Carbon, nitrogen, d13C, and d15N water column data from the "SalpPOOP" cruise on R/V Tangaroa during October and November 2018

Website: https://www.bco-dmo.org/dataset/813731
Data Type: Cruise Results
Version: 1
Version Date: 2020-07-07

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

Contributors	Affiliation	Role
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Abstract
Carbon, nitrogen, d13C, and d15N water column data from the "SalpPOOP" cruise on R/V Tangaroa during October and November 2018.

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Coverage

Spatial Extent: **N**:-42.6622 **E**:-179.8847 **S**:-45.5557 **W**:179.9428
Temporal Extent: 2018-10-25 - 2018-11-18

Methods & Sampling

Samples were collected by Niskin bottle and transferred into 2.2-L amber polyethylene bottles. They were then immediately vacuum filtered through pre-combusted GF/F filters. Filters were covered in pre-combusted aluminum foil and placed in cryovials. They were then placed in a -80C filter until they could be dried in a drying oven for shipping. Post-cruise, samples were acidified with fuming HCl, then thoroughly dried again and put into tin capsules. Samples were analyzed by isotope ratio mass spectrometer at the U.C. Davis Stable Isotope Facility.

Data Processing Description

BCO-DMO Processing:
- changed date format to yyyy-mm-dd;
- rounded lat and lon to 4 decimal places;
- rounded POC, PN, d13C, and d15N to 2 decimal places;
- renamed fields.

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Data Files

File
POM.csv (Comma Separated Values (.csv), 11.08 KB) MD5:747e1bc8aaa6ab55cdb88b141c63af96 Primary data file for dataset ID 813731

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Parameters

Parameter	Description	Units
Date	Date (New Zealand Standard Time); format: yyyy-mm-dd	unitless
Cycle	Lagrangian experiment number	unitless
Event	Cruise event number	unitless
Lat	Latitude	degrees North
Lon	Longitude	degrees East
Depth	Depth	meters (m)
POC	Particulate organic carbon	micromoles C per liter (umol C L-1)
PN	Particulate nitrogen	micromoles N per liter (umol N L-1)
d13C	delta 13C	per mil
d15N	delta 15N	per mil

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Isotope-ratio Mass Spectrometer
Generic Instrument Description	The Isotope-ratio Mass Spectrometer is a particular type of mass spectrometer used to measure the relative abundance of isotopes in a given sample (e.g. VG Prism II Isotope Ratio Mass-Spectrometer).

Dataset-specific Instrument Name	
Generic Instrument Name	Niskin bottle
Generic Instrument Description	A Niskin bottle (a next generation water sampler based on the Nansen bottle) is a cylindrical, non-metallic water collection device with stoppers at both ends. The bottles can be attached individually on a hydrowire or deployed in 12, 24, or 36 bottle Rosette systems mounted on a frame and combined with a CTD. Niskin bottles are used to collect discrete water samples for a range of measurements including pigments, nutrients, plankton, etc.

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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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