Chlorophyll and phaeopigment data collected off the Oregon Coast on two cruises aboard NOAA Ship Bell M. Shimada during 2018

Website: https://www.bco-dmo.org/dataset/837587
Data Type: Cruise Results
Version: 1
Version Date: 2021-01-21

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

Contributors	Affiliation	Role
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Abstract
Chlorophyll and phaeopigment data collected off the Oregon Coast on two cruises aboard NOAA Ship Bell M. Shimada during 2018.

Table of Contents

- Coverage
- Dataset Description
  - Methods & Sampling
  - Data Processing Description
- Data Files
- Related Publications
- Parameters
- Instruments
- Deployments
- Project Information
- Funding

Coverage

Spatial Extent: **N**:44.6517 **E**:-123.0855 **S**:38.19667 **W**:-128.178
Temporal Extent: 2018-02-27 - 2018-05-10

Methods & Sampling

Seawater samples were collected from discrete depths during CTD casts using Niskin bottles attached to the CTD rosette. Sub-samples (100mL) of seawater were filtered onto GF/F filters and frozen at -20˚C for later analysis of chlorophyll-a and phaeopigment concentrations following the acidification technique described in the JGOFS protocols using a Turner 10AU fluorometer. Details of sampling and analytical procedures can be found in O'Loughlin et al. (2020).

Data Processing Description

BCO-DMO Processing:
- concatenated data from two 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.

[table of contents | back to top]

Data Files

File
chl.csv (Comma Separated Values (.csv), 22.11 KB) MD5:d461c38246abb92e7e0eaf3c247a0be9 Primary data file for dataset ID 837587

[table of contents | back to top]

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

[table of contents | back to top]

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
Depth	Depth of collection	meters (m)
Vol_Filt	Volume of seawater filtered	milliliters (mL)
Vol_Acet	Volume of acetone added	milliliters (mL)
FluoB	Fluorescence reading before acidification	unitless
FluoA	Fluorescence reading after acidification	unitless
Chl	Chlorophyll-a concentration	micrograms per liter (ug/L)
Phaeo	Phaeopigment concentration	micrograms per liter (ug/L)

[table of contents | back to top]

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.

Dataset-specific Instrument Name	Niskin bottles
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.

Dataset-specific Instrument Name	Turner 10AU 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).

[table of contents | back to top]

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

[table of contents | back to top]

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:
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.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1838492

[table of contents | back to top]