Profile data from WireWalker deployments at Mission Beach, California in 2016 at a 50m depth

Website: https://www.bco-dmo.org/dataset/742124
Data Type: Other Field Results
Version: 1
Version Date: 2018-07-24

Project
» Quantifying plankton dynamics in the internal tide using swarms of buoyancy-controlled robots (QuIPP)

Contributors	Affiliation	Role
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Abstract
Profile data from WireWalker deployments at Mission Beach, California in 2016 at a 50m depth.

Table of Contents

Coverage

Spatial Extent: **Lat**:32.7685 **Lon**:-117.2922
Temporal Extent: 2016-06-13 - 2016-06-28

Dataset Description

Profile data from WireWalker deployments at Mission Beach, California in 2016 at a 50m depth.

The default data format served through the BCO-DMO data system is tabular. These data are available to download as matrices in NetCDF (.nc) and Matlab (.mat) files in the "Data Files" section of this page.

Related Datasets (Jun 2016, Mission Beach, CA)

* Thermistor chain https://www.bco-dmo.org/dataset/742137
* ADCP https://www.bco-dmo.org/dataset/742132

Methods & Sampling

Instruments were mounted on a WireWalker profiler (http://delmarocean.com/wirewalker/) and data collected

during ascent only. The interval between profiles was dependent on sea state. The WireWalker instrument was deployed on 50-m depth contour off Mission Beach, CA near a thermistor chain and in line with Internal Waves on the Continental Margin (IWAVES) stations. For more information about IWAVES stations see Lerczark, 2001.

Data Processing Description

Data interpolated on common depth and time grid.

Issues: Aquadopp data was corrupted and so was omitted.

BCO-DMO Data Manager Processing Notes:
* added a conventional header with dataset name, PI name, version date
* modified parameter names to conform with BCO-DMO naming conventions
* blank values in this dataset are displayed as "nd" for "no data." nd is the default missing data identifier in the BCO-DMO system.
* created tabular version of data by converting Matlab struct to a Matlab Table type then exported as csv.
* rounded matlab double values to three decimal places before writing to csv.
* On the first day (2018-06-13) records are ommitted in the tabular version of the data. All values (except depth &time) were NaN values.

[table of contents | back to top]

Data Files

File

QuIPP2016_WW_50m.mat

(Octet Stream, 35.69 MB)

MD5:312fd036610984a5761d0220ed67b79a

Profile data from WireWalker deployments at Mission Beach, California in 2016 at a 50m depth.

File contains matlab structure variable 'WW':

```
% WW =
%
%   struct with fields:
%
%        DO: [172×3120 double]
%         B: [172×3120 double]
%       chl: [172×3120 double]
%     phyco: [172×3120 double]
%      dnum: [1×3120 double]
%         C: [172×3120 double]
%         T: [172×3120 double]
%         P: [172×3120 double]
%         S: [172×3120 double]
%       rho: [172×3120 double]
%        n2: [172×3120 double]
%      dPdt: [172×3120 double]
%     depth: [1×172 double]
%      mask: [1×3120 double]
```

QuIPP2016_WW_50m.nc

(ZIP Archive (ZIP), 45.09 MB)

MD5:edb93841118ab27f02dc85490b5601a5

Profile data from WireWalker deployments at Mission Beach, California in 2016 at a 50m depth.

```
netcdf QuIPP2016_WW_50m {
dimensions:
 z = 172 ;
 time = 3120 ;
variables:
 double C(time, z) ;
  C:units = "mS/cm" ;
 double T(time, z) ;
```

File

T:units = "degrees Celsius" ;

double P(time, z) ;

P:units = "dbar" ;

double S(time, z) ;

S:units = "PSU" ;

double rho(time, z) ;

rho:units = "kg/m^3" ;

double n2(time, z) ;

double dPdt(time, z) ;

double DO(time, z) ;

DO:units = "%" ;

DO:comment = "optical backscatter" ;

double B(time, z) ;

B:units = "counts" ;

double chl(time, z) ;

chl:units = "counts" ;

chl:comment = "chlorophyll (fluorescence)" ;

double phyco(time, z) ;

phyco:units = "counts" ;

phyco:comment = "phycoerythrin" ;

double dnum(time) ;

dnum:units = "days" ;

dnum:comment = "Matlab timestamp" ;

double depth(z) ;

depth:units = "m" ;

depth:comment = "vertical positive down" ;

double mask(time) ;

// global attributes:

:title = "CTD, dissolved oxygen, optical backscatter, chlorophyll (fluorescence), phycoerithrin profiles in 50-m of water off Mission Beach, CA. Collected in June 2016 for PhD thesis by Garwood, SIO." ;

:processing_level = "Conversion from binary using RSKtools, interpolated on common depth/time grid." ;

:institution = "Scripps Institution of Oceanography, UCSD" ;

:instrument = "RBRMaestro, RINKO, WET lab fluorometer and ECO puck" ;

:coordinates = "lat: 32.7685, lon: -117.2922" ;

File

:time_coverage_start = "13-Jun-16 17:56:55" ;

:time_coverage_end = "28-Jun-16 14:50:40" ;

:date_issued = "June 2018" ;

:creator_name = "Jessica C. Garwood" ;

:creator_email = "jgarwood@ucsd.edu" ;

:contributor_name = "Peter Franks, Drew Lucas, Arnaud Le Boyer" ;

:contributor_role = "Co-advisor, Co-advisor, Data processing" ;

