Experimental results on swimming behaviors of four species of cnidarian hydromedusae at Friday Harbor in 2012 (Jellyfish predation in turbulence project)

Website: https://www.bco-dmo.org/dataset/650306
Data Type: experimental
Version:
Version Date: 2016-06-29

Project
» Influence of organism-scale turbulence on the predatory impacts of a suite of cnidarian medusae (jellyfish predation in turbulence)

Contributors	Affiliation	Role
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Dataset Description

Swimming behaviors of four species of cnidarian hydromedusae (*Aequorea victoria, Mitrocoma cellularia, Stomotoca atra, Aglantha digitale*) exposed to two flow conditions in a laboratory turbulence generator - still water and turbulent (ε ~10-7 m2 s-3) were examined.

A two-way ANOVA was used to test for significant effects of species, flow level (still and turbulent) and their interaction on swimming behavior parameters, including depth in the tank, observed speed, acceleration, NGDR, and time spent swimming. Raw data that did not meet the assumption of normality were square root transformed. Proportion data (NGDR, and time spent swimming) that did not meet the assumption of normality were arcsine square root transformed, which is appropriate for proportion data (Zar, 1999).

Related Datasets:
HydroSwimParams_N
HydroSwimParams_IndStats

Data Processing Description

BCO-DMO Processing:

- added conventional header with dataset name, PI name, version date
- renamed parameters to BCO-DMO and BODC standards
- added column 'id'
- shortened post-decimal sigificant digits from 15 to 4

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Data Files

File
ANOVA_means.csv (Comma Separated Values (.csv), 5.90 KB) MD5:fdd92c7d59e983f480eb90c008ddf1be Primary data file for dataset ID 650306

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Parameters

Parameter	Description	Units
species	hydromedusa genus	unitless
treatment	treatment: still or turbulent water	unitless
id	add by BCO-DMO to distinguish records	unitless
tank	tank identification	unitless
speed_mean	mean swimming speed	cm/sec
speed_max	maximum swimming speed	cm/sec
accel_mean	mean acceleration	cm/sec^2
swimtime_pcent_mean	mean time spent swimming	percent
NGDR_mean	mean net-to-gross displacement ratio	unitless
depth_mean	mean depth of swimming	cm

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Camera
Dataset-specific Description	Sony HDR-HC9 camcorder (1920 x 1080 pixels, 30 frames s-1; Sony Electronics Inc., Fort Myers, FL, USA) with a 16 x 9 cm field-of view.
Generic Instrument Description	All types of photographic equipment including stills, video, film and digital systems.

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Deployments

FHL_Sutherland

Website	https://www.bco-dmo.org/deployment/649916
Platform	Friday_Harbor
Start Date	2012-06-01
End Date	2016-06-30

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Project Information

Influence of organism-scale turbulence on the predatory impacts of a suite of cnidarian medusae (jellyfish predation in turbulence)

Coverage: Friday Harbor Labs, WA

Bloom-forming jellyfish are increasing in number, frequency and magnitude, in part due to anthropogenic impacts, underscoring a need for enhanced understanding of trophic exchanges in jellyfish-dominated ecosystems. Interactions between jellyfish and their prey are driven by morphology, behavior, and unique fluid signatures that result in species-specific prey selection patterns. Fluid signatures generated by predators entrain prey, and motile prey organisms have evolved to sense and respond to these stereotyped fluid signatures. The shape and coherence of these unique fluid signatures are strongly mediated by turbulence, which is ubiquitous in the ocean. Yet, the effects of turbulence are almost always neglected in feeding studies. This three-year project will investigate the influence of turbulence on predator-prey interactions using a suite of cnidarian hydromedusae with unique morphologies, fluid signatures and prey selection patterns collected in the region of Friday Harbor Laboratory, WA.

This project seeks to establish a detailed, mechanistic understanding of the effects of turbulence on organism-scale predator-prey interactions using gelatinous zooplankton predators with contrasting predation modes. The PI will investigate prey selection under varying levels of turbulence by studying swimming behavior, wake structure, and predator-prey interactions in a laboratory turbulence generator designed for fragile plankton. The PI will also make in situ measurements of turbulence and observations of organism behavior using a Self-contained Underwater Velocimetry Apparatus (SCUVA). This is a fully submersible instrument for flow visualization, and its use will provide a cross-calibration of field and laboratory rates and behaviors. The influence of turbulence on trophic position among the different species of hydromedusae will be quantified through field studies of prey selection patterns. The proposed comparative approach using species with distinct predation modes will provide insights applicable to other planktonic predators that can be similarly grouped.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1155084

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