CTD data from 9 casts at the oxygen-deficient zone of the Eastern Tropical North Pacific (ETNP), RV/Atlantis cruise AT37-12, April-May 2017

Website: https://www.bco-dmo.org/dataset/739098
Data Type: Cruise Results
Version: 1
Version Date: 2018-06-21

Project
» Collaborative Research: Environmental Drivers of Chemoautotrophic Carbon Production at Deep-Sea Hydrothermal Vents - Comparative Roles of Oxygen and Nitrate (vent O2 NO3 roles)

Contributors	Affiliation	Role
Sievert, Stefan M	Woods Hole Oceanographic Institution (WHOI)	Principal Investigator
Babbin, Andrew	Massachusetts Institute of Technology (MIT-EAPS)	Co-Principal Investigator, Contact
Copley, Nancy	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
CTD data from Atlantis cruise AT37-12 in the Eastern Tropical North Pacific in April and May 2017. Data from 9 casts are included.

Table of Contents

Coverage

Spatial Extent: **N**:14.03274 **E**:-89.9996 **S**:9.82022 **W**:-104.34815
Temporal Extent: 2017-04-25 - 2017-05-13

Dataset Description

CTD data from Atlantis cruise AT 37-12 in the Eastern Tropical North Pacific in April and May 2017.

Acquisition Description

Header information from Sea-Bird SBE 9 data files (sample from cast 1):
* Sea-Bird SBE 9 Data File:
* FileName = C:\data\ctd\at3712001.hdr
* Software Version Seasave V 7.23.2
* Temperature SN = 4303
* Conductivity SN = 3009
* Number of Bytes Per Scan = 40
* Number of Voltage Words = 5
* Number of Scans Averaged by the Deck Unit = 1
* System UpLoad Time = Apr 25 2017 14:19:16
* NMEA Latitude = 14 01.97 N
* NMEA Longitude = 104 20.66 W
* NMEA UTC (Time) = Apr 25 2017 14:19:00
* Store Lat/Lon Data = Append to Every Scan
* System UTC = Apr 25 2017 14:19:16
# nquan = 26
# nvalues = 3003
# units = specified

name 0 = timeS: Time, Elapsed [seconds]
name 1 = longitude: Longitude [deg]
name 2 = latitude: Latitude [deg]
name 3 = prDM: Pressure, Digiquartz [db]
name 4 = t090C: Temperature [ITS-90, deg C]
name 5 = t190C: Temperature, 2 [ITS-90, deg C]
name 6 = c0S/m: Conductivity [S/m]
name 7 = c1S/m: Conductivity, 2 [S/m]
name 8 = CStarTr0: Beam Transmission, WET Labs C-Star [%]

name 9 = flECO-AFL: Fluorescence, WET Labs ECO-AFL/FL [mg/m^3]
name 10 = turbWETntu0: Turbidity, WET Labs ECO [NTU]
name 11 = sbeox0V: Oxygen raw, SBE 43 [V]
name 12 = altM: Altimeter [m]
name 13 = nbf: Bottles Fired
name 14 = spar: SPAR/Surface Irradiance
name 15 = T2-T190C: Temperature Difference, 2 - 1 [ITS-90, deg C]
name 16 = depSM: Depth [salt water, m], lat = 14.0328
name 17 = density00: Density [density, kg/m^3]
name 18 = density11: Density, 2 [density, kg/m^3]
name 19 = sal00: Salinity, Practical [PSU]
name 20 = sal11: Salinity, Practical, 2 [PSU]
name 21 = svCM: Sound Velocity [Chen-Millero, m/s]
name 22 = svCM1: Sound Velocity, 2 [Chen-Millero, m/s]
name 23 = sbeox0Mm/L: Oxygen, SBE 43 [umol/l], WS = 2
name 24 = dz/dtM: Descent Rate [m/s], WS = 2
name 25 = flag: flag

span 0 = 10.777, 6384.982
span 1 = -104.34815, -104.34439
span 2 = 14.02820, 14.03274
span 3 = 2.012, 1517.275
span 4 = 3.0261, 29.5506
span 5 = 3.0246, 29.5499
span 6 = 3.203151, 5.633423
span 7 = 3.202059, 5.631726
span 8 = 97.9989, 100.2511
span 9 = -0.0468, 1.1713
span 10 = -0.1532, -0.1508
span 11 = 0.5349, 2.6302
span 12 = 19.15, 103.34
span 13 = 0, 23
span 14 = 3.2622e+00, 6.3235e+00
span 15 = -0.5208, 0.1394
span 16 = 2.000, 1503.000
span 17 = 1021.1002, 1034.5674
span 18 = 1021.0921, 1034.5583
span 19 = 33.7034, 34.8581
span 20 = 33.6949, 34.8381
span 21 = 1485.17, 1543.87
span 22 = 1485.17, 1543.86

