CTD cast temperature, salinity, oxygen, and other measurements from R/V Oceanus cruise OC454-02 in the Mediterranean Sea (Pickled Protists project)

Website: https://www.bco-dmo.org/dataset/3400
Version:
Version Date: 2011-01-03

Project
» Pickled Protists or Community Uniquely Adapted to Hypersalinity? (Pickled Protists)

Contributors	Affiliation	Role
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Dataset Description

11 CTD casts were done during the cruise to identify the depth of the brine layer and collect water samples using the Niskin bottles.

Casts were distributed between two brine basins, and the Comment field in the data indicates whether a CTD cast was in the vicinity of the Discovery or Urania brine basin. The cast comments recorded prior to acquisition are:

cast 3: intending to sample the interface. 3590 as published in Waller, and which coincides with our CTD data. Salinometer readings are more or less same as seawater, but this is misleading because the Na conc in the brine is 68 (VanderWielen), which is the reading that Kostas got with the salinometer for water we believe is brine (soapy, low or undetectable oxygen). Using the Fornari camera here.
cast 5: the coordinates for this site were different from Yakimov. We are at 35 13.51N and 21 28.24E
cast 6: GOING TO INT.
cast 7: Second CTD cast to interface. This time need to go a little deeper
cast 8: last sample was too deep so now targeting
cast 9: to interface
cast 11: joan's multicore 1 site "on bottom" coords

Methods & Sampling

11 CTD casts were done during the cruise. Data were recovered from the WHOI Data Library and Archives. CTD profile data were recovered from the Seabird *.cnv files processed during the cruise.

No information was contributed as to any quality assurance done during the cruise. CTD profile data files from 11 casts were processed during the cruise using the Seabird software utilities. All casts (except for 9) were pressure binned (binavg_* routines). The cast 9 data file processing stopped after the loopedit step; no binavg done.

Seabird CTD header from cast 11 .cnv file:

