Sediment trap chlorophyll a and phaeopigment flux from the "SalpPOOP" cruise on R/V Tangaroa during October and November 2018

Website: https://www.bco-dmo.org/dataset/813859
Data Type: Cruise Results
Version: 1
Version Date: 2020-06-02

Project
» Collaborative Research: Quantifying trophic roles and food web ecology of salp blooms of the Chatham Rise (Salp Food Web Ecology)

Contributors	Affiliation	Role
Stukel, Michael	Florida State University (FSU)	Principal Investigator
Decima, Moira	New Zealand National Institute of Water and Atmospheric Research (NIWA)	Co-Principal Investigator
Kelly, Thomas	Florida State University (FSU)	Co-Principal Investigator
Nodder, Scott	New Zealand National Institute of Water and Atmospheric Research (NIWA)	Co-Principal Investigator
Rauch, Shannon	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
Sediment trap chlorophyll a and phaeopigment flux from the "SalpPOOP" cruise on R/V Tangaroa during October and November 2018.

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Coverage

Spatial Extent: **N**:-42.654 **E**:-179.7765 **S**:-45.54917 **W**:174.11167
Temporal Extent: 2018-10-24 - 2018-11-18

Methods & Sampling

Data comes from VERTEX-style, surface-tethered, drifting sediment trap deployments. Particle interceptor tubes were deployed on cross-pieces with 16 tubes attached. Tubes were deployed with a dense formaldehyde brine created by adding NaCl and formaldehyde to filtered seawater. After recovery, overlying seawater was removed from each cruise by gentle suction. Tubes were then gravity filtered through a 200-micron nitex mesh filter, and the 200-micron filters were carefully analyzed under a stereomicroscope and all metazoan zooplankton "swimmers" were removed from the sample. Material remaining on the 200-micron filters (i.e.,

sinking material) was then imaged with a macrophotography rig and subsequently rinsed back into the original sample tube (i.e., re-combined with the <200-micron sinking material). Samples were then separated and filtered onto different types of filters for a suite of different analyses including: particulate organic carbon flux, particulate nitrogen flux, carbon and nitrogen isotopes, chlorophyll a and phaeopigment flux, microscopy, genetic analyses, and 234Th flux.

Triplicate 50-mL subsamples for Chlorophyll a and phaeopigments were filtered onto GF/F filters under low vacuum pressure. Samples were then placed in glass vials and frozen at -80C. They were later thawed out, and 7-mL of acetone was added. Samples were placed in a -20C freezer for 24 hours. Samples were then analyzed on a 10-AU fluorometer for Chl a and phaeopigments following Strickland and Parsons (1972).

Data Processing Description

BCO-DMO Processing:
- converted latitude values from degrees South to degrees North;
- rounded lat and lon to 5 decimal places;
- added UTC date/time fields in ISO8601 format;
- renamed fields.

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Data Files

File
chl_phaeo.csv (Comma Separated Values (.csv), 3.73 KB) MD5:d6d0c25389d9312a5d455249805395d0 Primary data file for dataset ID 813859

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Parameters

Parameter	Description	Units
Cruise	Cruise name	unitless
Cycle	Lagrangian experiement number	unitless
Date_Deployed	Date/time of deployment (New Zealand ST); format: MM/DD/YY hh:mm	unitless
Deployed_ISO_DateTime_UTC	Date/time of deployment (UTC) formatted to ISO8601 standard: YYYY-MM-DDThh:mmZ	unitless
Date_Recovered	Date/time of recovery (New Zealand ST); format: MM/DD/YY hh:mm	unitless
Recovered_ISO_DateTime_UTC	Date/time of recovery (UTC) formatted to ISO8601 standard: YYYY-MM-DDThh:mmZ	unitless
Duration	Duration of deployment	days
Deployment_Lat	Latitude of deployment (positive values = North)	degrees North
Deployment_Lon	Longitude of deployment (positive values = East)	degrees East
Recovery_Lat	Latitude of recovery (positive values = North)	degrees North
Recovery_Lon	Longitude of recovery (positive values = East)	degrees East
Depth	Depth of deployment	meters (m)
Chl	Chlorophyll a flux	milligrams chl-a per square meter per day (mg Chl a m-2 d-1)
Chl_stdev	Standard deviation of Chlorophyll a flux	milligrams chl-a per square meter per day (mg Chl a m-2 d-1)
Phaeo	Phaeopigment flux	milligrams chl-a equivalents per square meter per day (mg Chl equivalents a m-2 d-1)
Phaeo_stdev	Standard deviation of Phaeopigment flux	milligrams chl-a equivalents per square meter per day (mg Chl equivalents a m-2 d-1)

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Instruments

Dataset-specific Instrument Name	Canon 5D mark II camera
Generic Instrument Name	Camera
Generic Instrument Description	All types of photographic equipment including stills, video, film and digital systems.

