CTD data from ARSV Laurence M. Gould LMG1110 in the Southern Ocean from November to December 2011 (Salp_Antarctic project)

Website: https://www.bco-dmo.org/dataset/559174
Data Type: Cruise Results
Version: final
Version Date: 2015-05-26

Project

» Population ecology of Salpa thompsoni based on molecular indicators (Salp_Antarctic)

Contributors	Affiliation	Role
Bucklin, Ann	University of Connecticut (UConn - Avery Point)	Principal Investigator
Warren, Joseph	Stony Brook University - SoMAS (SUNY-SB SoMAS)	Co-Principal Investigator
Allison, Dicky	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

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Coverage

Spatial Extent: **N**:-60.735 **E**:-53.5638 **S**:-65.0817 **W**:-68.8352
Temporal Extent: 2011-11-11 - 2011-11-25

Dataset Description

This is from the cruise report (see LGM1110 deployment page for link) and particulary pertains to the Fluorescence data that were collected:

"Preliminary CTD Results: A total of 20 CTD stations were occupied and sampled during the cruise. Hydrographic data were collected in all sampling regions of the study. Casts were sent to the shallower of 1,000 m or 5-10 m above the bottom. The primary fluorometer was mis-calibrated (had the wrong scale factor in the calibration/processing file), so fluorescence data from the first four (or five) stations (Stns #22, #7, #8, #11) had to be re-processed with the correct scaling factor. Examination of the *.cnv file showed which casts had the miscalibrated data, as the max reading for fluorescence was ~ 0.05 mg/m3. For nearly every other station, maximum fluorescence readings were > 1.0 mg/m3. A secondary fluorometer was added to the CTD rosette between Stns #11 and #12, which verified that the issue was with the scale factor in the CTD processing software."

The data that are served have warnings about fluorescence numbers in the headers of the casts at Stations 22, 7, 8 and 11.

Variables that were part of the data that have been rendered invisible from the data online are: Elapsed time in seconds, modulo error count (always zero), and nbin (number of scans per bin). Those numbers are available upon request.

IEDA has published a DOI for another version of this dataset: 'Bucklin, A., (2015). 'Calibrated Hydrographic Data from Drake Passage acquired with a CTD during the Laurence M. Gould expedition LMG1110 (2011).

doi: .

Data Files

File
ctd_cruise.csv(Comma Separated Values (.csv), 4.09 MB) MD5:b5f698e48ff2ad25e5f8914a70f04323 Primary data file for dataset ID 559174

Parameters

Parameter	Description	Units
station_std	standard station numbers (as opposed to consecutive station numbers)	number
cast	CTD cast number	number
lat_start	latitude at the start of the cast	decimal degrees; negative = South of Equator
lon_start	longitude at the start of the cast	decimal degrees; negative = West of Greenwich
day_gmt	day of the month in Greenwich Mean Time (a.k.a.UTC)	two digit day
month_gmt	month of the year in Greenwich Mean Time (a.k.a.UTC)	two digit month
year	year	four digit year
time_start_gmt	time at the start of the cast: "NMEA UTC (Time)"	HH:MM:SS
ISO_DateTime_UTC	ISO 8601 standard date and time	ISO format
press	water pressure at the point of data collection; can be considered depth within certain conditions	decibars
depth_w	water depth at the data collection point	meters
temp	water temperature [ITS-90] from primary sensor	degrees C