:acknowledgment = "National Science Foundation, grant NSF-OCE 1459393." ;

:comment = "File 1/1. WireWalker profiler (http://delmarocean.com/wirewalker/) deployed in 50-m of water off Mission Beach, CA. Aquadopp did not work; data omitted." ;

}

wirewalker.csv (Comma Separated Values (.csv), 67.69 MB)
MD5:8f968a99569b39504b3b379555fad188

Primary data file for dataset ID 742124

[table of contents | back to top]

Related Publications

Lerczak, J. A., Hendershott, M. C., & Winant, C. D. (2001). Observations and modeling of coastal internal waves driven by a diurnal sea breeze. Journal of Geophysical Research: Oceans, 106(C9), 19715–19729. doi:10.1029/2001jc000811 https://doi.org/10.1029/2001JC000811
Related Research

[table of contents | back to top]

Parameters

Parameter	Description	Units
dnum	Matlab time/date format (datenum, UTC)	unitless
date	Date (UTC) in format 'yyyy-mm-dd'	unitless
time	Time (UTC) in format 'HH:MM:SS'	unitless
ISO_DateTime_UTC	Timestamp (UTC) in standard ISO 8601:2004(E) format YYYY-mm-ddTHH:MMZ	unitless
depth	depth	meters (m)
DO	dissolved oxygen saturation	percent (%)
B	backscatter	counts
chl	chlorophyll (fluorescence)	counts
phyco	phycoerythrin	counts
C	conductivity	millisiemens per centimeter (mS/cm)
T	temperature	degrees Celsius
P	pressure	decibars (dbar)
S	salinity	Practical Salinity Units (PSU)
rho	density	kilograms per meter cubed (kg/m3)
n2	buoyancy frequency	per seconds squared (s-2)
dPt	dPdt	decibars per second (dbar/s)
mask	Mask (values 0 or 1) indicating the reliability of interpolated values. NaN values in the mask indicate times when there was a significant gap between profiles, and where the interpolation may be less reliable. For best data, one should focus on points when the mask value is equal to 1.	unitless

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	RBRMaestro
Generic Instrument Name	Data Logger
Generic Instrument Description	Electronic devices that record data over time or in relation to location either with a built-in instrument or sensor or via external instruments and sensors.

Dataset-specific Instrument Name	WET Labs fluorometer and ECO puck
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.

Dataset-specific Instrument Name	RINKO III
Generic Instrument Name	Oxygen Sensor
Generic Instrument Description	An electronic device that measures the proportion of oxygen (O2) in the gas or liquid being analyzed

[table of contents | back to top]

Deployments

QuIPP_2016

Website	https://www.bco-dmo.org/deployment/742542
Platform	shoreside Calif_shore
Start Date	2016-06-10
End Date	2016-06-28
Description	ADCP, T-chain, WireWalker deployments.

[table of contents | back to top]

Project Information

Quantifying plankton dynamics in the internal tide using swarms of buoyancy-controlled robots (QuIPP)

Coastal waters are among the most heavily used and threatened systems on the planet. Successful prediction and management of coastal resources can only come from a deep understanding of the dynamics of the species in these regions. Fluctuations of coastal invertebrate and vertebrate populations are often driven by the supply of planktonic larvae to the adult habitat by ocean currents. Numerous studies have associated the cross-shelf transport of plankton - including the larvae of economically valuable species - with the internal tide: a wave in the ocean's interior that oscillates at the tidal frequency. Though the interactions of plankton with internal waves have been studied for decades, it has not been possible to track individual plankton underwater. Thus, the dynamics underlying the cross-shelf transport of plankton in internal waves and internal tides remain conjectural. This project will use undersea swarms of novel, autonomous plankton-mimicking drifting robots to quantify, in situ, the cross-shore transport of plankton driven by high-frequency internal waves and the internal tide. This research will significantly enhance our understanding of the distributions, settling patterns, and population connectivity of coastal species. One PhD student will be supported and educational outreach in collaboration with the Ocean Discovery Program in San Diego will support curricula creation, after-school

programs, and teacher development.

These researchers have recently gained the capability to deploy swarms of plankton-mimicking, autonomous, drifting robots in the ocean. These robots, Autonomous Underwater Explorers (AUEs), are 1.5-liter cylinders with temperature and pressure sensors, a hydrophone, and a piston that regulates buoyancy. Subsurface three-dimensional localization is accomplished through an acoustic long-baseline navigation system. The three-dimensional position of each AUE is obtained every 12 seconds with ~1 m horizontal and <1 cm vertical accuracy with a range of ~5 km. This high spatial and temporal resolution represents a major advance over traditional neutrally buoyant floats. Swarms of 20 AUEs will be programmed with either depth-keeping or isotherm-following behaviors, and deployed in the internal tide on the shelf to quantify their transport, accumulation, and vertical movement over a tidal cycle. The swarms will move through a mooring array consisting of a vertically profiling Wirewalker, a thermistor chain, and two bottom-mounted Acoustic Doppler Current Profilers. Data from these deployments will be combined with process studies using a numerical model to test long-standing hypotheses concerning the effects of plankton behavior on transport and accumulation in internal waves and the internal tide. This research will increase the operational capacity of AUEs, advancing the state of the art in studying cross-shelf transport due to internal waves, and lead to new insights into the physical and biological interactions controlling larval transport across the shelf.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1459393

[table of contents | back to top]