

# Alongtrack data collected continuously by the ship's underway acquisition system from ARSV Laurence M. Gould cruise LMG1110 in the Southern Ocean in 2011

**Website:** <https://www.bco-dmo.org/dataset/3636>

**Version:** 30 May 2012

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## Project

» [Population ecology of \*Salpa thompsoni\* based on molecular indicators](#) (Salp\_Antarctic)

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## Coverage

**Spatial Extent:** N:-52.7606 E:-53.5462 S:-65.0827 W:-69.3806

**Temporal Extent:** 2011-11-02 - 2011-12-01

## Dataset Description

This alongtrack data set consists of a single file produced for each day of the LMG1110 cruise, from 11/2/2011 to 12/1/2011. Data were obtained primarily by applying calibrations to raw data and decimating to whole point intervals. However, several fields are derived measurements from more than a single raw input.

IEDA has published a DOI for another version of this dataset: 'Underway Hydrographic, Weather and Ship-state Data (JGOFS) from Laurence M. Gould expedition LMG1110 (2011)' [10.1594/IEDA/318148](https://doi.org/10.1594/IEDA/318148)

## Methods & Sampling

The LMG alongtrack data acquisition systems continuously log data from a suite of instruments throughout the cruise.

For information about events and known problems with acquisition, see the [Cruise Data Report](#).

## Data Processing Description

**BCO-DMO Processing Notes and Edits:** BCO-DMO obtained the data in .dat format and made the following edits: Space and tab delimiters were replaced with commas. Values originally used to indicate null,

unusual, or unknown values (i.e. "9999" or "999.99") were replaced with "nd". Two columns that were labeled "Not used" were omitted from display (these were columns 11 and 20 in original .dat files). Original time in format of hh:mm:ss was removed from display. "time\_gmt", "month\_gmt", "day\_gmt" and "yrday" were calculated and added to the display.

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## Data Files

File
<b>alongtrack.csv</b> (Comma Separated Values (.csv), 5.41 MB) MD5:1e0908842bd1db08d1e9755e07ea378d Primary data file for dataset ID 3636

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## Parameters

Parameter	Description	Units
date	day, month, year (GMT time) e.g. 26/11/11. Name changed from "GMT date" to "date" during data processing. Format is dd/mm/yy.	dd/mm/yy
time_gmt	Time GMT, 24 hour clock. Name changed from "GMT time" to "time_gmt" during data processing. Values converted from hh:mm:ss format to hhmm.ss format.	decimal hours
lat	Latitude, negative = South. Name changed from "PCOD latitude" to "lat" during data processing.	decimal degrees
lon	Longitude, negative = West. Name changed from "PCOD longitude" to "lon" during data processing.	decimal degrees
sog	Speed over ground. Name changed from "Ships speed" to "sog" during data processing.	knots
gps_hdop	Horizontal Dilution of Position is an indicator of the precision of the GPS measurement. The lower the number, the more precise the position. Name changed from "GPS HDOP" to "gps_hdop" during data processing.	-
head	The ship's heading, measured by the Gyroscope. Name changed from "Gyro Heading" to "head" during data processing.	Degrees(azimuth)
cog	Course over ground. Name changed from "Course over ground" to "cog" during data processing.	Degrees(azimuth)
PAR_mast	Downwelled Photosynthetically Available Radiation 400-700nm (PAR), sensor package mounted on ship's science mast. Name changed from "Mast PAR" to "PAR_mast" during data processing.	uE/m2/sec
temp_ss	Sea surface temperature. Name changed from "Sea surface temperature" to "temp_ss" during data processing.	degrees C
sal_ss	Sea surface salinity. Name changed from "Sea surface salinity" to "sal_ss" during data processing.	PSU
wind_speed	Wind speed (true, port windbird). Name changed from "True wind speed" to "wind_speed" during data processing.	meters/sec
wind_dir	Wind direction (true, port windbird). Name changed from "True wind direction" to "wind_dir" during data processing.	degrees(azimuth)
temp_air	Ambient air temperature. Name changed from "Ambient air temperature" to "temp_air" during data processing.	degrees C
rel_hum	Relative humidity. Name changed from "Relative humidity" to "rel_hum" during data processing.	%
air_press	Barometric pressure. Name changed from "barometric pressure" to "air_press" during data processing.	milliBars
PIR	Long wave radiation, using a Precision Infrared Radiometer.	watts/meters2
PSP	Short wave radiation, using a Precision Spectral Pyranometer.	watts/meters2
yrday	Jan. 1 = yrday 0. GMT day and decimal time, as 325.5 for the 326th day of the year, or November 22 at 1200 hours (noon). Values derived from the "date" field.	integer
depth_w	Sea depth, uncorrected, calc. sw sound vel. 1500 m/s. Name changed from "Sea depth" to "depth_w" during data processing.	m
fluor_ss	Sea surface fluorometry. Name changed from "Sea surface fluorometry" to "fluor_ss" during data processing.	volts (0-5 FSO)
month_gmt	Month, GMT. Values derived from the "date" field.	mm
day_gmt	Day, GMT. Values derived from the "date" field.	dd
year	year in yyyy format	unitless

