Downcast profiles from Seacat CTD on MacLane pump from R/V Oceanus OC449-02 and OC449-03 in the Eastern North Atlantic and Indian oceans in 2008 (SIRENA project)

Website: https://www.bco-dmo.org/dataset/3475
Version: 09 May 2011
Version Date: 2011-05-09

Project
» Sources of Iron to the EasterN tropical Atlantic (SIRENA)

Program
» Ocean Carbon and Biogeochemistry (OCB)

Contributors	Affiliation	Role
Lam, Phoebe J.	Woods Hole Oceanographic Institution (WHOI)	Principal Investigator, Contact
Gegg, Stephen R.	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

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Dataset Description

CTD data from Lam SBE19plus (Seacat) attached to end of the MacLane pump line - **Down Casts**
Note: These data not collected on R/V Islandia ISL0109 cruise

PI's Note/09May2011:
In comparing my pump seacat CTD to the ship's CTD, I've discovered that the ship's CTD's fluorescence and beam attenuation are no good, at least for OC449-3. The ship's fluorometer was clearly just not working. The ship's transmissometer misbehaved in a more subtle manner--oceanographically consistent, but of a different pattern than my pump seacat data. I concluded that my pump seacat CTD's transmissometer is the "correct" one by comparing to discrete particulate carbon measurements on particles collected on my pumps. Both particulate carbon concentrations and beam attenuation from my pump seacat CTD show a minimum at 500m at OC449-3 station 3, whereas the ship's CTD shows an anomalous minimum in subsurface beam attenuation at station 2, which is not seem in the particulate carbon concentrations.

Methods & Sampling

The CTD was allowed to debubble briefly just below the surface before paying out wire, but this was often insufficient to get out all bubbles, so upper ~15m of the downcasts are generally not good.

The transmissometer windows were wiped clean with distilled water before and after each cast, and kept capped in between deployments. The voltage of the transmissometer in air (Vair) and in the dark (Vdark) were read after each deployment to monitor drift, though beam attenuation reported here do not yet take shipboard baseline measurements into account, and use the calibrations of the transmissometer from the beginning of OC449-2 cruise.

See: VIII. Protocols for Optics: Transmissometer and Scattering Sensors&rdquoSampling and Sample-handling Protocols for GEOTRACES Cruises, Edited by the 2010 GEOTRACES Standards and Intercalibration Committee.

Data Processing Description

SBE43 oxygen sensor was calibrated to 32 Winkler titrations conducted on first leg (OC449-2) by Taka Ito at stations 9,13,17,22.

See: “VIII. Protocols for Optics: Transmissometer and Scattering Sensors” in the Sampling and Sample-handling Protocols for GEOTRACES Cruises, Edited by the 2010 GEOTRACES Standards and Intercalibration Committee.

BCO-DMO Processing Notes
- Awk written to reformat original .cnv files contributed by Phoebe Lam
- AWK: SIRENA_CTD_Pump_2_BCODMO.awk

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Data Files

File
CTD_Pumps_Dn.csv (Comma Separated Values (.csv), 1.18 MB) MD5:93fd61baa2df3bd74ad2d3931386a73c Primary data file for dataset ID 3475

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Parameters

Parameter	Description	Units
cruise_id	SIRENA Cruise Id	text
station	Station Number	integer
cast	Cast Number	integer
CTD_DataSet_Id	CTD Dataset Id	text
date	Station date	YYYYMMDD
time	Station time	HHMMSS
lat	Station latitude (South is negative)	decimal degrees
lon	Station longitude (West is negative)	decimal degrees
sampled_for	Sampling	text
depth_station	Station Depth	meters
Temperature	tv290C: Temperature ITS-90	degrees celsius
Conductivity	c0S/m: Conductivity	S/m
Pressure	prdM: Pressure Strain Gauge	decibars
Oxygen	sbeox0Mm/Kg: Oxygen; SBE 43	umol/Kg
Bat	bat: Beam Attenuation Chelsea/Seatech/Wetlab CStar	1/m
Fluor	FlECO-AFL: Fluorescence Wetlab ECO-AFL/FL	mg/m^3
Upoly0	upoly0: Upoly 0 Turbidity Meter	NTU(??)
V1	v1: Voltage 1	volts
OxygenV	sbeox0V: Oxygen Voltage SBE 43	volts
Salinity	sal00: Salinity	PSU
Density	sigma-é00: Density sigma-theta	Kg/m^3
Depth	depSM: Depth salt water lat=12	meters
PoTemp	potemp090C: Potential Temperature ITS-90	degrees celsius
Oxygen_Sat	oxsatML/L: Oxygen Saturation	ml/l
flag	flag	nd