span 23 = 0.417, 206.650
span 24 = -1.760, 1.703
span 25 = 0.0000e+00, 0.0000e+00

interval = meters: 1
start_time = Apr 25 2017 14:19:00 [NMEA time, header]
bad_flag = -9.990e-29

<Sensors count="15" >
<sensor Channel="1" >
<!-- Frequency 0, Temperature -->
<TemperatureSensor SensorID="55" >
<SerialNumber>4303</SerialNumber>
<CalibrationDate>20-Jan-16</CalibrationDate>
<UseG_J>1</UseG_J>
<A>0.00000000e+000</A>
<B>0.00000000e+000</B>
<C>0.00000000e+000</C>
<D>0.00000000e+000</D>
<F0_Old>0.000</F0_Old>
<G>4.38501054e-003</G>
<H>6.47529902e-004</H>
<I>2.19462935e-005</I>
<J>1.64955605e-006</J>
<F0>1000.000</F0>
<Slope>1.00000000</Slope>
<Offset>0.0000</Offset>
</TemperatureSensor>
</sensor>

<sensor Channel="2" >
<!-- Frequency 1, Conductivity -->
<ConductivitySensor SensorID="3" >
<SerialNumber>3009</SerialNumber>
<CalibrationDate>20-Jan-16</CalibrationDate>
<UseG_J>1</UseG_J>
<!-- Cell const and series R are applicable only for wide range sensors. -->
<SeriesR>0.0000</SeriesR>
<CellConst>2000.0000</CellConst>
<ConductivityType>0</ConductivityType>
<Coefficients equation="0" >

// <A>0.00000000e+000</A>
<B>0.00000000e+000</B>
<C>0.00000000e+000</C>
<D>0.00000000e+000</D>
<M>0.0</M>
<CPcor>-9.57000000e-008</CPcor>
</Coefficients>
<Coefficients equation="1" >
<G>-1.04864981e+001</G>
<H>1.48778269e+000</H>
<I>3.67673536e-004</I>
<J>5.06417242e-005</J>
<CPcor>-9.57000000e-008</CPcor>
<CTcor>3.2500e-006</CTcor>
<!-- WBOTC not applicable unless ConductivityType = 1. -->
<WBOTC>0.00000000e+000</WBOTC>
</Coefficients>
<Slope>1.00000000</Slope>
<Offset>0.00000</Offset>
</ConductivitySensor>
</sensor>

<sensor Channel="3" >
<!-- Frequency 2, Pressure, Digiquartz with TC -->
<PressureSensor SensorID="45" >
<SerialNumber>0749</SerialNumber>
<CalibrationDate>08-Apr-14</CalibrationDate>
<C1>-4.970438e+004</C1>
<C2>-4.005750e-001</C2>
<C3>1.365700e-002</C3>
<D1>3.669600e-002</D1>
<D2>0.000000e+000</D2>
<T1>3.027760e+001</T1>
<T2>-4.522040e-004</T2>
<T3>4.002070e-006</T3>
<T4>1.971140e-009</T4>
<Slope>0.99992397</Slope>
<Offset>-1.86008</Offset>
<T5>0.000000e+000</T5>
<AD590M>1.283700e-002</AD590M>
<AD590B>-8.706643e+000</AD590B>

</PressureSensor>
</sensor>

<sensor Channel="4" >
<!-- Frequency 3, Temperature, 2 -->
<TemperatureSensor SensorID="55" >
<SerialNumber>4360</SerialNumber>
<CalibrationDate>20-Jan-16</CalibrationDate>
<UseG_J>1</UseG_J>
<A>0.00000000e+000</A>
<B>0.00000000e+000</B>
<C>0.00000000e+000</C>
<D>0.00000000e+000</D>
<F0_Old>0.000</F0_Old>
<G>4.36265052e-003</G>
<H>6.49800036e-004</H>
<I>2.30621342e-005</I>
<J>1.84888934e-006</J>
<F0>1000.000</F0>
<Slope>1.00000000</Slope>
<Offset>0.0000</Offset>
</TemperatureSensor>
</sensor>