Dataset-specific Instrument Name	stereomicroscope
Generic Instrument Name	Microscope - Optical
Generic Instrument Description	Instruments that generate enlarged images of samples using the phenomena of reflection and absorption of visible light. Includes conventional and inverted instruments. Also called a "light microscope".

Dataset-specific Instrument Name	VERTEX-style, surface-tethered, drifting sediment trap
Generic Instrument Name	Sediment Trap
Generic Instrument Description	Sediment traps are specially designed containers deployed in the water column for periods of time to collect particles from the water column falling toward the sea floor. In general a sediment trap has a jar at the bottom to collect the sample and a broad funnel-shaped opening at the top with baffles to keep out very large objects and help prevent the funnel from clogging. This designation is used when the specific type of sediment trap was not specified by the contributing investigator.

Dataset-specific Instrument Name	10-AU fluorometer
Generic Instrument Name	Turner Designs Fluorometer 10-AU
Generic Instrument Description	The Turner Designs 10-AU Field Fluorometer is used to measure Chlorophyll fluorescence. The 10AU Fluorometer can be set up for continuous-flow monitoring or discrete sample analyses. A variety of compounds can be measured using application-specific optical filters available from the manufacturer. (read more from Turner Designs, turnerdesigns.com, Sunnyvale, CA, USA)

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Deployments

TAN1810

Website	https://www.bco-dmo.org/deployment/757070
Platform	R/V Tangaroa
Start Date	2018-10-23
End Date	2018-11-21

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Project Information

Collaborative Research: Quantifying trophic roles and food web ecology of salp blooms of the Chatham Rise (Salp Food Web Ecology)

Coverage: East of New Zealand, Chatham Rise area

NSF Award Abstract:
Salps are unique open-ocean animals that range in size from a few millimeters to greater than twenty centimeters, have a gelatinous (jelly-like) body, and can form long chains of many connected individuals. These oceanic organisms act as oceanic vacuum cleaners, having incredibly high feeding rates on phytoplankton and, unusual for consumers of their size, smaller bacteria-sized prey. This rapid feeding and the salps' tendency to form dense blooms, allows them move substantial amounts of prey carbon from the surface into the deep ocean, leading to carbon dioxide removal from the atmosphere. However, salps are often considered a trophic dead-end, rather than a link, in the food web due to the assumption that they themselves are not consumed, since their gelatinous bodies are less nutritious than co-occurring crustacean prey. Along with this, salp populations are hypothesized to be increasing due to climate change. This proposal addresses these questions: 1) Do salps compete primarily with crustaceans (as in the prevailing paradigm) or are they competitors of single-celled protists, which are the dominant grazers of small phytoplankton? 2) Do salp blooms increase the efficiency of food-web pathways from tiny phytoplankton to fisheries production in nutrient-poor ocean regions?

This project will support the interdisciplinary education of a graduate student who will learn modeling and laboratory techniques in the fields of biological and chemical oceanography and stimulate international collaborations between scientists in the United States and New Zealand. Additionally, several Education and Outreach initiatives are planned, including development of a week-long immersive high school class in biological oceanography, and education modules that will serve the "scientists-in-the schools" program in Tallahassee, FL.

It is commonly assumed that salps are a trophic sink. However, this idea was developed before the discovery that protists (rather than crustaceans) are the dominant grazers in the open ocean and was biased by the difficulty of recognizing gelatinous salps in fish guts. More recent studies show that salps are found in guts of a diverse group of fish and seabirds and are a readily available prey source when crustacean abundance is low. This proposal seeks to quantify food web flows through contrasting salp-dominated and salp-absent water parcels near the Chatham Rise off western New Zealand where salp blooms are a predictable phenomenon. The proposal will leverage previously obtained data on salp abundance, bulk grazing impact, and biogeochemical significance during Lagrangian experiments conducted by New Zealand-based collaborators. The proposal will determine 1) taxon- and size-specific phytoplankton growth rate measurements, 2) taxon- and size-specific protozoan and salp grazing rate measurements, 3) compound specific isotopic analysis of the amino acids of mesozooplankton to quantify the trophic position of salps, hyperiid amphipods, and other crustaceans, 4) sediment traps to quantify zooplankton carcass sinking rates, and 5) linear inverse ecosystem modeling syntheses. Secondary production and trophic flows from this well-constrained ecosystem model will be compared to crustacean-dominated and microbial loop-dominated ecosystems in similarly characterized regions (California Current, Costa Rica Dome, and Gulf of Mexico).

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1756465
NSF Division of Ocean Sciences (NSF OCE)	OCE-1756610

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