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Instruments

Dataset-specific Instrument Name	CTD Sea-Bird SEACAT
Generic Instrument Name	CTD Sea-Bird SEACAT
Dataset-specific Description	* Sea-Bird SBE19plus Data File: * FileName = C:dataSIRENAseacat awhexfiles20080809_stn3_d1.hex * Software Version 1.59 * Temperature SN = 5236 * Conductivity SN = 5236 * System UpLoad Time = Aug 10 2008 14:20:50 ** KN192-05 SeacatSIRENA OC449-2 Seacat ** Nov-Dec 2007 GMTAugust 2008 ** TMCR or McLane DeploymentMcLane Deployments
Generic Instrument Description	The CTD SEACAT recorder is an instrument package manufactured by Sea-Bird Electronics. The first Sea-Bird SEACAT Recorder was the original SBE 16 SEACAT developed in 1987. There are several model numbers including the SBE 16plus (SEACAT C-T Recorder (P optional))and the SBE 19 (SBE 19plus SEACAT Profiler measures conductivity, temperature, and pressure (depth)). More information from Sea-Bird Electronics.

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Deployments

OC449-02

Website	https://www.bco-dmo.org/deployment/58665
Platform	R/V Oceanus
Start Date	2008-08-06
End Date	2008-09-04

Description	R/V Oceanus Voyage #449, Leg II was a trans-Atlantic transect from Bridgetown, Barbados to Porto Grande, Cape Verde (5-20 degrees North, 20-58 degrees West). The main scientific objective was to test the hypothesis that the continental margin of northwest Africa provides a significant subsurface supply of iron to the open eastern tropical Atlantic. Measurements include: CTD profiles, U/W Tow Fish Water Sampler, Trace Metal Profiles mostly in upper 1000 meters and one cast to 6000 meters, SeaSoar SeaMac Winch to deploy eleven battery-operated in-situ pumps with sci-provided non-metallic wire off the 01 deck using the side A-frame and SSSG non-metallic block and Gravity Coring WHOI cruise planning synopsis Cruise information and original data are available from the NSF R2R data catalog. **Methods & Sampling** * Sea-Bird SBE19plus Data File: * FileName = C:dataSIRENAseacat awhexfiles20080809_stn3_d1.hex * Software Version 1.59 * Temperature SN = 5236 * Conductivity SN = 5236 * System UpLoad Time = Aug 10 2008 14:20:50 ** KN192-05 SeacatSIRENA OC449-2 Seacat ** Nov-Dec 2007 GMTAugust 2008 ** TMCR or McLane DeploymentMcLane Deployments ** Lat Long16N28.712, 52W21.563 ** Station 3, McLane Deploy 1 to 740m * ds * SeacatPlus V 1.6b SERIAL NO. 5236 10 Aug 2008 18:17:09 * vbatt = 11.1, vlith = 8.8, ioper = 61.6 ma, ipump = 40.3 ma, * iext01 = 42.8 ma * iext23 = 50.6 ma * * status = not logging * number of scans to average = 1 * samples = 79872, free = 361633, casts = 1 * mode = profile, minimum cond freq = 3046, pump delay = 60 sec * autorun = no, ignore magnetic switch = no * battery type = alkaline, battery cutoff = 7.3 volts * pressure sensor = strain gauge, range = 10000.0 * SBE 38 = no, Gas Tension Device = no * Ext Volt 0 = yes, Ext Volt 1 = yes, Ext Volt 2 = yes, Ext Volt 3 = yes * echo commands = yes * output format = raw HEX * append UCSD sigma-t, V * S> * * SeacatPlus V 1.6b SERIAL NO. 5236 10 Aug 2008 18:17:23 * temperature: 10-oct-07 * TA0 = 1.233097e-03 * TA1 = 2.599901e-04 * TA2 = -6.217010e-08 * TA3 = 1.424099e-07 * TOFFSET = 0.000000e+00 * conductivity: 10-oct-07 * G = -1.011156e+00 * H = 1.570412e-01 * I = -5.888161e-04 * J = 6.994908e-05 * CF0 = 2.546154e+03 * CPCOR = -9.570000e-08 * CTCOR = 3.250000e-06 * CSLOPE = 1.000000e+00 * pressure S/N = 227881, range = 10000 