CTD profiles collected from the R/V Atlantis cruise AT18-14 from the Eastern Mediterranean Sea in 2011 (Pickled Protists project)

Website: https://www.bco-dmo.org/dataset/3618
Version: 14 February 2012
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Project
» Pickled Protists or Community Uniquely Adapted to Hypersalinity? (Pickled Protists)

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Dataset Description

Standard CTD measurements plus bio-optical measurements are reported from three CTD casts.

Data Processing Description

Bottom values where salinity exceeded the sensor limit of 40 PSU were removed from the profle.

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Data Files

File
CTD.csv (Comma Separated Values (.csv), 1.20 MB) MD5:7350ad11855ed499f7eea7c6a138b129 Primary data file for dataset ID 3618

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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
prmax	maximum pressure recorded during cast	decibars
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
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
fluor	fluorescence from WET Labs ECO-AFL/FL	micrograms/meter^3
sound_vel	Sound Velocity (Delgrosso method)	meters/second
potemp	Potential Temperature	degrees C
density	density of seawater	kilograms/meter^3

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Instruments

Dataset-specific Instrument Name	SBE 43 Dissolved Oxygen Sensor
Generic Instrument Name	Sea-Bird SBE 43 Dissolved Oxygen Sensor
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 the manufacturer: https://www.seabird.com/products/sbe-43-dissolved-oxygen-sensor

Dataset-specific Instrument Name	CTD Sea-Bird SBE 911plus
Generic Instrument Name	Sea-Bird SBE 911plus CTD
Generic Instrument Description	[tethered, real-time] 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	Transmissometer
Generic Instrument Name	Transmissometer
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

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Deployments

AT18-14

Website	https://www.bco-dmo.org/deployment/58732
Platform	R/V Atlantis
Start Date	2011-11-25
End Date	2011-12-08
Description	According to the pre-cruise plan, the two main science objectives are: (1) water column sampling at two basins: Discovery and Urania Basins, at 3 depths: brine (approx 3500-4000m depth), halocline (~3500m), and reference (~2000m) using a new sampler, the SID-ISMS (under construction), with the vessel CTD/Niskin rosette as backup and (2) sediment coring at both basins, using ROV Jason. Cores will be collected in 3 locations for each basin, the "bathtub ring" where the halocline impinges on the seafloor, the brine, and a reference core sample from above the halocline. Station "Discovery" (35° 19.213' N 21° 41.351' E) will be occupied for 6 days as will "Station 2" (35° 13.674' N 21° 28.58' E). The proposed science activities include: (1) water column sampling using the SID-ISMS to collect in situ filtered water (ship must hold position during deployment while instrument is working) and preserved in situ for molecular work; (2) water column sampling using the SID-ISMS to collect in situ filtered and preserved samples for FISH/microscopy experiments; (3) grazing experiment using SID-ISMS to collect water from halocline of each basin and measure the grazing rates of protozoa over a 6 hour period. The instrument must remain at depth during the 6 hour SID-ISMS grazing experiments. The sampler can be lifted to ~3000 m depth to get it away from the bottom, but the ship must maintain position to avoid dragging the sampler; (4) coring of "bathtub ring" at each basin using the ROV Jason that will be used to locate the bathtub ring and then collect cores at that location; (5) coring of brine at each basin (ROV Jason will reach into the brine from the bathtub ring area and will collect cores). Corers will be a combination of large Jason pushcores (property of co-PI Bernhard) and also some RNAlater samplers (similar to those used by Tim Shank (WHOI). The RNAlater samplers must be fabricated (and perhaps some borrowed from the Shank lab group); and (6) coring of a reference sample from outside the halocline (above) at each basin (normal seawater sediments). The research team aboard the R/V Atlantis, headed south on 25 November 2011 from Piraeus (port of Athens, Greece), to the study areas about 100 miles west of the island of Crete. No cruise report will be submitted for this cruise, but the science party did maintain a blog at the Dive and Discover site for Dive and Discover Expedition 14 - The Mediterranean Deep Brines (URL: http://www.divediscover.whoi.edu/expedition14/index.html). During the cruise, 5 ROV Jason dives, 10 SID-ISMS deployments, 1 multicorer (no samples recovered), and 3 Niskin rosette casts were completed. Image data from the ROV Jason dives for the AT18-14 cruise are available from the WHOI ROV Jason Virtual Van by clicking the year 2011 on the page's left side panel, and then clicking on the link for AT18-14. The cruise was supported by NSF-BIOLOGY awards: http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=0849578 (Edgcomb) http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=1061391 (Bernhard) Original cruise data are available from the NSF R2R data catalog

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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.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0849578

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