## Instruments

<b>Dataset-specific Instrument Name</b>	Anemometer
<b>Generic Instrument Name</b>	Anemometer
<b>Dataset-specific Description</b>	Gill Ultrasonic Wind Observer II; provided continuous measurement of port wind speed and direction. Further information is in the instrument datasheet.
<b>Generic Instrument Description</b>	An anemometer is a device for measuring the velocity or the pressure of the wind. It is commonly used to measure wind speed. Aboard research vessels, it is often mounted with other meteorological instruments and sensors.

<b>Dataset-specific Instrument Name</b>	Barometer
<b>Generic Instrument Name</b>	Barometer
<b>Dataset-specific Description</b>	R.M. Young 61201
<b>Generic Instrument Description</b>	A barometer is an instrument used to measure atmospheric pressure. There are many types of barometers identified by make and model and method of measurement.

<b>Dataset-specific Instrument Name</b>	Eppley Longwave Radiometer
<b>Generic Instrument Name</b>	Eppley Longwave Radiometer
<b>Dataset-specific Description</b>	Eppley PIR; measures longwave radiation
<b>Generic Instrument Description</b>	The Eppley Precision Infrared Radiometer (PIR) pyrgeometer measures longwave (infrared) radiation. It is housed in a weatherproof titanium canister that has been painted with a very flat black paint that absorbs radiation. A small glass dome at the top of the instrument is covered with an 'interference coating' which allows only infrared radiation to come through. Light levels are detected as temperature changes creating voltages in fine wire coil detectors. more from Eppley Labs

<b>Dataset-specific Instrument Name</b>	Fluorometer
<b>Generic Instrument Name</b>	Fluorometer
<b>Dataset-specific Description</b>	WET Labs ECO-FL (Serial Number FLRTD-399); provides continuous operation when powered, with 6,000-m depth rating. Further information about this instrument is in the user's guide.
<b>Generic Instrument Description</b>	A fluorometer or fluorimeter is a device used to measure parameters of fluorescence: its intensity and wavelength distribution of emission spectrum after excitation by a certain spectrum of light. The instrument is designed to measure the amount of stimulated electromagnetic radiation produced by pulses of electromagnetic radiation emitted into a water sample or in situ.

<b>Dataset-specific Instrument Name</b>	Global Positioning System Receiver
<b>Generic Instrument Name</b>	Global Positioning System Receiver
<b>Dataset-specific Description</b>	Trimble 20636-00SM, Seapath 330, Garmin 17
<b>Generic Instrument Description</b>	The Global Positioning System (GPS) is a U.S. space-based radionavigation system that provides reliable positioning, navigation, and timing services to civilian users on a continuous worldwide basis. The U.S. Air Force develops, maintains, and operates the space and control segments of the NAVSTAR GPS transmitter system. Ships use a variety of receivers (e.g. Trimble and Ashtech) to interpret the GPS signal and determine accurate latitude and longitude.

<b>Dataset-specific Instrument Name</b>	Gyro
<b>Generic Instrument Name</b>	Gyro
<b>Dataset-specific Description</b>	Raytheon Anschutz gyro.
<b>Generic Instrument Description</b>	Compass with a motorized gyroscope that tracks true north (heading).

<b>Dataset-specific Instrument Name</b>	Hygrometer
<b>Generic Instrument Name</b>	Hygrometer
<b>Dataset-specific Description</b>	Model: R.M. Young 41372LC; Probe used to measure Air Temp and Relative Humidity on LMG1110 cruise. Calibrated range: -50 to 50 degrees C. More information on this instrument is available from Campbell Scientific.
<b>Generic Instrument Description</b>	Hygrometers are used for measuring relative humidity. This term is used when details of the make, model number and measurement principle are not known.

<b>Dataset-specific Instrument Name</b>	MicroTSG Thermosalinograph
<b>Generic Instrument Name</b>	MicroTSG Thermosalinograph
<b>Dataset-specific Description</b>	SeaBird 45; used for continuous measure of salinity. For further information, see the spec sheet.
<b>Generic Instrument Description</b>	An externally powered, high-accuracy instrument, designed for shipboard determination of sea surface (pumped-water) conductivity and temperature. Salinity and sound velocity can also be computed.