psia: 04-oct-07 * PA0 = 1.049048e+01 * PA1 = 1.113019e-01 * PA2 = -1.291358e-09 * PTCA0 = 5.244870e+05 * PTCA1 = 4.940270e+00 * PTCA2 = 4.455964e-03 * PTCB0 = 2.759300e+01 * PTCB1 = 3.766667e-03 * PTCB2 = 0.000000e+00 * PTEMPA0 = 5.933266e+01 * PTEMPA1 = -5.963576e+01 * PTEMPA2 = 1.426064e+01 * POFFSET = 0.000000e+00 * volt 0: offset = -4.723474e-02, slope = 1.247667e+00 * volt 1: offset = -4.757158e-02, slope = 1.247768e+00 * volt 2: offset = -4.668316e-02, slope = 1.246813e+00 * volt 3: offset = -4.697684e-02, slope = 1.247485e+00 * EXTFREQSF = 1.000012e+00 * dh * cast 1 09 Aug 2008 16:14:04 samples 1 to 79872, avg = 1, stop = mag switch * S> # nquan = 15 # nvalues = 760 # units = specified # name 0 = tv290C: Temperature [ITS-90, deg C] # name 1 = c0S/m: Conductivity [S/m] # name 2 = prdM: Pressure, Strain Gauge [db] # name 3 = sbeox0Mm/Kg: Oxygen, SBE 43 [umol/Kg] # name 4 = bat: Beam Attenuation, Chelsea/Seatech/Wetlab CStar [1/m] # name 5 = flECO-AFL: Fluorescence, Wetlab ECO-AFL/FL [mg/m^3] # name 6 = upoly0: Upoly 0, Turbidity Meter # name 7 = v1: Voltage 1 # name 8 = sbeox0V: Oxygen Voltage, SBE 43 # name 9 = sal00: Salinity [PSU] # name 10 = sigma-é00: Density [sigma-theta, Kg/m^3] # name 11 = depSM: Depth [salt water, m], lat = 12 # name 12 = potemp090C: Potential Temperature [ITS-90, deg C] # name 13 = oxsatML/L: Oxygen Saturation [ml/l] # name 14 = flag: flag # span 0 = 6.3620, 29.2534 # span 1 = 1.230963, 5.842750 # span 2 = 1.006, 765.785 # span 3 = 106.811, 215.696 # span 4 = -0.0179, 4.9453 # span 5 = -0.1484, 15.6959 # span 6 = 0.0114213, 4.6879689 # span 7 = 1.9703, 4.8128 # span 8 = 1.3021, 2.6530 # span 9 = 7.4903, 37.2916 # span 10 = 1.4659, 27.3130 # span 11 = 1.000, 760.000 # span 12 = 6.2928, 29.2531 # span 13 = 4.44782, 6.87465 # span 14 = 0.0000e+00, 0.0000e+00 # interval = meters: 1 # start_time = Aug 09 2008 16:14:04 # bad_flag = -9.990e-29 # sensor 0 = Frequency 0 temperature, 5236, 10-OCT-07 # sensor 1 = Frequency 1 conductivity, 5236, 10-OCT-07, cpcor = -9.5700e-08 # sensor 2 = Pressure Number # sensor 3 = Extrnl Volt 0 Oxygen, SBE, primary, 1336, 02-Oct-07 # sensor 4 = Extrnl Volt 1 transmissometer, primary, CST-1070DR, 9-Aug-08 # sensor 5 = Extrnl Volt 2 WET Labs, ECO_AFL # sensor 6 = Extrnl Volt 3 userpoly 0, FLNTURTD-870, 9-OCT-2007 # datcnv_date = Sep 01 2008 16:47:14, 7.14e # datcnv_in = c:dataSIRENAseacat awhexfiles20080809_stn3_d1.hex C:dataSIRENAseacatprocessed20080901OC449-2SIRENA.con # datcnv_skipover = 500 # alignctd_date = Sep 01 2008 16:47:21, 7.14e # alignctd_in = c:dataSIRENAseacatprocessed20080809_stn3_d1.cnv # alignctd_adv = tv290C 0.500, c0S/m -0.100, sbeox0Mm/Kg 4.000 # celltm_date = Sep 01 2008 16:47:22, 7.14e # celltm_in = c:dataSIRENAseacatprocessed20080809_stn3_d1.cnv # celltm_alpha = 0.0400, 0.0000 # celltm_tau = 8.0000, 0.0000 # celltm_temp_sensor_use_for_cond = primary, # Derive_date = Sep 01 2008 16:47:23, 7.14e # Derive_in = c:dataSIRENAseacatprocessed20080809_stn3_d1.cnv C:dataSIRENAseacatprocessed20080901OC449-2SIRENA.con # binavg_date = Sep 01 2008 16:47:34, 7.14e # binavg_in = c:dataSIRENAseacatprocessed20080809_stn3_d1.cnv # binavg_bintype = meters # binavg_binsize = 1 # binavg_excl_bad_scans = no # binavg_skipover = 0 # binavg_surface_bin = yes, min = 0.000, max = 0.000, value = 0.000 # split_date = Sep 01 2008 16:47:49, 7.14e # split_in = c:dataSIRENAseacatprocessed20080809_stn3_d1bin1m.cnv # split_excl_bad_scans = yes # file_type = ascii *END*

