CTD data collected off the Oregon Coast on three cruises aboard NOAA Ship Bell M. Shimada during 2018

Website: https://www.bco-dmo.org/dataset/837256
Data Type: Cruise Results
Version: 1
Version Date: 2021-01-20

Project
» RAPID: The ecological role of Pyrosoma atlanticum in the Northern California Current (NCC Pyrosomes)

Contributors	Affiliation	Role
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Abstract
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Coverage

Spatial Extent: **N**:45.48 **E**:-123.0855 **S**:38.19667 **W**:-128.772
Temporal Extent: 2018-02-27 - 2018-09-25

Methods & Sampling

CTD casts were made using a Seabird CTD 911 to near the sea floor (as deep as 2000m at some stations). Details of sampling and analytical procedures can be found in O'Loughlin et al. (2020).

Data Processing Description

BCO-DMO Processing:
- concatenated data from three separate cruise files into one dataset;
- added station latitude, longitude, depth, and transect name from the "ShimadaStations.xlsx" file;
- changed date format to YYYY-MM-DD;
- re-named fields.

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Data Files

File
CTD.csv (Comma Separated Values (.csv), 3.64 MB) MD5:bf08602f553c0af4f1a492c419f689e3 Primary data file for dataset ID 837256

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Related Publications

O'Loughlin, J. H., Bernard, K. S., Daly, E. A., Zeman, S., Fisher, J. L., Brodeur, R. D., & Hurst, T. P. (2020). Implications of Pyrosoma atlanticum range expansion on phytoplankton standing stocks in the Northern California Current. Progress in Oceanography, 188, 102424. doi:10.1016/j.pocean.2020.102424
Results

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Parameters

Parameter	Description	Units
Cruise	Cruise name	unitless
Date	Date, local; format: YYYY-MM-DD	unitless
Station	Station name	unitless
Depth_Seafloor	Sea floor depth	meters (m)
Latitude	Station latitude	degrees North
Longitude	Station longitude	degrees East
Transect	Transect name	unitless
Press	Pressure	decibars
Temp	Temperature	degrees Celsius
Cond	Conductivity	unitless
Sal	Salinity	psu
Den	Density	kilograms per cubic meter (kg/m3)
Oxy	Oxygen	milligrams per liter (mg/L)
Flo	Fluorescence	milligrams per cubic meter (mg/m3)

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	CTD Sea-Bird 911
Generic Instrument Description	The Sea-Bird SBE 911 is a type of CTD instrument package. The SBE 911 includes the SBE 9 Underwater Unit and the SBE 11 Deck Unit (for real-time readout using conductive wire) for deployment from a vessel. The combination of the SBE 9 and SBE 11 is called a SBE 911. The SBE 9 uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 and SBE 4). The SBE 9 CTD can be configured with auxiliary sensors to measure other parameters including dissolved oxygen, pH, turbidity, fluorescence, light (PAR), light transmission, etc.). More information from Sea-Bird Electronics.

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Deployments

SH-18-01

Website	https://www.bco-dmo.org/deployment/837249
Platform	NOAA Ship Bell M. Shimada
Start Date	2018-02-24
End Date	2018-03-05

SH-18-04

Website	https://www.bco-dmo.org/deployment/837252
Platform	NOAA Ship Bell M. Shimada
Start Date	2018-05-02
End Date	2018-05-11

SH-18-11

Website	https://www.bco-dmo.org/deployment/837254
Platform	NOAA Ship Bell M. Shimada
Start Date	2018-09-20
End Date	2018-09-29

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Project Information

RAPID: The ecological role of Pyrosoma atlanticum in the Northern California Current (NCC Pyrosomes)

Coverage: Northern California Current, Oregon Coast

NSF Award Abstract:

NSF Award Abstract:
In the last three years, fishermen off the coast of Oregon have been baffled and alarmed by the sudden appearance of thousands of rod-shaped, jelly-like animals, called pysrosomes, fouling their gear and dominating their catches. Beach-goers, too, have been fascinated by these creatures that can blanket the sand when washed up in the surf. This warm water species was rarely encountered north of southern California until the last three years, when they have become increasingly abundant in the Northern California Current (NCC) off the coast of Oregon and even up into the Gulf of Alaska. A recent fisheries survey caught 18,000 pyrosomes in a 5-minute trawl. The effect on local marine food webs is not clear, but pyrosomes could compete with other important species for food, potentially changing the marine food web of the NCC. Few studies have been conducted so understanding of the implications of increased pyrosome occurrence is limited. There is thus an urgent need to learn more about the species. This project provides insight into the possible ecological effects of pyrosomes in the NCC. The study will also benefit researchers working in other regions, like the Gulf of Alaska. Broader impacts will be strengthened by outreach. An undergraduate student will work on the project over the summer, gaining valuable research experience. The research team will create a display about pyrosomes in collaboration with the Visitor Center at the Hatfield Marine Science Center (Newport, OR). The lead investigator on the project will also work with the media outreach team at Oregon State University to produce a high-quality popular science article about the research to be distributed via various media streams, including online, in print, and via social media.

Pyrosoma atlanticum (commonly known as the pyrosome) is a warm water species of pelagic colonial tunicate that until recently had not occurred north of southern California. However, in the last three years, pyrosomes have become increasingly abundant in the Northern California Current (NCC) off the coast of Oregon, and as far north as the Gulf of Alaska, with implications for ecosystem productivity and fisheries. Preliminary data collected by the investigators show that pyrosome colonies off the Oregon Coast have extremely high grazing rates, suggesting that pyrosome blooms are capable of grazing significant amounts of phytoplankton standing stock. Indeed, in other parts of the world oceans, pyrosome blooms are capable of removing more than half of the phytoplankton standing stock in the top 10 m of the ocean. Pyrosome blooms in the NCC could outcompete other zooplankton grazers, such as copepods and euphausiids, thereby negatively affecting the higher trophic levels that rely on those crustaceans as prey. The effects on the food chain are likely to be significant. Pyrosomes have already been recorded in the stomach contents of a number of fish species, including Pacific halibut, rockfishes, sablefish, and Pacific salmon, yet their caloric content is half that of these fish species' preferred prey, krill. With increasing frequency of pyrosome blooms, there is an urgent need to assess their potential ecological implications in the NCC. Scientific understanding of the ecological role of pyrosomes in the global oceans is severely limited and the effects of the unprecedented continuous large blooms of pyrosomes in the NCC are unknown. This project is an intensive study on the role of pyrosomes in the pelagic food web and biogeochemical cycles of the NCC to answer the following research questions: (1) What proportion of the phytoplankton standing stock do pyrosome blooms remove daily? (2) What size fraction of the phytoplankton do pyrosomes preferentially graze upon in the NCC? (3) What is the contribution of pyrosomes to the flux of organic matter to the sea floor in the NCC?

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-1838492

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