<b>Dataset-specific Instrument Name</b>	Photosynthetically Available Radiation Sensor
<b>Generic Instrument Name</b>	Photosynthetically Available Radiation Sensor
<b>Dataset-specific Description</b>	Biosph. Instr. QSR-240P
<b>Generic Instrument Description</b>	A PAR sensor measures photosynthetically available (or active) radiation. The sensor measures photon flux density (photons per second per square meter) within the visible wavelength range (typically 400 to 700 nanometers). PAR gives an indication of the total energy available to plants for photosynthesis. This instrument name is used when specific type, make and model are not known.

<b>Dataset-specific Instrument Name</b>	Precision Spectral Pyranometer
<b>Generic Instrument Name</b>	Precision Spectral Pyranometer
<b>Dataset-specific Description</b>	Eppley PSP; measures shortwave radiation
<b>Generic Instrument Description</b>	This radiometer measures sun and sky irradiance in the range of wavelengths 0.285 to 2.8 microns, including most of the solar spectrum. The PSP is intended to weight the energy flux in all wavelengths equally. It is a "hemispheric receiver" intended to approximate the cosine response for oblique rays. The Eppley Precision Spectral Pyranometer (PSP) is primarily used where high accuracy is required or where it is used to calibrate other pyranometers. The PSP outputs a low level voltage ranging from 0 to a maximum of about 12mV depending on sensor calibration and radiation level. An instruction manual provided by Eppley contains the sensor calibration constant and serial number. The Precision Spectral Pyranometer is a World Meteorological Organization First Class Radiometer and comes with a calibration certificate traceable to the World Radiation Reference and a temperature compensation curve. More information is available from Eppley Labs.

<b>Dataset-specific Instrument Name</b>	Radiometer
<b>Generic Instrument Name</b>	Radiometer
<b>Dataset-specific Description</b>	Biosh. Inst. GUV-2511. For more information, search on "GUV Series" at Biospherical Instruments.
<b>Generic Instrument Description</b>	Radiometer is a generic term for a range of instruments used to measure electromagnetic radiation (radiance and irradiance) in the atmosphere or the water column. For example, this instrument category includes free-fall spectral radiometer (SPMR/SMSR System, Satlantic, Inc), profiling or deck cosine PAR units (PUV-500 and 510, Biospherical Instruments, Inc). This is a generic term used when specific type, make and model were not specified.

<b>Dataset-specific Instrument Name</b>	Thermometer
<b>Generic Instrument Name</b>	Water Temperature Sensor
<b>Dataset-specific Description</b>	SeaBird 38 Digital Remote Thermometer used to measure sea surface temperature. For further information, see the spec sheet.
<b>Generic Instrument Description</b>	General term for an instrument that measures the temperature of the water with which it is in contact (thermometer).

<b>Dataset-specific Instrument Name</b>	Wet Labs CSTAR Transmissometer
<b>Generic Instrument Name</b>	WET Labs {Sea-Bird WETLabs} C-Star transmissometer
<b>Dataset-specific Description</b>	Wet Labs C-Star 25 cm deep. For more information, see the spec sheet.
<b>Generic Instrument Description</b>	The C-Star transmissometer has a novel monolithic housing with a highly integrated opto-electronic design to provide a low cost, compact solution for underwater measurements of beam transmittance. The C-Star is capable of free space measurements or flow-through sampling when used with a pump and optical flow tubes. The sensor can be used in profiling, moored, or underway applications. Available with a 6000 m depth rating. More information on Sea-Bird website: <a href="https://www.seabird.com/c-star-transmissometer/product?id=6076246717">https://www.seabird.com/c-star-transmissometer/product?id=6076246717</a>

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## Deployments

LMG1110

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/58728">https://www.bco-dmo.org/deployment/58728</a>
<b>Platform</b>	ARSV Laurence M. Gould
<b>Report</b>	<a href="http://data.bcodmo.org/LMG11-10/LMG11-10_Cruise_Report_06dec11.pdf">http://data.bcodmo.org/LMG11-10/LMG11-10_Cruise_Report_06dec11.pdf</a>
<b>Start Date</b>	2011-11-02
<b>End Date</b>	2011-12-01
<b>Description</b>	UNOLS STRS record: <a href="http://strs.unols.org/Public/diu_cruise_view.aspx?cruise_id=127242">http://strs.unols.org/Public/diu_cruise_view.aspx?cruise_id=127242</a> 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, <i>Salpa thompsoni</i> 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 <sup>2</sup> 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

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## 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](http://www.marine-geo.org/tools/search/Files.php?data_set_uid=18148).



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## Funding

Funding Source	Award
<a href="#">NSF Antarctic Sciences (NSF ANT)</a>	<a href="#">ANT-1044982</a>

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