* Sea-Bird SBE 9 Data File:
* FileName = C:dataoc454-20011.hdr
* Software Version Seasave V 7.18d
* Temperature SN = 4303
* Conductivity SN = 2707
* Number of Bytes Per Scan = 40
* Number of Voltage Words = 5
* Number of Scans Averaged by the Deck Unit = 1
* System UpLoad Time = Aug 03 2009 22:29:34
* NMEA Latitude = 35 20.14 N
* NMEA Longitude = 021 40.17 E
* NMEA UTC (Time) = Aug 03 2009 22:29:33
* Store Lat/Lon Data = Append to Every Scan

```
** this is joan's multicore 1 site "on bottom" coords
# nquan = 22
# nvalues = 3917
# units = specified
# name 0 = prDM: Pressure, Digiquartz [db]
# name 1 = t090C: Temperature [ITS-90, deg C]
# name 2 = t190C: Temperature, 2 [ITS-90, deg C]
# name 3 = sal00: Salinity [PSU]
# name 4 = sal11: Salinity, 2 [PSU]
# name 5 = c0S/m: Conductivity [S/m]
# name 6 = c1S/m: Conductivity, 2 [S/m]
# name 7 = sbeox0V: Oxygen Voltage, SBE 43
# name 8 = sbeox0ML/L: Oxygen, SBE 43 [ml/l]
# name 9 = xmiss: Beam Transmission, Chelsea/Seatech/Wetlab CStar [%]
# name 10 = density00: Density [density, Kg/m^3]
# name 11 = flECO-AFL: Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
# name 12 = upoly0: Upoly 0, WetLabs Turbidity
# name 13 = altM: Altimeter [m]
# name 14 = sbeox1V: Oxygen Voltage, SBE 43, 2
# name 15 = sbeox1ML/L: Oxygen, SBE 43, 2 [ml/l]
# name 16 = sbeox0ML/L: Oxygen, SBE 43 [ml/l], WS = 2
# name 17 = sal00: Salinity [PSU]
# name 18 = sbeox1ML/L: Oxygen, SBE 43, 2 [ml/l], WS = 2
# name 19 = sal11: Salinity, 2 [PSU]
# name 20 = depSM: Depth [salt water, m], lat = 35.3357
# name 21 = flag: flag
# span 0 =      2.000,   3638.000
# span 1 =    13.8108,    27.0088
# span 2 =    13.8108,    27.0112
# span 3 =    38.7345,    97.3056
# span 4 =    38.7987,    97.2901
# span 5 =   4.640047,  11.543013
# span 6 =   4.645992,  11.574247
# span 7 =     0.5036,     3.3284
# span 8 =  -23.97469,    5.90225
# span 9 =    -3.8414,    98.8069
# span 10 =  1025.7462,  1089.5758
# span 11 =    -0.0330,     1.0039
# span 12 =  0.0494042,  2.0979324
# span 13 =       5.97,      99.63
# span 14 =     0.5409,     3.0223
# span 15 =  -41.88372,    5.70259
# span 16 =  -58.50867,    5.88089
# span 17 =    38.7345,    97.3128
# span 18 =  -46.32159,    5.69958
# span 19 =    38.7987,    97.2938
# span 20 =      1.985,   3580.853
# span 21 = 0.0000e+00, 0.0000e+00
# interval = decibars: 1
# start_time = Aug 03 2009 22:29:34
# bad_flag = -9.990e-29
# sensor 0 = Frequency  0  temperature, primary, 4303, 2008-09-25
# sensor 1 = Frequency  1  conductivity, primary, 2707, 2008-09-24, cpcor = -9.5700e-08
# sensor 2 = Frequency  2  pressure, 69685, 12/18/2002
# sensor 3 = Frequency  3  temperature, secondary, 4312, 2008-09-23
# sensor 4 = Frequency  4  conductivity, secondary, 2768, 2008-09-25, cpcor = -9.5700e-08
# sensor 5 = Extrnl Volt  0  WET Labs, ECO_AFL
# sensor 6 = Extrnl Volt  1  userpoly 0, FLNTURTD-1013, 2008-04-18
# sensor 7 = Extrnl Volt  2  transmissometer, primary, CST-1117DR, 2008-04-30
# sensor 8 = Extrnl Volt  4  altimeter
# sensor 9 = Extrnl Volt  5  Oxygen, SBE, primary, 0794, 2009-03-13
# sensor 10 = Extrnl Volt  6  userpoly 1, Flashbird-5
# sensor 11 = Extrnl Volt  7  Oxygen, SBE, secondary, 0072, 2009-05-13
# sensor 12 = Extrnl Volt  9  surface irradiance (SPAR), degrees = 0.0
# datcnv_date = Aug 04 2009 00:03:54, 7.15
# datcnv_in = c:ctd_processingoc454-20011.hex c:ctd_processingoc454-20011.CON
# datcnv_skipover = 0
# wildedit_date = Aug 04 2009 00:04:07, 7.15
# wildedit_in = c:ctd_processingoc454-20011.cnv
# wildedit_pass1_nstd = 2.0
# wildedit_pass2_nstd = 20.0
# wildedit_pass2_mindelta = 1.000e+000
# wildedit_npoint = 100
# wildedit_vars = prDM t090C t190C sal00 sal11 c0S/m c1S/m sbeox0V sbeox0ML/L xmiss density00 flECO-AFL upoly0 altM sbeox1V sbeox1ML/L
# wildedit_excl_bad_scans = yes
# filter_date = Aug 04 2009 00:04:23, 7.15
# filter_in = c:ctd_processingoc454-20011.cnv
# filter_low_pass_tc_A = 0.030
# filter_low_pass_tc_B = 0.100
# filter_low_pass_A_vars = sal00 sal11 c0S/m c1S/m sbeox0V sbeox0ML/L xmiss density00 flECO-AFL upoly0 sbeox1V sbeox1ML/L
# filter_low_pass_B_vars = prDM
# alignctd_date = Aug 04 2009 00:04:53, 7.15
# alignctd_in = c:ctd_processingoc454-20011.cnv
```

```
# alignctd_adv = sbeox0V 4.000, sbeox0ML/L 4.000
# celltm_date = Aug 04 2009 00:05:09, 7.15
# celltm_in = c:ctd_processingoc454-20011.cnv
# celltm_alpha = 0.0300, 0.0300
# celltm_tau = 7.0000, 7.0000
# celltm_temp_sensor_use_for_cond = primary, secondary
# loopedit_date = Aug 04 2009 00:05:25, 7.15
# loopedit_in = c:ctd_processingoc454-20011.cnv
# loopedit_minVelocity = 0.100
# loopedit_surfaceSoak: do not remove
# loopedit_excl_bad_scans = yes
# Derive_date = Aug 04 2009 00:05:47, 7.15
# Derive_in = c:ctd_processingoc454-20011.cnv c:ctd_processingoc454-20011.CON
# derive_time_window_docdt = seconds: 2
# binavg_date = Aug 04 2009 00:06:08, 7.15
# binavg_in = c:ctd_processingoc454-20011.cnv
# binavg_bintype = decibars
# binavg_binsize = 1
# binavg_excl_bad_scans = yes
# binavg_skipover = 0
# binavg_surface_bin = no, min = 0.000, max = 0.000, value = 0.000
# file_type = ascii
*END*
```

Data Processing Description

No post-cruise processing was done and there are no plans to do any futher processing of these data.