<sensor Channel="5" >
<!-- Frequency 4, Conductivity, 2 -->
<ConductivitySensor SensorID="3" >
<SerialNumber>2707</SerialNumber>
<CalibrationDate>20-Jan-16</CalibrationDate>
<UseG_J>1</UseG_J>
<!-- Cell const and series R are applicable only for wide range sensors. -->
<SeriesR>0.0000</SeriesR>
<CellConst>2000.0000</CellConst>
<ConductivityType>0</ConductivityType>
<Coefficients equation="0" >
<A>0.00000000e+000</A>
<B>0.00000000e+000</B>
<C>0.00000000e+000</C>
<D>0.00000000e+000</D>
<M>0.0</M>
<CPcor>-9.57000000e-008</CPcor>

</Coefficients>
<Coefficients equation="1" >
<G>-1.07265688e+001</G>
<H>1.55946953e+000</H>
<I>-1.31572164e-003</I>
<J>1.86775491e-004</J>
<CPcor>-9.57000000e-008</CPcor>
<CTcor>3.2500e-006</CTcor>
<!-- WBOTC not applicable unless ConductivityType = 1. -->
<WBOTC>0.00000000e+000</WBOTC>
</Coefficients>
<Slope>1.00000000</Slope>
<Offset>0.00000</Offset>
</ConductivitySensor>
</sensor>

<sensor Channel="6" >
<!-- A/D voltage 0, Oxygen, SBE 43 -->
<OxygenSensor SensorID="38" >
<SerialNumber>0072</SerialNumber>
<CalibrationDate>16-Jan-16</CalibrationDate>
<Use2007Equation>1</Use2007Equation>
<CalibrationCoefficients equation="0" >
<!-- Coefficients for Owens-Millard equation. -->
<Boc>0.0000</Boc>
<Soc>0.0000e+000</Soc>
<offset>0.0000</offset>
<Pcor>0.00e+000</Pcor>
<Tcor>0.0000</Tcor>
<Tau>0.0</Tau>
</CalibrationCoefficients>
<CalibrationCoefficients equation="1" >
<!-- Coefficients for Sea-Bird equation - SBE calibration in 2007 and later. -->
<Soc>4.8025e-001</Soc>
<offset>-0.5316</offset>
<A>-4.2594e-003</A>
<B> 2.1935e-004</B>
<C>-3.0959e-006</C>
<D0> 2.5826e+000</D0>
<D1> 1.92634e-004</D1>
<D2>-4.64803e-002</D2>

<E> 3.6000e-002</E>
<Tau20> 2.5000</Tau20>
<H1>-3.3000e-002</H1>
<H2> 5.0000e+003</H2>
<H3> 1.4500e+003</H3>
</CalibrationCoefficients>
</OxygenSensor>
</sensor>

<sensor Channel="7" >
<!-- A/D voltage 1, Free -->
</sensor>

<sensor Channel="8" >
<!-- A/D voltage 2, Free -->
</sensor>

<sensor Channel="9" >
<!-- A/D voltage 3, Transmissometer, WET Labs C-Star -->
<WET_LabsCStar SensorID="71" >
<SerialNumber>CST-1117</SerialNumber>
<CalibrationDate>20May15, Field 8Mar17</CalibrationDate>
<M>20.9850</M>
<B>-0.1538</B>
<PathLength>0.250</PathLength>
</WET_LabsCStar>
</sensor>

<sensor Channel="10" >
<!-- A/D voltage 4, Fluorometer, WET Labs ECO-AFL/FL -->
<FluoroWetlabECO_AFL_FL_Sensor SensorID="20" >
<SerialNumber>FLTURT-1013</SerialNumber>
<CalibrationDate>2014-April-25</CalibrationDate>
<ScaleFactor>6.00000000e+000</ScaleFactor>
<!-- Dark output -->
<Vblank>0.0870</Vblank>
</FluoroWetlabECO_AFL_FL_Sensor>
</sensor>

<sensor Channel="11" >
<!-- A/D voltage 5, Turbidity Meter, WET Labs, ECO-NTU -->
<TurbidityMeter SensorID="67" >