OC449-03

Website	https://www.bco-dmo.org/deployment/58663

Platform	R/V Oceanus
Start Date	2008-09-08
End Date	2008-09-18

Description	R/V Oceanus Voyage #449, Leg III was a Coastal transect between Cape Verde and the Mauritanian coast (17N/24.5W to 20N/17.3W). The main scientific objective was to test the hypothesis that the continental margin of northwest Africa provides a significant subsurface supply of iron to the open eastern tropical Atlantic. The planned scientific activities include CTD casts, In Situ Water Pump casts for large volume water collection, Gravity Coring, and Aerosol sampling. Scientific personnel: Dr. Phoebe Lam, Chief Scientist, Woods Hole Oceanographic Institution Dr. Henrieta Dulaiova, Woods Hole Oceanographic Institution Mr. Steven Pike, Woods Hole Oceanographic Institution Mr. James Saenz, Woods Hole Oceanographic Institution Dr. Aron Stubbins, Old Dominion University Ms. Hongmei Chen, Old Dominion University Dr. Edward Michael Perdue, Georgia Institute of Technology Mr. Nelson Green, Georgia Institute of Technology Mr. Péricles Silva, Instituto Nacional de Desenvolvimento das Pescas (INDP) Dr. Anibal Medina, Instituto Nacional de Desenvolvimento das Pescas (INDP) Mr. Alexander Dorsk, Woods Hole Oceanographic Institution WHOI cruise planning synopsis> Cruise information and original data are available from the NSF R2R data catalog. **Methods & Sampling** * Sea-Bird SBE19plus Data File: * FileName = C:dataSIRENAseacat awhexfiles20080809_stn3_d1.hex * Software Version 1.59 * Temperature SN = 5236 * Conductivity SN = 5236 * System UpLoad Time = Aug 10 2008 14:20:50 ** KN192-05 SeacatSIRENA OC449-2 Seacat ** Nov-Dec 2007 GMTAugust 2008 ** TMCR or McLane DeploymentMcLane Deployments ** Lat Long16N28.712, 52W21.563 ** Station 3, McLane Deploy 1 to 740m * ds * SeacatPlus V 1.6b SERIAL NO. 5236 10 Aug 2008 18:17:09 * vbatt = 11.1, vlith = 8.8, ioper = 61.6 ma, ipump = 40.3 ma, * iext01 = 42.8 ma * iext23 = 50.6 ma * * status = not logging * number of scans to average = 1 * samples = 79872, free = 361633, casts = 1 * mode = profile, minimum cond freq = 3046, pump delay = 60 sec * autorun = no, ignore magnetic switch = no * battery type = alkaline, battery cutoff = 7.3 volts * pressure sensor = strain gauge, range = 10000.0 * SBE 38 = no, Gas Tension Device = no * Ext Volt 0 = yes, Ext Volt 1 = yes, Ext Volt 2 = yes, Ext Volt 3 = yes * echo commands = yes * output format = raw HEX * append UCSD sigma-t, V * S> * * SeacatPlus V 1.6b SERIAL NO. 5236 10 Aug 2008 18:17:23 * temperature: 10-oct-07 * TA0 = 1.233097e-03 * TA1 = 2.599901e-04 * TA2 = -6.217010e-08 * TA3 = 1.424099e-07 * TOFFSET = 0.000000e+00 * conductivity: 10-oct-07 * G = -1.011156e+00 * H = 1.570412e-01 * I = -5.888161e-04 * J = 6.994908e-05 * CF0 = 2.546154e+03 * CPCOR = -9.570000e-08 * CTCOR = 3.250000e-06 * CSLOPE = 1.000000e+00 * pressure S/N = 227881, range = 10000 psia: 04-oct-07 * PA0 = 1.049048e+01 * PA1 = 1.113019e-01 * PA2 = -1.291358e-09 * PTCA0 = 5.244870e+05 * PTCA1 = 4.940270e+00 * PTCA2 = 4.455964e-03 * PTCB0 = 2.759300e+01 * PTCB1 = 3.766667e-03 * PTCB2 = 0.000000e+00 * PTEMPA0 = 5.933266e+01 * PTEMPA1 = -5.963576e+01 * PTEMPA2 = 1.426064e+01 * POFFSET = 0.000000e+00 * volt 0: offset = -4.723474e-02, slope = 1.247667e+00 * volt 1: offset = -4.757158e-02, slope = 1.247768e+00 * volt 2: offset = -4.668316e-02, slope = 1.246813e+00 * volt 3: offset = -4.697684e-02, slope = 1.247485e+00 * EXTFREQSF = 1.000012e+00 * dh * cast 1 09 Aug 2008 16:14:04 samples 1 to 79872, avg = 1, stop = mag switch * S> # 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celltm_in = c:dataSIRENAseacatprocessed20080809_stn3_d1.cnv # celltm_alpha = 0.0400, 0.0000 # celltm_tau = 8.0000, 0.0000 # celltm_temp_sensor_use_for_cond = primary, # Derive_date = Sep 01 2008 16:47:23, 7.14e # Derive_in = c:dataSIRENAseacatprocessed20080809_stn3_d1.cnv C:dataSIRENAseacatprocessed20080901OC449-2SIRENA.con # binavg_date = Sep 01 2008 16:47:34, 7.14e # binavg_in = c:dataSIRENAseacatprocessed20080809_stn3_d1.cnv # binavg_bintype = meters # binavg_binsize = 1 # binavg_excl_bad_scans = no # binavg_skipover = 0 # binavg_surface_bin = yes, min = 0.000, max = 0.000, value = 0.000 # split_date = Sep 01 2008 16:47:49, 7.14e # split_in = c:dataSIRENAseacatprocessed20080809_stn3_d1bin1m.cnv # split_excl_bad_scans = yes # file_type = ascii *END*

