Sensors count=13

Casts 22 through 26:
name 0 = scan: Scan Count
name 1 = latitude: Latitude [deg]

name 2 = longitude: Longitude [deg]
name 3 = t190C: Temperature, 2 [ITS-90, deg C]
name 4 = t090C: Temperature [ITS-90, deg C]
name 5 = sal00: Salinity, Practical [PSU]
name 6 = sal11: Salinity, Practical, 2 [PSU]
name 7 = potemp090C: Potential Temperature [ITS-90, deg C]
name 8 = depSM: Depth [salt water, m]
name 9 = c0S/m: Conductivity [S/m]
name 10 = bat: Beam Attenuation, Chelsea/Seatech/WET Labs CStar [1/m]
name 11 = xmiss: Beam Transmission, Chelsea/Seatech/WET Labs CStar [%]
name 12 = nbf: Bottles Fired
name 13 = density00: Density [density, Kg/m^3]
name 14 = sigma-é00: Density [sigma-theta, Kg/m^3]
name 15 = flECO-AFL: Fluorescence, WET Labs ECO-AFL/FL [mg/m^3]
name 16 = wetCDOM: Fluorescence, WET Labs CDOM [mg/m^3]
name 17 = flCUVA: Fluorescence, Chelsea UV Aquatracka [ug/l]
name 18 = sbeox0Mg/L: Oxygen, SBE 43 [mg/l]
name 19 = sbeox0PS: Oxygen, SBE 43 [% saturation]
name 20 = prDM: Pressure, Digiquartz [db]
name 21 = flag: 0.000e+00
interval = seconds: 0.0416667; bad_flag = -9.990e-29; Sensors count=13

sensor channel 1 = Frequency 0, Temperature; Sensor ID: 55; SerialNumber: 4195
Calibration Date: 23-Jan-10

sensor channel 2 = Frequency 1, Conductivity; Sensor ID: 3; Serial Number: 2670
Calibration Date: 12-Jan-10

sensor channel 3 = Frequency 2, Pressure, Digiquartz with TC; Sensor ID: 45; Serial Number: 63505 SBE090462
Calibration Date: 12/23/2002

sensor channel 4 = Frequency 3, Temperature, 2; Sensor ID: 55; Serial Number: 4481
Calibration Date: 12-Jan-10

sensor channel 5 = Frequency 4, Conductivity, 2; Sensor ID: 3; Serial Number: 2880
Calibration Date: 12-Jan-10

sensor channel 6 = A/D voltage 0, Fluorometer, WET Labs ECO-AFL/FL; Sensor ID: 20 SerialNumber: FLNTURTD-FL-1012
Calibration Date: 2008-04-18

sensor channel 7 = A/D voltage 1, Turbidity Meter, WET Labs, ECO-NTU; Sensor ID: 67; Serial Number: FLNTURTD-1012
Calibration Date: 2008-04-18

sensor channel 8 = A/D voltage 2, Fluorometer, WET Labs CDOM; Sensor ID: 19; Serial Number: FLCDRTD-1379
Calibration Date: 4/14/2010

sensor channel 9 = A/D voltage 3, Fluorometer, Turner SCUFA; Sensor ID: 17; Serial Number: 201011
Calibration Date: 2010-Aug-18

sensor channel 10 = A/D voltage 4, Altimeter; Sensor ID: 0; Serial Number PSA916-1162
Calibration Date: (blank)

sensor channel 11 = A/D voltage 5, Oxygen, SBE 43; Sensor ID: 38; Serial Number: 0723
Calibration Date: 12-Feb-10

sensor channel 12 = A/D voltage 6, Transmissometer, Chelsea/Seatech/WET Lab CStar; Sensor ID: 59 Serial Number: CST-1118DR
Calibration Date: 2008-04-30

sensor channel 13 = A/D voltage 7, Fluorometer, Chelsea UV Aquatracka; Sensor ID: 7; Serial Number:

107733001
Calibration Date: 2010-8-18

Data Processing Description

The CTD data were processed on Seasave software version 7.20f as per routine operating procedures.

BCO-DMO made the following modifications:
- Removed duplicate parameters from display.
- Changed parameter names to conform with BCO-DMO conventions.
- Added date_start_utc, time_start_utc, lat_start, and lon_start from the header information in the original CTD files.
- Files named '12.04' were assumed to be be '12.05', based on the event log.

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Data Files

File
AT18-02_CTD.csv (Comma Separated Values (.csv), 190.70 MB) MD5:0c87bdf6d3d1d49bde12cf48dfbea984 Primary data file for dataset ID 3728

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Parameters

Parameter	Description	Units
cast	Consecutive cast number of the instrument.	unitless
event	Unique event number. The first one or two digits (before the decimal) are the station number.	unitless
date_start_utc	Date at start of CTD cast; UTC. format: mm/dd/YYYY	unitless
time_start_utc	Time at start of CTD cast; 24-hour clock; UTC; in hours and decimal minutes. format: HHMM.mm	unitless
lat_start	Latitude at start of cast; postive values = North.	decimal degrees
lon_start	Longitude at start of cast; negative values = West.	decimal degrees
lat	Latitude; postive values = North.	decimal degrees
lon	Longitude; negative values = West.	decimal degrees
time_elapsed	Number of seconds elapsed from the start of the cast. Originally named 'timeS'.	seconds
press	Pressure. Originally named 'prDM'.	decibars
depth	Depth. Originally named 'depSM'.	meters
temp	Primary temperature measurement. Originally named 'T090C'.	degrees Celsius