<SerialNumber>FLTURT-1013</SerialNumber>
<CalibrationDate>2014 April 25</CalibrationDate>
<ScaleFactor>0.080000</ScaleFactor>
<!-- Dark output -->
<DarkVoltage>2.000000</DarkVoltage>
</TurbidityMeter>
</sensor>

<sensor Channel="12" >
<!-- A/D voltage 6, Altimeter -->
<AltimeterSensor SensorID="0" >
<SerialNumber>PSA916-40852</SerialNumber>
<CalibrationDate></CalibrationDate>
<ScaleFactor>15.000</ScaleFactor>
<Offset>0.000</Offset>
</AltimeterSensor>
</sensor>

<sensor Channel="13" >
<!-- A/D voltage 7, Free -->
</sensor>

<sensor Channel="14" >
<!-- SPAR voltage, Unavailable -->
</sensor>

<sensor Channel="15" >
<!-- SPAR voltage, SPAR/Surface Irradiance -->
<SPAR_Sensor SensorID="51" >
<SerialNumber>16500</SerialNumber>
<CalibrationDate>March 28, 2013</CalibrationDate>
<ConversionFactor>1641.85000000</ConversionFactor>
<RatioMultiplier>1.00000000</RatioMultiplier>
</SPAR_Sensor>
</sensor>
</Sensors>

datcnv_date = Apr 25 2017 16:08:39, 7.23.2 [datcnv_vars = 16]
datcnv_in = c:\data\ctd\at3712001.hex c:\data\ctd\at3712001.XMLCON
datcnv_skipover = 0
datcnv_ox_hysteresis_correction = yes

wildedit_date = Apr 25 2017 16:08:50, 7.23.2

wildedit_in = c:\data\ctd\process\at3712001.cnv
wildedit_pass1_nstd = 2.0
wildedit_pass2_nstd = 20.0
wildedit_pass2_mindelta = 2.000e+000
wildedit_npoint = 100
wildedit_vars = longitude latitude prDM t090C t190C c0S/m c1S/m CStarTr0 flECO-AFL turbWETntu0 sbeox0V altM spar T2-T190C
wildedit_excl_bad_scans = yes
alignctd_date = Apr 25 2017 16:08:57, 7.23.2
alignctd_in = c:\data\ctd\process\at3712001.cnv
alignctd_adv = c0S/m 0.073, c1S/m 0.073, sbeox0V 2.000
celltm_date = Apr 25 2017 16:09:07, 7.23.2
celltm_in = c:\data\ctd\process\at3712001.cnv
celltm_alpha = 0.0300, 0.0300
celltm_tau = 7.0000, 7.0000
celltm_temp_sensor_use_for_cond = primary, secondary
Derive_date = Apr 25 2017 16:09:13, 7.23.2 [derive_vars = 9]
Derive_in = c:\data\ctd\process\at3712001.cnv c:\data\ctd\process\at3712001.XMLCON
derive_time_window_docdt = seconds: 2
derive_ox_tau_correction = no
derive_time_window_dzdt = seconds: 2
binavg_date = Apr 25 2017 16:09:19, 7.23.2
binavg_in = c:\data\ctd\process\at3712001.cnv
binavg_bintype = meters
binavg_binsize = 1
binavg_excl_bad_scans = yes
binavg_skipover = 0
binavg_surface_bin = no, min = 1.000, max = 0.000, value = 0.000
file_type = ascii

Further information on sensors:
sensor_channel,parameter,sensor_id,serial_number,instrument,calibration_date
1,Temperature_1,55,4303,nd,2016-01-20
2,Conductivity_1,3,3009,nd,2016-01-20
3,Pressure,45,0749,Digiquartz_with_TC,2014-04-08
4,Temperature_2,55,4360,nd,2016-01-20
5,Conductivity_2,3,2707,nd,2016-01-20
6,Oxygen,38,0072,SBE_43,2016-01-16
7,free,,,,
8,free,,,,
9,Transmissometer,71,CST-1117,WET_LabsCStar,20-May-15;_8-Mar-17

10,Fluorometer,20,FLTURT-1013,WetlabECO_AFL_FL_Sensor,2014-04-25
11,Turbidity,67,FLTURT-1013,WET_Labs,_ECO-NTU,2014-04-25
12,Altimeter,0,PSA916-40852,nd,
13,free,,,,
14,SPAR,,,Unavailable,
15,SPAR/Surface_Irradiance,50,16500,,2013-03-28

Processing Description

BCO-DMO made the following modifications:
- Changed parameter names to conform with BCO-DMO conventions.
- Added date_start, lat_start, lon_start, time_start_UTC and bottom depth from the summary information provided by the PI.