temp_2	water temperature [ITS-90] from secondary sensor	degrees C
temp_diff	temperature difference; secondary sensor - primary sensor	degrees C
cond	conductivity from primary sensor	milliSiemens per centimeter [mS/cm]
cond_2	conductivity from secondary sensor	milliSiemens per centimeter [mS/cm]
O2_um_Kg	dissolved oxygen from primary CTD sensor	micromoles per Kilogram
O2_ml_L	dissolved oxygen from primary CTD sensor	milliliters per Liter
O2_um_Kg_2	dissolved oxygen from secondary CTD sensor	micromoles per Kilogram
O2_ml_L_2	dissolved oxygen from secondary CTD sensor	milliliters per Liter
fluor	fluorescence	milligrams per cubic meter
lat	latitude	decimal degrees; negative = South
lon	longitude	decimal degrees; negative = West
sal_diff	practical salinity difference; secondary sensor - primary sensor	PSU
cond_diff	conductivity difference; secondary sensor - primary sensor	milliSiemens per centimeter [mS/cm]
sigma_t	water density from primary sensors	kilograms per cubic meter - 1000
density_2	water density from secondary sensors	kilograms per cubic meter
potemp	Potential Temperature [ITS-90] from primary sensors	degrees C
potemp_2	Potential Temperature [ITS-90] from secondary sensors	degrees C
sound_vel	sound velocity [using Chen-Millero equation]	meters per second

sal	salinity from primary sensor	practical salinity units (PSU)
sal_2	salinity from secondary sensor	practical salinity units (PSU)

[ ]

Instruments

Dataset-specific Instrument Name	CTD
Generic Instrument Name	CTD Sea-Bird SBE 911plus
Dataset-specific Description	The Sea-Bird 911+ offers real-time operation via sea cable telemetry, includes a solid state memory module, and has a maximum depth of 6800 m. The CTD is mounted on a 24-bottle General Oceanics rosette.
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	Dissolved Oxygen sensors
Generic Instrument Name	Sea-Bird SBE 43 Dissolved Oxygen Sensor
Dataset-specific Description	Calibration sheet for primary Dissolved oxygen sensor with model and serial numbers. Calibration sheet for secondary Dissolved oxygen sensor with model and serial numbers. (This calibration sheet is not well reproduced.)
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	Primary Temperature Sensor
Generic Instrument Name	Sea-Bird SBE-3 Temperature Sensor
Dataset-specific Description	Calibration Page of the primary sensor with model and serial numbers. Calibration Page of the secondary sensor with model and serial numbers.
Generic Instrument Description	The SBE-3 is a slow response, frequency output temperature sensor manufactured by Sea-Bird Electronics, Inc. (Bellevue, Washington, USA). It has an initial accuracy of +/- 0.001 degrees Celsius with a stability of +/- 0.002 degrees Celsius per year and measures seawater temperature in the range of -5.0 to +35 degrees Celsius. more information from Sea-Bird Electronics

Dataset-specific Instrument Name	Conductivity sensors
Generic Instrument Name	Sea-Bird SBE-4 Conductivity Sensor
Dataset-specific Description	Calibration sheet for primary conductivity sensor with model and serial numbers. Calibration sheet for secondary conductivity sensor with model and serial numbers.
Generic Instrument Description	The Sea-Bird SBE-4 conductivity sensor is a modular, self-contained instrument that measures conductivity from 0 to 7 Siemens/meter. The sensors (Version 2; S/N 2000 and higher) have electrically isolated power circuits and optically coupled outputs to eliminate any possibility of noise and corrosion caused by ground loops. The sensing element is a cylindrical, flow-through, borosilicate glass cell with three internal platinum electrodes. Because the outer electrodes are connected together, electric fields are confined inside the cell, making the measured resistance (and instrument calibration) independent of calibration bath size or proximity to protective cages or other objects.

Dataset-specific Instrument Name	Fluorometer
Generic Instrument Name	Wet Labs ECO-AFL/FL Fluorometer
Dataset-specific Description	Calibration page for first fluorometer. "The primary fluorometer was mis-calibrated (had the wrong scale factor in the calibration/processing file), so fluorescence data from the first four (or five) stations (Stns #22, #7, #8, #11) had to be re-processed with the correct scaling factor. Examination of the *.cnv file showed which casts had the miscalibrated data, as the max reading for fluorescence was ~ 0.05 mg/m3. For nearly every other station, maximum fluorescence readings were > 1.0 mg/m3. A secondary fluorometer was added to the CTD rosette between Stns #11 and #12, which verified that the issue was with the scale factor in the CTD processing software." (from Cruise Report) The Default Scale Factor in the Calibration sheet, 25, is the correct scale factor and was not the one used for the first four CTDs. (2,3,5,6 from stations 22,7,8,and 11, respectively) The fluorescence in those casts should not be used until corrected.
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

