Temperature, salinity, O2, velocity, and headings from R/V Challenger cruise LIS0507 in the Long Island Sound in 2007

Website: https://www.bco-dmo.org/dataset/3653
Version: 14 May 2012
Version Date: 2012-05-14

Project
» Testing hypotheses about diversity, gene flow, and effective population size in marine planktonic ciliates (CiliateDivGenePop)

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Dataset Description

Physical data from the LIS0507 cruise recorded by CTD and ADCP. Note that temperature, salinity, and oxygen concentration values are from CTD casts (averaged for depth of water) and not from the niskin bottles used to collect samples for DNA analysis. There is a lag in time and some drift of reaserch vessel between the two, since the niskin bottles were not on the CTD itself.

Related files and references:
Doherty, M, M Tamura, BA Costas, ME Ritchie, GB McManus, and LA Katz. 2010. Ciliate Diversity and Distribution Across an Environmental and Depth Gradient in Long Island Sound, USA. Environmental Microbiology 12:886-898. doi:10.1111/j.1462-2920.2009.02133.x (PDF)

Methods & Sampling

Physical data were collected during a 6-station sampling cruise in Long Island Sound on 01 June 2007. Samples were collected at an increasing distance from the shore, over increasing depths. Some lat, lon, and time values were estimated from the ship's log.

Data Processing Description

Physical data were processed with the SeaSoft program from SeaBird.

BCO-DMO made the following modifications to the dataset: format of parameter names was changed to conform to BCO-DMO conventions; blanks were replaced with 'nd;, lat and lon values were converted from degrees/decimal minutes to decimal degrees; missing time_gmt value for sample 264 was added; lon value of sample 267 was changed from 072 49.583 to 072 19.583 (presumed to be a typographical error).

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Data Files

File
LIS0507_physical.csv (Comma Separated Values (.csv), 1.67 KB) MD5:643817c1714b36d2e660547f2aedb4c6 Primary data file for dataset ID 3653

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Parameters

Parameter	Description	Units
year	Year the sample was taken, in YYYY format.	dimensionless
month_gmt	Month in GMT format.	dimensionless
day_gmt	Day in GMT format.	dimensionless
yrday_gmt	Sequential day of the year on which the sample was taken.	dimensionless
station	Numeric identifier of the sample station.	dimensionless
sample	Unique identifier of the sample.	dimensionless
site_descrip	Indicates if the sample site is located in ('in_plume') or out ('out_plume') of the plume.	dimensionless
time_local	Local time at which the sample was taken.	dimensionless
time_gmt	Time in GMT format (local time +4 hours).	dimensionless
lat	Latitude. Positive values indicate North. Values have been converted from degrees and decimal-minutes to decimal degrees.	decimal degrees
lon	Longitude. Negative values indicate West. Values have been converted from degrees and decimal-minutes to decimal degrees.	decimal degrees
depth	Sample depth in meters.	meters

temp	Temperature of the water sample in degrees Celsius.	degrees Celsius
sal	Salinity of the water sample.	PSU
O2_mg	Oxygen level of water sample measured in mg/L.	mg/L
u	Eastward velocity measured by ADCP (in cm/s). Originally named 'East Velocity'.	cm/s
v	Northward velocity measured by ADCP (in cm/s). Originally named 'NorthVelocity'.	cm/s
angle_from_N	Angle from North, measured in degrees.	degrees
magnitude	Magnitude in cm/s.	cm/s
compass_head	Compass heading in degrees from true North.	degrees
cruiseid	Unique identifier of the cruise.	dimensionless
ISO_DateTime_UTC	Date and time formatted to ISO8601 standard. T indicates start of time string; Z indicates UTC.	YYYY-MM-DDTHH:MM:SS.ssZ

