Moored physical and chemical parameters measured by MiniDOT at El Rosario and Isla Natividad sites, Mexico

Website: https://www.bco-dmo.org/dataset/714339
Data Type: Other Field Results
Version: 04 October 2017
Version Date: 2017-10-04

Project
» Ocean Acidification: Collaborative Research: Interactive effects of acidification, low dissolved oxygen and temperature on abalone population dynamics within the California Current (CA Current MS Abpop)
» CNH: Enhancing Resilience of Coastal Ecosystems and Human Communities to Oceanographic Variability: Social and Ecological Feedbacks (CNH-Baja Pacific)

Program
» Science, Engineering and Education for Sustainability NSF-Wide Investment (SEES): Ocean Acidification (formerly CRI-OA) (SEES-OA)

Contributors	Affiliation	Role
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Coverage

Spatial Extent: **N**:29.79099 **E**:-115.18875 **S**:27.87989 **W**:-115.804
Temporal Extent: 2015-09-11 - 2017-04-01

Dataset Description

Moored physical and chemical parameters measured by MiniDOT at El Rosario and Isla Natividad sites, Mexico.

Methods & Sampling

All instruments were mounted vertically on taut-line moorings. Instruments were deployed and recovered by scuba divers. Data were processed using vendor supplied software and quality controlled to remove bad data (salinity below 30 or above 40, temperature below 4 C or above 30 C, pressure < 1 m). No known issues or problems.

Data Processing Description

BCO-DMO Processing:
- replaced missing data/blanks with 'nd' (no data);
- replaced spaces with underscores;
- corrected the SN_Instrument column as Excel had erroneously incremented values in cells;
- changed date format of all Deployment_Date_Time_LT and Retrieval_Date_Time_LT values to yyyy-mm-dd_HH:MM;
- corrected erroneous location name in the Punta Prieta Buckets data per feedback from PI;
- renamed original date/time field of "Greenwich_Mean_Date_Time" to "Date_Time_LT" per feedback from PI.

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Parameters

Parameter	Description	Units
Location	Mooring name	unitless
Latitude	Latitude; positive values = north	decimal degrees
Longitude	Longitude; negative values = west	decimal degrees
Type_Instrument	Instrument type	unitless
SN_Instrument	Instrument serial number	unitless
Country	Country of origin	unitless
Site	Region/site	unitless
Deployment_Date_Time_LT	Date and time of deployment (local standard time); formatted as yyyy-nn-dd_HH:MM	unitless
Retrieval_Date_Time_LT	Date and time of retrieval (local standard time); formatted as yyyy-mm-dd_HH:MM	unitless
Sampling_Interval_minutes	Sampling interval	minutes
Depth_m	Water depth at location	meters (m)
MAB	Meters above bottom	meters (m)
UTC_Date_Time	Time stamp (UTC); formatted as yyyy-mm-dd_HH:MM:SS	unitless
Date_Time_LT	Time stamp (local standard time); formatted as mm/dd/yy_HH:MM	unitless
Time_sec	Unix time stamp, seconds since 1 Jan 1970	seconds
Temperature_C	Water temperature	degrees Celsius
DissolvedOxygen_mgL	Water dissolved oxygen	milligrams per liter (mg/L)
DissolvedOxygen_Saturation	Percent dissolved oxygen saturation	percent (%)
Salinity_Compensation	Salt content of water	practical salinity units (PSU)
Elevation_Compensation_m	Elevation	meters (m)
Q	Vendor-specified quality control	unitless
deployment_name	Name of the deployment	unitless

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Instruments

Dataset-specific Instrument Name	MiniDOT
Generic Instrument Name	PME MiniDOT Logger
Generic Instrument Description	The PME miniDOT logger is a submersible sensor designed to measure water temperature and dissolved oxygen concentration. Dissolved oxygen is measured by an optode that measures lifetime-based luminescence quenching of a thin membrane. The sensing foil contains a coating with a variable fluorescence depending on the oxygen concentration of the surrounding water. The miniDOT reports in milligrams per liter (mg/L) and logs all measurements to an internal SD card. Also featured is a temperature sensor and batteries. Data can be offloaded to a computer via USB cable. The logger has an accuracy of +/- 5 percent (+/- 0.3 mg/L) for oxygen, and +/- 0.1 degrees Celsius for temperature. Temperature range is 0 to 35 degrees Celsius, oxygen range is 0 to 150 percent saturation. Depth-rated to 300 meters. Instrument description from the manufacturer: https://www.pme.com/products/minidot

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Deployments

MPB_MiniDOT

Website	https://www.bco-dmo.org/deployment/712401
Platform	Morro Prieto Buckets
Start Date	2015-09-11
End Date	2016-12-16
Description	MiniDOT deployed at Morro Prieto Buckets mooring from 09/11/2015 to 12/16/2016.

MP_MiniDOT

Website	https://www.bco-dmo.org/deployment/712406
Platform	Morro Prieto Pyramid
Start Date	2013-03-09
End Date	2015-09-11
Description	MiniDOT deployed at Morro Prieto Pyramid mooring from 03/09/2013 to 09/11/2015.

PPB_MiniDOT

Website	https://www.bco-dmo.org/deployment/712415
Platform	Punta Prieta Buckets
Start Date	2016-04-12
End Date	2017-03-31
Description	MiniDOT deployed at Punta Prieta Buckets mooring from 04/12/2016 to 03/31/2017.