Deployments

LMG1110

Website	https://www.bco-dmo.org/deployment/58728
Platform	ARSV Laurence M. Gould
Report	http://data.bcodmo.org/LMG11-10/LMG11-10_Cruise_Report_06dec11.pdf
Start Date	2011-11-02
End Date	2011-12-01
Description	UNOLS STRS record: http://strs.unols.org/Public/diu_cruise_view.aspx?cruise_id=127242 The primary science objectives of the cruise are to examine genome-wide patterns of gene expression, target gene expression levels, and patterns of population genetic diversity and structure of the Antarctic salp, Salpa thompsoni in relation to biological and physical environmental parameters in the Western Antarctic Peninsula region. High-frequency acoustics data will be used to provide information about the distribution of salps, krill, and other zooplankton. Sampling from shelf and oceanic waters between 0 and 2,000 meters will take place at selected stations using a 1-meter^2 MOCNESS to characterize the planktonic assemblage, and a Reeve net to collect live material for molecular and biochemical analysis. Environmental parameters to be measured include standard hydrographic variables (temperature, salinity, and depth), as well as fluorescence and turbidity. Water samples will be collected using a CTD rosette to determine chlorophyll concentration. An additional science objective is to develop a method of using acoustics to assess the abundance and distribution of salps in the Southern Ocean. Cruise Data Report

Project Information

Population ecology of Salpa thompsoni based on molecular indicators (Salp_Antarctic)

Coverage: Southern Ocean

The Antarctic salp, *Salpa thompsoni*, is an increasingly important player in the vulnerable Antarctic Peninsula pelagic ecosystem. Observations of high abundance of Salpa thompsoni during the summer in the Southern Ocean suggest that this species is capable of rapid somatic and population growth, and frequently forms dense blooms under favorable environmental conditions. The proposed research will examine genome-wide patterns of gene expression, target gene expression levels, and patterns of population genetic diversity and structure of the target salp species. Our preliminary results and data analysis have provided a promising basis for transcriptomic studies of *S. thompsoni* in the Southern Ocean. The proposed next steps in our genomic/transcriptomic analysis of *Salpa thompsoni* are: 1) completion of a reference transcriptome as a basis for genome-wide analysis of gene expression; 2) whole transcriptome shotgun sequencing (RNA-Seq) analysis to characterize gene expression in relation to individual characteristics and environmental conditions; 3) quantitative real-time PCR (qRT-PCR) characterization and validation of gene expression for 10-20 top differentially-expressed genes; and 4) detection of strand-specific allelic variation at SNP (Single Nucleotide Polymorphic) sites to analyze clonal diversity and population genetic diversity and structure. We hypothesize that: 1) deep analysis of the Salpa thompsoni transcriptome will reveal significant associations among selected set of differentially-expressed genes and critical life history stages and events (e.g., ontogenetic maturation, sexual reproduction, senescence) of the salp; and 2) the species will show variable levels of clonal diversity and significant genetic differentiation among salp populations in different regions of the Southern Ocean. Samples will be obtained from research cruises during 2011-2013 in diverse regions of the Southern Ocean; dedicated sample and data collection will be carried out during a cruise of the R/V LM GOULD (LMG11-10) to the Western

Antarctic Peninsula region in November, 2011. The significance of this effort lies in new understanding of the molecular processes underlying the complex life history and population dynamics of *S. thompsoni* in relation to the Antarctic pelagic ecosystem and extreme and variable environmental conditions of the Southern Ocean.

Most of the data from this project are available from the Marine Geoscience Data System (MGDS), part of IEDA and is available at http://www.marine-geo.org/tools/search/Files.php?data_set_uid=18148.

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Funding

Funding Source	Award
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