[table of contents | back to top]

Parameters

Parameter	Description	Units
station	station identifier	unitless
date_start_UTC	date [UTC] at start of cast formatted as yyyy-mm-dd	unitless
lat_start	cast start latitude; north is positive	decimal degrees
lon_start	cast start longitude; east is positive	decimal degrees
depth_bottom	depth of water	meters
time_start_UTC	time [UTC] at start of cast formatted as HH:MM:SS	unitless
time_elapsed	Number of seconds elapsed from the start of the cast. Originally named 'timeS'.	seconds
lon	latitude; north is positive. Originally named 'latitude'.	decimal degrees
lat	longitude; east is positive. Originally named 'longitude'.	decimal degrees
press	Pressure. Originally named 'prDM'.	decibars

temp	Primary temperature measurement. Originally named 't090C'.	degrees Celsius
temp_2	Secondary tempearture measurement. Originally named 't190C'.	degrees Celsius
cond	Primary conductivity measurement. Originally named 'c0S/m'.	Siemens/meter [S/m]
cond_2	Secondary conductivity measurement. Originally named 'c1S/m'.	Siemens/meter [S/m]
trans	Beam transmission expressed as percent. Originally named 'CStarTr0'.	unitless
fluor	Fluorescence measured by WET Labs ECO-AFL/FL in milligrams per cubic meter. Originally named 'flECO-AFL'.	milligrams/cubic meter [mg/m^3]
turbidity	Turbidity measured by WET Labs ECO. Originally named 'turbWetntu0'.	NTU
O2_v	Raw voltage from SBE43 oxygen sensor. Originally named 'Sbeox0V'.	volts
altitude	Altimeter reading. Originally named 'altM'.	meters
bottles_fired	Number of bottle fired. Originally named 'nbf'.	unitless
SPAR	SPAR/Surface Irradiance. Originally named 'spar'.	microEinsteins/meter^2/second
temp_diff	Temperature Difference. Originally named 'T2-T190C'.	degrees Celsius
depth	Depth. Originally named 'depSM'.	meters
density	Primary measure of density in kilograms per cubic meter. Originally named 'density00'.	kilograms/cubic meter [kg/m^3]
density_2	Secondary measure of density in kilograms per cubic meter. Originally named 'density11'.	kilograms/cubic meter [kg/m^3]
sal	Primary salinity measurement. Originally named 'sal00'.	practical salinity units [PSU]

sal_2	Secondary salinity measurement. Originally named 'sal11'.	practical salinity units [PSU]
sound_vel	Sound velocity in meters per second. Originally named 'svCM'.	meters/second [m/s]
sound_vel_2	Sound velocity in meters per second from secondary sensor. Originally named 'svCM1'.	meters/second [m/s]
O2	Oxygen concentration from SBE 43. Originally named 'sbeox0Mm/L'.	micromol/liter [umol/l]
descent_rate	Descent Rate. Originally named 'dz/dtM'.	meters/second [m/s]
flag	Quality flag; bad flag = -9.99e-29.	unitless

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	Sea-Bird SBE 9
Generic Instrument Name	CTD profiler
Generic Instrument Description	The Conductivity, Temperature, Depth (CTD) unit is an integrated instrument package designed to measure the conductivity, temperature, and pressure (depth) of the water column. The instrument is lowered via cable through the water column and permits scientists observe the physical properties in real time via a conducting cable connecting the CTD to a deck unit and computer on the ship. The CTD is often configured with additional optional sensors including fluorometers, transmissometers and/or radiometers. It is often combined with a Rosette of water sampling bottles (e.g. Niskin, GO-FLO) for collecting discrete water samples during the cast. This instrument designation is used when specific make and model are not known.