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Instruments

Dataset-specific Instrument Name	Acoustic Doppler Current Profiler
Generic Instrument Name	Acoustic Doppler Current Profiler
Generic Instrument Description	The ADCP measures water currents with sound, using a principle of sound waves called the Doppler effect. A sound wave has a higher frequency, or pitch, when it moves to you than when it moves away. You hear the Doppler effect in action when a car speeds past with a characteristic building of sound that fades when the car passes. The ADCP works by transmitting "pings" of sound at a constant frequency into the water. (The pings are so highly pitched that humans and even dolphins can't hear them.) As the sound waves travel, they ricochet off particles suspended in the moving water, and reflect back to the instrument. Due to the Doppler effect, sound waves bounced back from a particle moving away from the profiler have a slightly lowered frequency when they return. Particles moving toward the instrument send back higher frequency waves. The difference in frequency between the waves the profiler sends out and the waves it receives is called the Doppler shift. The instrument uses this shift to calculate how fast the particle and the water around it are moving. Sound waves that hit particles far from the profiler take longer to come back than waves that strike close by. By measuring the time it takes for the waves to bounce back and the Doppler shift, the profiler can measure current speed at many different depths with each series of pings. (More from WHOI instruments listing).

Dataset-specific Instrument Name	CTD Sea-Bird
Generic Instrument Name	CTD Sea-Bird
Dataset-specific Description	Temperature, salinity, and oxygen concentrations were recorded at each station using a SeaBird CTD.
Generic Instrument Description	A Conductivity, Temperature, Depth (CTD) sensor package from SeaBird Electronics. This instrument designation is used when specific make and model are not known or when a more specific term is not available in the BCO-DMO vocabulary. Refer to the dataset-specific metadata for more information about the specific CTD used. More information from: http://www.seabird.com/

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Deployments

LIS0507

Website	https://www.bco-dmo.org/deployment/58821
Platform	R/V Challenger
Start Date	2007-06-01
End Date	2007-06-01
Description	Samples were collected at 6 stations in the estuary of Long Island Sound where water exiting the Connecticut River forms a shallow plume of low-salinity water. The cruise occurred on a small boat operated by UConn (known as R/V Challenger).

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Project Information

Testing hypotheses about diversity, gene flow, and effective population size in marine planktonic ciliates (CiliateDivGenePop)

Website: http://microzooplankton.uconn.edu

Coverage: Coastal Northwest Atlantic, from Long Island Sound to Maine

The microbial ecologist Tom Fenchel recently said, “The decoupling of molecular and classical (including experimental) approaches to environmental microbiology has not been fruitful and it represents one of the most important challenges for the field in the coming years.” (Fenchel 2005). Classical approaches center on the centuries-old tradition of describing individual species via meticulous observation and analysis to generate monographs, such as is done for plants and animals. Unfortunately, the rush to new molecular techniques has sometimes ignored this tradition, with claims about new lineages never seen before and reports of staggering diversity of microbial eukaryotes based on environmental DNA samples not backed up by even the most elementary microscopic observations.

In the face of this disconnect between the traditional and the molecular, we propose a marriage of the two approaches in the study of marine ciliate diversity and gene flow. Our own data show that in some clades of planktonic ciliates (Strombidiidae) there is indeed a high level of molecular diversity underlying a relatively small number of morphospecies. In other clades (some choreotrichs), the opposite appears to be true, with morphological heterogeneity underlain by apparently clonal lines, based on molecular data. Currently, we do not understand what sustains diversity in some clades; nor do we know why other clades show low diversity. But this problem is amenable to both experimental and observational approaches.

This proposal uses a two-pronged approach, combining molecular (clone libraries, DGGE,FISH) and traditional (light microscopy) techniques to address three broad questions:
i. What are the most important physical and biological factors that affect distribution and diversity of planktonic marine ciliates?
ii. What is the effective population size for marine ciliate populations, and how does this compare to census population sizes?
iii. How well do traditional morphological descriptions of ciliate species fare when compared with molecular characterizations?

Using a combination of molecular and microscopy methods, we will address these questions in coastal planktonic ciliates. Analyses of the resulting data will yield insights into the nature of ciliate species and patterns of gene flow within the North Atlantic.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0648711

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