

Pyrosome gut pigment contents from samples collected off the Oregon Coast on two cruises aboard NOAA Ship Bell M. Shimada during 2018

Website: <https://www.bco-dmo.org/dataset/837640>

Data Type: Cruise Results

Version: 1

Version Date: 2021-01-22

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:-124.2948 S:41.9 W:-128.772

Temporal Extent: 2018-05 - 2018-09

Acquisition Description

Pyrosomes (*Pyrosoma atlanticum*) were picked out of zooplankton catches, counted and measured for total colony length (mm) and then frozen at -80°C for subsequent analysis of gut pigment content following the gut fluorescence technique. Details of sampling and analytical procedures can be found in O'Loughlin et al. (2020).

Processing Description

BCO-DMO Processing:

- concatenated data from two separate cruise files into one dataset;
- changed date format to YYYY-MM-DD;

- re-named fields;
- rounded values to three decimal places.

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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](https://doi.org/10.1016/j.pocean.2020.102424)
Results

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Parameters

| Parameter | Description | Units |
|------------|--|---|
| Cruise | Cruise name | unitless |
| Station | Station name | unitless |
| Lat | Station latitude | degrees North |
| Long | Station longitude | degrees East |
| Time_PST | Time, local; format: hh:mm | unitless |
| D_N | Day or night | unitless |
| Month | Month | unitless |
| Pyro_ID | Pyrosome identifier | unitless |
| Sub_Whole | Sub-sample (2) or whole (1) | unitless |
| Sub_WW | Sub-sample wet weight | grams (g) |
| Rem_WW | Remainder wet weight | grams (g) |
| Sub_Prop | Sub-sample proportion | unitless |
| SampGP | Sample gut pigment content | micrograms Chl (ug Chl) |
| Length | Colony length | centimeters (cm) |
| SampGut_cm | Sample gut pigment content per centimeter | micrograms Chl per centimeter (ug Chl/cm) |
| SampGut_g | Sample gut pigment content per gram | micrograms Chl per gram (ug Chl/g) |
| Gut_col | Gut pigment per colony | micrograms Chl per colony (ug Chl/col) |
| Gut_Cm | Gut pigment of whole colony per centimeter | micrograms Chl per centimeter (ug Chl/cm) |
| IR_col_hr | Ingestion rate per colony per hour | micrograms Chl per colony per hour (ug Chl/col/hr) |
| IR_cm_hr | Ingestion rate per cm of a colony per hour | micrograms Chl per centimeter per hour (ug Chl/cm/hr) |

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Instruments

| | |
|---|--|
| Dataset-specific Instrument Name | Bongo net |
| Generic Instrument Name | Bongo Net |
| Generic Instrument Description | A Bongo Net consists of paired plankton nets, typically with a 60 cm diameter mouth opening and varying mesh sizes, 10 to 1000 micron. The Bongo Frame was designed by the National Marine Fisheries Service for use in the MARMAP program. It consists of two cylindrical collars connected with a yoke so that replicate samples are collected at the same time. Variations in models are designed for either vertical hauls (OI-2500 = NMFS Pairovet-Style, MARMAP Bongo, CalVET) or both oblique and vertical hauls (Aquatic Research). The OI-1200 has an opening and closing mechanism that allows discrete "known-depth" sampling. This model is large enough to filter water at the rate of 47.5 m ³ /minute when towing at a speed of two knots. More information: Ocean Instruments, Aquatic Research, Sea-Gear |

| | |
|---|---|
| Dataset-specific Instrument Name | Turner Designs Trilogy |
| Generic Instrument Name | Fluorometer |
| Generic Instrument Description | 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. |

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Deployments

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:

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 pyrosomes, 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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