Data Files

File
CTD.csv (Comma Separated Values (.csv), 7.22 MB) MD5:bbf67a7e1a17e26eb2d77f9dc9a0c9cd
Primary data file for dataset ID 3400

Parameters

Parameter	Description	Units
cast	CTD cast number	integer
date	start date (UTC) of cast as YYYYMMDD	YYMMMDD
time	start time (UTC) of cast as HHMM	HHMM
lon	longitude (positive is East)	decimal degrees
lat	latitude (positive is North)	decimal degrees
Pmax	maximum pressure recorded during cast	decibars
Comment	comment indicating station location	dimensionless
press	water pressure from CTD Digiquartz sensor	decibars
temp	water temperature from primary T0 sensor (ITS-90)	degrees Celsius
sal	salinity from CTD (PSU) (from primary T0 and C0 sensors)	dimensionless
sigma_0	water potential density - 1000	kilograms/meter^3
temp_S	water temperature from secondary T1 sensor (ITS-90)	degrees Celsius
sal_S	salinity from CTD (PSU) (from secondary T1 and C1 sensors)	dimensionless
cond	conductivity from primary C0 sensor	Siemens/meter
cond_S	conductivity from secondary C1 sensor	Siemens/meter
O2_ml_L	dissolved Oxygen from SBE 43	milliliters/liter
chl_a_fluor	fluorescence from Wetlab ECO-AFL/FL; rescaled units are numerically equivalent to chlorophyll-a concentrations	milligrams/meter^3
turbid_v	turbidity from WetLabs sensor	volts
trans	transmissometer from primary CST-1117DR sensor	percent
depth	water depth calculated from CTD pressure using starting latitude for each cast	meters

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Instruments

Dataset-specific Instrument Name	CTD Sea-Bird SBE 911plus
Generic Instrument Name	CTD Sea-Bird SBE 911plus
Generic Instrument Description	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

Dataset-specific Instrument Name	SBE 43 Dissolved Oxygen Sensor
Generic Instrument Name	Sea-Bird SBE 43 Dissolved Oxygen Sensor
Dataset-specific Description	Oxygen, SBE, primary, 0794, 2009-03-13
Generic Instrument Description	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

Dataset-specific Instrument Name	Transmissometer
Generic Instrument Name	Transmissometer
Dataset-specific Description	primary, CST-1117DR, 2008-04-30
Generic Instrument Description	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.

Dataset-specific Instrument Name	Wet Labs ECO-AFL/FL Fluorometer
Generic Instrument Name	Wet Labs ECO-AFL/FL Fluorometer
Generic Instrument Description	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

Dataset-specific Instrument Name	WetLabs FLNTU
Generic Instrument Name	WetLabs FLNTU
Dataset-specific Description	FLNTURTD-1013, 2008-04-18
Generic Instrument Description	The WetLabs ECO FLNTU is a dual-wavelength, single-angle sensor for simultaneously determining both chlorophyll fluorescence and turbidity. It detects light scattered by particles suspended in water, generating an output voltage proportional to turbidity or suspended solids. Scaling factors are used to convert the voltage readings to values representing chlorophyll concentration and turbidity expressed in Nephelometric Turbidity Units (NTUs).