temp2	Secondary tempearture measurement. Originally named 'T190C'.	degrees Celsius
cond	Primary conductivity measurement in Siemens per meter. Originally named 'c0S/m'.	S/m
cond2	Primary conductivity measurement in Siemens per meter. Originally named 'c1S/m'.	S/m
sal	Primary salinity measurement. Originally named 'Sal00'.	PSU
sal2	Secondary salinity measurement. Originally named 'Sal11'.	PSU
density	Primary measure of density in kilograms per cubic meter.	kg/m^3
density2	Secondary measure of density in kilograms per cubic meter.	kg/m^3
sigma_0	Sigma theta density. Orignally named 'Sigma-e00'.	kg/m^3
O2_sat_pcnt	Percent oxygen saturation. Originally named 'Sbeox0PS'.	%
O2_v	Raw voltage from SBE43 oxygen sensor. Originally named 'Sbeox0V'.	volts
O2_mg_L	Oxygen in milligrams per liter. Originally named 'Sbeox0Mg/L'.	mg/L
O2_umol_kg_SBE	Oxygen in micromoles per kilograms measured by SBE43 sensor. Originally named 'Sbeox0Mm/Kg'.	umol/kg
O2_umol_kg_W	Oxygen in micromoles per kilograms measured by Weiss sensor. Originally named 'oxsatMm/Kg'.	umol/kg
trans	Beam transmission. Originally named 'Xmiss'.	%
beam_c	Beam attenuation. Originally named 'Bat'.	1/m
potemp	Primary measure of potential temperature. Originally named 'potemp090C'.	degrees Celsius
potemp2	Secondary measure of potential temperature. Originally named 'potemp190C'.	degrees Celsius
fluor_ug_L	Fluorescence measured by WET Labs ECO-AFL/FL in milligrams per cubic meter. Originally named 'flECO-AFL'.	mg/m^3
turbidity	Turbidity measured by WET Labs ECO. Originally named 'turbWetntu0'.	NTU
CDOM	CDOM fluoresence in milligrams per cubic meter. Originally named 'wetCDOM'.	mg/m^3
chl_a_fluor	Fluorescence measured by Chelsea UV Aquatracka in micrograms per liter. Originally named 'flCUVA'.	ug/L
fluor_ppb	Fluorescence measured by Turner SCUFA in parts per billion. Originally named 'flScufa'.	ppb
alt	Altimeter reading.	meters
sound_vel_avg	Average sound velocity in meters per second. Originally named 'avgsvCM'.	m/s
bottles_fired	Number of bottle fired.	unitless
error_count	Modulo error count.	unitless

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Instruments

Dataset-specific Instrument Name	CTD Sea-Bird 9
Generic Instrument Name	CTD Sea-Bird 9
Generic Instrument Description	The Sea-Bird SBE 9 is a type of CTD instrument package. The SBE 9 is the Underwater Unit and is most often combined with the SBE 11 Deck Unit (for real-time readout using conductive wire) when deployed from a research 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, fluorometer, altimeter, etc.). Note that in most cases, it is more accurate to specify SBE 911 than SBE 9 since it is likely a SBE 11 deck unit was used. more information from Sea-Bird Electronics

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Deployments

AT18-02

Website	https://www.bco-dmo.org/deployment/58735
Platform	R/V Atlantis
Start Date	2010-11-08
End Date	2010-12-03
Description	The AT18-02 cruise sailed from Galveston, Texas and returned to Gulfport, Mississippi. Operations consisted of sediment sampling using the DSV ALVIN, hydrographic characterizations of the water column and sampling of water for geochemical and microbiological characterization using a standard CTD/Rosette, and additional sampling using a multiple corer. See more information from the WHOI cruise planning synopsis. Cruise information and original data are available from the NSF R2R data catalog.

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Project Information

RAPID Deepwater Horizon Oil Spill: Deep pelagic and benthic impacts of the oil spill (DWH_Deep_Microbes)

Coverage: Gulf of Mexico; 26.9N, 90.7W

During late spring and summer of 2010, the Northern Gulf of Mexico (GoM) was exposed to an oil spill different in magnitude and scope from any previous spill. The Deepwater Horizon, an ultra-deep, offshore drilling platform, began working GoM oil fields in 2001. While working a well in Mississippi Canyon on April 20, 2010, a bolus of methane gas ascended the drill pipe and exploded at the surface. Two days later the platform sank and since then, substantial quantities of oil and gas have leaked from the damaged wellhead. This work addressed the offshore oceanic impacts of the BP spill.

Sediment microbial mediated processes are capable of oxidizing oil and methane in the environment. The PI's examined the impacts of the Deepwater Horizon Oil Spill on microbially mediated processes in the deep waters and sediments in the vicinity of the spill site. The work complemented several funded or planned geochemical and microbiological sampling programs focused on the oil spill response. PI's evaluated rates of water column methane oxidation and sediment sulfate reduction and methanogenesis at multiple sites around the spill site.

Additional experiments quantified the impact of nutrients, oxygen and substrate concentrations on these important microbially mediated processes.

The Joye group participated in six research cruises during 2010 and received samples from another six cruises from the study area. On all cruises, water samples were collected using a CTD rosette and Niskin or Go-Flo bottles. Sediment samples were obtained by box coring, multi-coring, or using the manned submersible ALVIN.

The PI's extended the monitoring/assessment program that was initiated through the NOAA National Institute of Undersea Science and Technology (NIUST) funded cruise and further leveraged by NOAA/NIUST (cruises in July 2010, October 2010) by conducting three major expeditions in 2010. This RAPID project directly supported the PI's efforts for cruises in May/June 2010 (NSF Joye chief scientist); August 2010 (NSF Montoya, chief scientist); November/December 2010 (NSF Joye chief scientist); and July 2011 (NSF Montoya, chief scientist)

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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.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1043225

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