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Project Information

Sources of Iron to the EasterN tropical Atlantic (SIRENA)

Website: http://www.whoi.edu/sbl/liteSite.do?litesiteid=24492

Coverage: Tropical North Atlantic, focusing on a Cape Verde to Mauritanian Coast transect

We will test the hypothesis that the continental margin of northwest Africa provides a significant subsurface supply of iron to the open eastern tropical Atlantic that supplements dust.

We will test our continental margin hypothesis with a wintertime visit to the new Tropical Eastern North Atlantic Time-Series Observatory (TENATSO) near Cape Verde, located in the eastern tropical Atlantic about 850 km downstream of Mauritanian coastal upwelling, and a summertime cross-shelf transect from the Mauritanian coast to TENATSO with Ed Boyle, who is already funded to study iron in the tropical Atlantic. Our cross-shelf transect will closely examine the potential lateral source of Fe, and evaluate it against an atmospheric source of Fe. Our proposal takes advantage of a novel combination of measurements to uniquely determine the importance of lateral transport vs. dust inputs and subsurface remineralization as Fe sources to the surface ocean. These measurements include:

1) synchrotron x-ray analysis of particulate iron "hotspots": micron-size particles of iron detected with a synchrotron x-ray fluorescence microprobe have been previously shown to exhibit maxima at depths of continental margin input in two ocean basins. Further, the Ti:Fe ratios and the mineralogy of these particles of iron can distinguish dust-derived vs. continental margin iron. This is a qualitative tracer for a dust vs continental margin source of Fe.

2) radium isotopes: the major source of 228Ra into the study area is by diffusion from 232Th-bearing near shore and continental shelf sediments. An open-ocean to coastal transect of 228Ra activities will allow us to determine horizontal mass transfer. 228Ra will be used to quantify the lateral flux of iron from the shelf.

3) 234Th profiles: high vertical resolution 234Th profiles can be used to determine the depth of particle remineralization. This will be used to determine whether or not putative subsurface Fe maxima are from remineralization of Fe-bearing particles.

TENATSO (Tropical Eastern North Atlantic Time-Series Observatory) time series station
16°N, 24°W, North-east of Mindelo, Sao Vicente, Cape Verde

TENATSO Home

TENATSO/SIRENA at Cafe Thorium/WHOI

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Program Information

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 CO2 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.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0726367

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