Lobate ctenophore in situ swimming velocities and morphometrics sampled off of Woods Hole, Massachusetts and the Kona coast of Hawaii, USA from 2019 to 2022

Website: https://www.bco-dmo.org/dataset/895989
Data Type: Other Field Results
Version: 1
Version Date: 2023-05-18

Project
» Collaborative Research: Quantifying the trophic roles of epipelagic ctenophores (Ocean Ctenos)

Contributors	Affiliation	Role
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Abstract
This dataset includes morphological and swimming data of lobate ctenophores swimming in the field. The data were collected by SCUBA divers using videography off of Woods Hole, Massachusetts (41°30'48.14"N, 70°41'36.56"W) and the Kona coast of Hawaii (19°34'55.24"N, 156°12'56.60"W) from 2019 to 2022. The videos were collected at various dates and locations depending on the lobate species.

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Coverage

Location: Data were collected either from waters of Woods Hole, MA or Kona, HI
Spatial Extent: **N**:41.5134 **E**:-70.6935 **S**:19.582 **W**:-156.216
Temporal Extent: 2019-08-15 - 2022-04-20

Methods & Sampling

Data were collected using SCUBA diving techniques off Woods Hole, Massachusetts, USA (41° 31' 36.7" N 70° 40' 30.6"W) and off the Kona coast of Hawaii, USA (19° 40' 10.5" N 156° 02' 46.4" W). Morphometric and behavioral data were collected using recordings from custom video underwater video/imaging systems of animals in their natural environment using SCUBA techniques. Morphometric parameters were quantified by

recording undisturbed individuals in the water column using high-resolution 4K video cameras (Sony AX100) with brightfield collimated-light optical systems (Townsend et al. 2020). From the video, we measured the total length, the lobe length, the lobe width, and opening width. In situ swimming speed was quantified from the videos by measuring the speed relative to ambient particles near the ctenophore. Only particles that were in the plane with the ctenophore and passed between or adjacent to the lobes were selected.

Data Processing Description

Videos were processed using ImageJ software.

BCO-DMO Processing Description

- Adjusted field/parameter names to comply with BCO-DMO naming conventions.
- Converted dates to format: YYYY-MM-DD.
- Latitude and longitude values were converted to decimal degrees, where negative values denote the Southern and Western hemispheres.
- Rounded values for latitude and longitude to 3 decimal places.

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Data Files

File
bco_swimming_velocity_data-1.csv (Comma Separated Values (.csv), 7.98 KB)   MD5:d88fc5699e5ee04d7ea157bf3d8cc32d   Primary data file for dataset 895989, version 1.

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Related Publications

Cordeiro, M., Costello, J. H., Gemmell, B. J., Sutherland, K. R., & Colin, S. P. (2022). Oceanic lobate ctenophores possess feeding mechanics similar to the impactful coastal species Mnemiopsis leidyi. Limnology and Oceanography, 67(12), 2706–2717. Portico. https://doi.org/10.1002/lno.12232
Results

Townsend, J. P., Tassia, M. G., Damian-Serrano, A., Whelan, N. V., Halanych, K. M., & Sweeney, A. M. (2020). A mesopelagic ctenophore representing a new family, with notes on family-level taxonomy in Ctenophora: Vampyroctena delmarvensis gen. nov. sp. nov. (Vampyroctenidae, fam. nov.). Marine Biodiversity, 50(3). https://doi.org/10.1007/s12526-020-01049-9
Methods

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Related Datasets

IsRelatedTo

Sutherland, K. R., Heimbichner Goebel, W., Colin, S., Costello, J. H., Gemmell, B. J. (2024) **Pleurobrachia bachei morphology and swimming parameters from samples collected at the Oregon Institute of Marine Biology, Coos Bay, Charleston, OR, in July 2018.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2023-04-28 doi:10.26008/1912/bco-dmo.894939.1 [view at BCO-DMO]

