Current velocities from ADCP from an R/V Lowell Weicker cruise in Fisher's Island Sound (NY/CT) in May 2012

Website: https://www.bco-dmo.org/dataset/3713

Data Type: Cruise Results

Version: 1

Version Date: 2012-09-06

Project

» Diversity and dynamics of planktonic ciliates - what can next-generation sequencing technologies tell us? (CiliateSequencing)

Contributors	Affiliation	Role
McManus, George B.	University of Connecticut (UConn - Avery Point)	Principal Investigator, Contact
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Abstract

This dataset contains northward and eastward components of current velocity measured by Acoustic Doppler Current Profiler (ADCP). Velocity components are given at every 0.5 meter depth.

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Coverage

Spatial Extent: **N**:41.3061 **E**:-71.93639 **S**:41.29669 **W**:-71.99368

Temporal Extent: 2012-05-30

Dataset Description

Northward and eastward components of current velocity measured by Acoustic Doppler Current Profiler (ADCP). Velocity components are given at every 0.5 meter depth.

Acquisition Description

Current velocities were collected at 5 stations by ADCP aboard a one-day cruise in Fisher's Island Sound on R/V Lowell Weicker.

Processing Description

ADCP data were averaged for a 1 minute interval centered on the CTD downcast start time.

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Parameters

Parameter	Description	Units
sta	Station ID number.	unitless
cast	Cast number.	unitless
time_start_local	Local time at start of the measurements.	HHMM.mm
lat_start	Latitude at start of measurement. North = positive.	decimal degrees
lon_start	Longitude at start of measurement. West = negative.	decimal degrees
depth	Depth, in meters. Velocity components are given at every 0.5 meter.	meters
u_m	Eastward component of current velocity, in meters per second. Eastward flow is positive.	m/s

v_m	Northward component of current velocity, in meters per second. Northward flow is positive.	m/s
ISO_DateTime_Local	Date and time formatted to ISO8601 standard (local time). See time_diff for time zone info.	YYYY-MM-DDTHH:MM:SS.ss
time_diff	The number of hours added to local time to convert to GMT.	hours
month_local	Two-digit month, local time (e.g. 05 = May)	unitless
day_local	2-digit day of month, local time	unitless
year	4-digit year, local time	unitless

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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).

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Deployments

LW_053012

Website	https://www.bco-dmo.org/deployment/58854
Platform	R/V Lowell Weicker
Start Date	2012-05-30
End Date	2012-05-30
Description	One-day cruise on R/V Lowell Weicker for the project 'Diversity and dynamics of planktonic ciliates â€“ what can next-generation sequencing technologies tell us?'. Sampling stations were located in Fisherâ€™s Island Sound (NY/CT, USA).

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Project Information

Diversity and dynamics of planktonic ciliates - what can next-generation sequencing technologies tell us? (CiliateSequencing)

Website: http://microzooplankton.uconn.edu
Coverage: NW Atlantic Continental Shelf

The Ocean's biomass and diversity are predominantly microbial, yet this aspect of diversity remains underexplored. Efforts in recent years have begun to document microbial diversity in marine systems, and to elucidate the processes that structure assemblages across space and time. This project focuses on two important sister clades of microbial eukaryotes, the oligotrich and choreotrich ciliates. These organisms comprise a major component of planktonic food webs as they graze on phytoplankton, and are in turn eaten by zooplankton and larval fish. Earlier molecular work on ciliate diversity relied on light microscopy, construction of clone libraries and Sanger sequencing. This revealed a high degree of cryptic diversity (similar species that are

genetically distinct), which is surprising, given the long-held idea that all microbes are globally distributed and that few species exist, at least as compared to animals and plants. This past work also showed that ciliate assemblages contain a few highly abundant forms and many rare ones, consistent with the concept of a "rare biosphere". However, these methods are limited by high costs of both labor and materials, so that efforts to sample any local assemblage comprehensively usually resulted in undersaturation (repeated sampling continued to uncover new species). Next generation approaches are needed to truly assess the depths of biodiversity in planktonic ciliates. This project brings together investigators with strengths in ecology, taxonomy and oceanography (PI McManus) and in molecular evolution, systematics and bioinformatics (PI Katz). Pyrosequencing will be used to sample the oligotrich and choreotrich ciliates â€™to exhaustionâ€™ in coastal environments. Denaturing gradient gel electrophoresis (DGGE), a technique that generates a fingerprint of the diversity in a sample, will be used to pre-select samples for pyrosequencing based on where strong gradients are observed in the composition of assemblages in relation to environmental factors (density fronts, thermolclines, etc.). Using these approaches, combined with the informatics pipeline already in place, this project will address three specific objectives: Objective 1. Determine the spatial scale of variability in ciliate diversity by measuring how ciliate assemblages change over meter, kilometer, 100 km, and basin scales. Objective 2. Assess the contributions of different size classes of ciliates to overall assemblage diversity. Objective 3. Experimentally evaluate factors that control the temporal shift of individual species from rarity to commonness in a natural assemblage, and vice versa. Note: See the related collaborative project, "Patterns of diversity in planktonic ciliates: spatio-temporal scales and community assembly in the coastal ocean", funded by awards OCE-1435515 and OCE-1436003.

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