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Deployments

OC454-02

Website	https://www.bco-dmo.org/deployment/58164
Platform	R/V Oceanus
Report	http://data.bco-dmo.org/Protists_2009/OC454-02_cruise_report.pdf
Start Date	2009-07-28
End Date	2009-08-05
Description	This cruise aboard Oceanus from Piraievs, Greece did field work in the Mediterranean Sea for the NSF OCE funded project: "Pickled Protists or Community Uniquely Adapted to Hypersalinity?". The cruise dates are from the Final UNOLS schedule (ID #10808 Version #7 Date: 1/5/2010) and agree with the cruise dates specified in the UNOLS Post-Cruise Assessment Report filed by the Chief Scientist. The cruise dates, 7-25 - 8-05-2009, from the R2R cruise catalog include the previous transit cruise during which no sampling was done for this project. The original science objectives included collection of water column and sediment samples at 3 different hypersaline anoxic basins, L'Atalante, Discovery, and Urania. The plan was to collect Niskin samples and SID samples (a WHOI sampler that carries out in situ fixation) from above the halocline, within the halocline, and within the brine of each basin (3 depths, two types of samples per depth, Niskin and SID). Researchers also planned to collect multicores from the bottom sediments where the halocline impinged on the seafloor, a reference sample from above the halocline, and a sample within the brine (3 depths along a transect through the halocline) from two of the basins. Science activities conducted during the cruise included sampling in two of the three basins, Discovery and Urania Basin: (1) 11 CTD casts to various depths as needed to support sampling objectives as determined by the depth of the halocline (2) Water samples were collected from Niskin bottle from 3 designated depths from two basins (3) SID samples were collected from Discovery Basin, but the SID malfunctioned due to extreme depth before a complete sampling program could be completed in Urania Basin (4) Partially successful deployments of the multicorer at Discovery Basin yielded some multicores from within the brine and above the halocline, but attempts to collect a halocline sample were unsuccessful. A brine sediment sample was successfully collected at Urania Basin, but repeated attempts to collect multicores failed. Multicore sampling was negatively affected by several factors: the tubes failed to close properly, the multicorer didn't fire properly, and researchers had difficulty locating the halocline since neither the multicorer nor the CTD instrument package had a functioning camera system. Although the original cruise plan included sample collection in a third basin (L'Atalante Basin), only two basins were occupied. The cruise plan was adjusted when equipment malfunctions negatively impacted the success of the coring work. The decision was made that co-PI Bernhard should collect some sediment cores from the second basin, Urania Basin, on the last day of the cruise instead of conducting the water column sampling in the third basin. More information is included in the 4 August 2010 Cruise report prepared by K. Kormas, M. Pachiadaki and P. Sigala (cruise report PDF file). Funded by: NSF OCE-0849578 (see abstract from NSF site) Cruise information and original data are available from the NSF R2R data catalog

Project Information

Pickled Protists or Community Uniquely Adapted to Hypersalinity? (Pickled Protists)

Coverage: Mediterranean Sea

Protists are an essential component of microbial food webs and play a central role in global biogeochemical cycles, and thus are key players in sustaining the healthy functioning of any ecosystem. Over the past few years a rich diversity of protists has been revealed in a range of extreme environments, indicating that the frontiers of eukaryotic life are still being explored. Only recently, one of the most extreme marine environments known to science was discovered in the eastern Mediterranean Sea at a depth of ~3500m, namely deep hypersaline anoxic basins (DHABs). These basins are characterized by extremely high salt concentrations (up to saturation) that have been considered anathema to life. Instead, highly diverse communities of bacteria exist in the waters of these basins. With the exception of a preliminary study to this proposal that indicated a diverse and active assemblage of protists in the water column along the halocline and below the halocline, these DHABs remain largely unexplored regarding eukaryotic life forms. The sediments of the DHABs have not been explored for protists at all.

The investigators will collect water column and sediment samples on a short cruise to two basins with different brine chemistries. An exciting combination of molecular, cultivation-independent and culture-based approaches will be used to study the microbial communities of two basins. Investigators will use those approaches to determine adaptive strategies of marine protist communities to hypersaline, anoxic environments and the degree of their potential impact on biogeochemical cycling as a result of their predation activities, the degree to which the dominant protists maintain bacterial or archaeal symbionts, and the identity of those symbionts. The original research proposal identified Bannock and Discovery Basins as the field study areas, however the 2009 cruise collected samples at Discovery and Urania Basin. Methods to be employed include RNA-based sequence analysis of diversity based on 18S rDNA genes, statistical analyses of community composition and phylotype richness, geochemical documentation of the water column and sediments using classical and microelectrode approaches, expression profiling using 3'-UTR fragments of mRNAs, sequencing of complete gene transcripts for proteins appearing to confer adaptation to hypersalinity, analysis of the proteome signatures, FISH-SEM to characterize novel extremophiles, CARD-FISH to identify eukaryote prey and putative symbionts, and TEM to assess morphology and endobiont presence in common benthic morphotypes.

Hypersaline environments rank highly in the list of extreme systems that have attracted increasing notice in science as well as by the lay public. For example, considering predictions of increasing temperatures and drought in certain regions of our planet, the

number of hypersaline habitats may increase dramatically causing this ecosystem to gain importance on a global scale. Thus, an understanding of the ecosystem in these habitats will help predict future ecosystem functioning due to global change. From a different perspective, revealing the mechanisms of adaptation to high salinity has become a major objective, both for biological science and for potential commercial exploitation of natural products associated with those adaptations.

Funding