Parameters

Parameter	Description	Units
Genus	Genus of ctenophore collected for data	unitless
Collection	Sample location name	unitless
Date	Date of collection	unitless
Latitude	Latitude of sample location	decimal degrees
Longitude	Longitude of sample location (West is negative)	decimal degrees
Temperature	Ambient temperature at time of collection	degrees Celsius
Individual	Replicate number	unitless
Length	Total length of ctenophore (see figure 4 in Cordeiro et al., 2022)	millimeters (mm)
Gap	Opening length between lobes (see figure 4 in Cordeiro et al., 2022)	millimeters (mm)
Width	Width of the lobe (see figure 4 in Cordeiro et al., 2022)	millimeters (mm)
Lobe	Length of the lobe (see figure 4 in Cordeiro et al., 2022)	millimeters (mm)
Velocity	Swimming velocity of the ctenophore	millimeters per second (mm/s)

Instruments

Dataset-specific Instrument Name	SCUBA
Generic Instrument Name	Self-Contained Underwater Breathing Apparatus
Generic Instrument Description	The self-contained underwater breathing apparatus or scuba diving system is the result of technological developments and innovations that began almost 300 years ago. Scuba diving is the most extensively used system for breathing underwater by recreational divers throughout the world and in various forms is also widely used to perform underwater work for military, scientific, and commercial purposes. Reference: http://oceanexplorer.noaa.gov/technology/diving/diving.html

Dataset-specific Instrument Name	Sony AX100 video camera
Generic Instrument Name	Underwater Camera
Generic Instrument Description	All types of photographic equipment that may be deployed underwater including stills, video, film and digital systems.

Project Information

Collaborative Research: Quantifying the trophic roles of epipelagic ctenophores (Ocean Ctenos)

NSF Award Abstract:
Ctenophores are gelatinous predators found throughout the world's oceans, and their predatory impacts can profoundly affect planktonic communities. A variety of methods employed by marine scientists have converged to demonstrate the key roles these animals play in determining planktonic composition and energy flows in coastal systems. The role of oceanic ctenophores, however, is still sparsely documented. Oceanic ctenophores are characterized by more delicate gelatinous bodies that usually do not survive capture by conventional nets and do not perform naturally when transferred from their wall-less oceanic environment to shipboard bottles and containers. The difficulty in obtaining quantitative measurements on feeding by oceanic species has limited the ability to understand the role of these organisms in oceanic systems. This project will transform the capabilities to quantify key processes of oceanic ctenophores with in situ studies. However, ctenophores are not the only delicate oceanic animals that will benefit from developing advanced in situ methods. Similar techniques and approaches can be applied to other groups such as cnidarian siphonophores, pelagic molluscs, marine snow and large protists such as radiolarians. Additionally, successful application of these methods by divers will open the path for applications on Remotely Operated Vehicles (ROVs) and other submersibles that can greatly extend the depth and range of the techniques. Training of new scientists will involve postdoctoral, graduate and undergraduates. The investigators will broaden public science outreach by using contacts with media and aquariums involved in public education to communicate new findings to a wide public audience.

This project will address the challenge of obtaining information about the role and activity of pelagic oceanic ctenophores by adapting methods developed in the laboratory and employing them in a field setting. The investigators have adapted high-speed, high-resolution imaging and fluid-mechanics methods to the animal's in situ environment. These methods are particularly appropriate for field measurements of animals that are intractable for controlled laboratory studies and must be studied in situ, such as oceanic ctenophores. The goal in this project will be to apply high-speed, in situ particle image velocimetry (PIV) and bright field imaging systems to study a suite of oceanic ctenophores possessing distinct morphologies with potentially variable trophic roles to quantify: a) their flow and feeding mechanics; b) their ingestion rates and prey selection; and c) their trophic impacts. The results will enable inclusion of about the activities of these widespread and important animals in models of epipelagic food web dynamics.

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.

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1829932