[table of contents | back to top]

Deployments

AT37-12

Website	https://www.bco-dmo.org/deployment/734074
Platform	R/V Atlantis
Report	http://datadocs.bco-dmo.org/docs/Vent_O2_NO3_Roles/data_docs/AT37-12_Cruise_Report.pdf
Start Date	2017-04-24
End Date	2017-05-15

[table of contents | back to top]

Project Information

Collaborative Research: Environmental Drivers of Chemoautotrophic Carbon Production at Deep-Sea Hydrothermal Vents - Comparative Roles of Oxygen and Nitrate (vent O2 NO3 roles)

Coverage: Deep-Sea hydrothermal vent field at 9 deg N on the East Pacific Rise

NSF award abstract: Deep-sea hydrothermal vents, first discovered in 1977, are exemplary ecosystems where microbial chemosynthesis rather than photosynthesis is the primary source of organic carbon. Chemosynthetic microorganisms use the energy generated by oxidizing reduced inorganic chemicals contained in the vent fluids, like hydrogen sulfide or hydrogen gas, to convert carbon dioxide (CO_2) into cell material. By doing so, they effectively transfer the energy from a geothermal source to higher trophic levels, in the process supporting the unique and fascinating ecosystems that are characterized by high productivity - oases in the otherwise barren deep ocean landscape. While the general view of the functioning of these ecosystems is established, there are still major gaps in our understanding of the microbiology and biogeochemistry of these systems. Particularly lacking are studies measuring rates of microbial activity in situ, which is ultimately needed to understand production of these ecosystems and to assess their impact on global biogeochemical cycles. This project makes use of the Vent-Submersible Incubation Device (Vent-SID), a robotic micro-laboratory that was recently developed and tested in the field. This instrument makes it possible for the first time to determine rates of carbon fixation at both in situ pressures and temperatures, revolutionizing the way we conduct microbial biogeochemical investigations at deep-sea hydrothermal vents. This is an interdisciplinary and collaborative effort between two US and foreign institutions, creating unique opportunities for networking and to foster international collaborations. This will also benefit two graduate students working in the project, who will get exposed to a wide range of instrumentation and scientific fields, facilitating their interdisciplinary education. In collaboration with Dr. Nitzan Resnick, academic dean of The Sage School, an elementary school outreach program will be developed and a long-term partnership with the school established. Further, a cruise blog site to disseminate the research to schools and the broader public will be set up. The results will be the topic of media coverage as well as be integrated into coursework and webpages existing either in the PI's labs or at the institution. This project is using a recently developed robotic micro-laboratory, the Vent-SID, to measure rates of chemoautotrophic production and to determine the relative importance of oxygen and nitrate in driving chemosynthesis at deep-sea hydrothermal vents at in situ pressures and temperatures and to tackle the following currently unresolved science objectives: 1) obtain in situ rates of chemoautotrophic carbon fixation, 2) obtain in situ nitrate reduction rate measurements, and 3) directly correlate the measurement of these processes with the expression of key genes involved in carbon and energy metabolism. Although recent data suggests that nitrate reduction either to N2 (denitrification) or to NH4+ (dissimilatory reduction of nitrate to ammonium) might be responsible for a significant fraction of chemoautotrophic production, NO3-reduction rates have never been measured in situ at hydrothermal vents. The researchers hypothesize that chemoautrophic growth is strongly coupled to nitrate respiration in vent microbial communities. During a cruise that will take place approximately 12 months into the project (~Feb 2017), the researchers will carry out a total of 4 deployments of the Vent-SID as well as ancillary sampling collection at the 9°46N to 9°53N segment of the East Pacific Rise. They will focus efforts on two diffuse-flow vent sites, "Crab Spa" and "Teddy Bear". "Crab Spa" is a diffuse flow vent site (T: 25°C) that has been used as a model system to gain insights into chemoautotrophic processes and has been frequently sampled over the last several years. This vent site has been very well characterized, both geochemically and microbiologically, providing excellent background data for the proposed process oriented studies. "Teddy Bear" is a diffuse-flow site that was discovered in Jan 2014, and it has a lower temperature (T: 12°C), making it a good comparative site. The researchers will perform a number of short duration time-course incubations to assess the role of different environmental parameters that have been identified as likely key variables (e.g., O2, temperature, NO3-), and to link these process rate measurements to the expression of functional genes using metatranscriptomic analyses. This study will be the first attempt to measure critical metabolic processes of hydrothermal vent microbial assemblages under critical in situ conditions and to assess the quantitative importance of electron donor and acceptor pathways in situ. In the future, it is envisioned that the Vent-SID will become a routine application by the oceanographic community for measuring time series rates of relevant metabolic processes at hydrothermal vents under in situ pressures and vent fluid temperatures.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1559042

[table of contents | back to top]