Sportfish_MiniDOT

Website	https://www.bco-dmo.org/deployment/712313
Platform	El Rosario
Start Date	2016-04-18
End Date	2017-03-30
Description	MiniDOT deployed at Sportfish mooring from 04/18/2016 to 03/30/2017.

Chinatown_MiniDOT

Website	https://www.bco-dmo.org/deployment/715469
Platform	El Rosario
Start Date	2013-08-05
End Date	2017-04-01
Description	MiniDOT deployed at Chinatown mooring from 08/05/2013 to 04/01/2017.

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Project Information

Ocean Acidification: Collaborative Research: Interactive effects of acidification, low dissolved oxygen and temperature on abalone population dynamics within the California Current (CA Current MS Abpop)

Coverage: Southern Monterey Bay, CA, USA: 36.6205 N, 121.9045 W; Isla Natividad, Mexico: 27.8758 N, 115.1847 W

Ocean acidification is increasingly recognized as a significant driver of change in marine ecosystems. In particular, ecosystems in eastern boundary current systems, including the California Current Large Marine Ecosystem (CCLME), routinely experience upwelling driven low pH, low dissolved oxygen (DO) waters in shallow near shore habitats, and these occurrences have been increasing in magnitude and duration over the past decade.

The goal of this project is to study the consequences of ocean acidification and other climate-related changes (dissolved oxygen(DO), temperature) in oceanographic conditions on near shore marine communities over a large scale oceanographic gradient in the CCLME. Understanding how the effects of ocean acidification combined with other climate-related changes on individual marine organisms or life stages will cascade to populations and the services they provide is a high priority for science, management, and policy. By integrating the results of oceanographic field measurements and laboratory experiments in a demographic and bio-economic modeling framework, the present project will advance our understanding of the role of oceanographic variability on the dynamics of marine populations and fisheries. In particular, this research will provide key insights regarding the interactive influences of simultaneous changes in pH, DO, and temperature on nearshore populations and fisheries. By investigating the effects of multiple stressors on coastal marine ecosystems, the project will allow us to better anticipate possible ecological and fishery impacts of increasing frequency and/or intensity of low pH and low DO events. A deeper understanding of the linkages among ocean acidification, coastal oceanographic processes and the health of nearshore marine ecosystems in the CCLME will inform adaptation strategies for future ocean conditions.

The research program will implement a novel individual- to population-level approach to specifically investigate how the direct effects of ocean acidification, alone or in combination with low DO and temperature, on two model species of great ecological and commercial relevance, red and pink abalone, will manifest at the population level, and ultimately, the services these species provide to humans. Researchers will: 1) measure and characterize the temporal variability of pH, DO and temperature in nearshore abalone habitat in Monterey Bay, Central California, and Isla Natividad, Mexico, particularly in relation to the duration and intensity of extreme low pH, low DO events, under alternative scenarios of future climate change, 2) conduct laboratory

experiments to investigate the effects of low pH, low DO conditions on the reproductive success, growth, calcification, and survival of juvenile red and pink abalone, and 3) develop demographic and bio-economic models to estimate the impacts of environmental and local anthropogenic stressors on the resilience of abalone populations and to assess what management and conservation strategies, including the implementation of networks of marine reserves, may contribute to buffering the negative effects of increased frequency and/or intensity of low pH and low DO events expected under near-future climate scenarios.

CNH: Enhancing Resilience of Coastal Ecosystems and Human Communities to Oceanographic Variability: Social and Ecological Feedbacks (CNH-Baja Pacific)

Coverage: Pacific Coast of Baja California 26 N – 32 N

This project will study the capacity of natural systems and human communities to adapt to environmental change. The research program will specifically investigate the impacts of oceanographic variability on coastal marine ecosystems and human communities of the Pacific coast of Baja California, Mexico, and the influences of local and global feedbacks on the resilience and adaptive capacity of these systems. Researchers will (1) characterize coastal oceanographic variability and the patterns and drivers of low-oxygen, or hypoxic, events; (2) assess the impacts of variability, particularly hypoxic events, on nearshore species, ecosystems, and fisheries, and compare these impacts with those of past ENSO events; (3) assess the cultural, social, and economic variables that influence the responses of local communities to these impacts, particularly their willingness and ability to invest in local conservation and adaptation; and (4) assess the willingness of selected groups of U.S. citizens to support these local conservation efforts and determine what factors influence such contributions.

As in a number of other coastal regions, the ecosystems and fisheries off Baja California have been heavily affected by extreme events driven by climate. ENSO events caused significant declines in key resources during 1982-83 and 1997-98, and recent episodes of low oxygen in the California Current region resulted in high mortality of ecologically and commercially important marine species. A better understanding of the capacity of humans and fisheries to adapt to oceanographic variability will help show how to mitigate the social and economic impacts of increased variability due to climate change and growing pressure on natural resources. For example, this project will help allow us to anticipate the occurrence and effects on fisheries of low-oxygen events off western North America, and to design marine reserves so as to buffer them. By examining how the local effects of uncertainty in the ocean can spread more widely in society, the project will lead to broader adaptation strategies. The project will also train undergraduate and graduate students to integrate social and ecological studies, a vitally needed skill in an increasingly crowded world.

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Program Information

Science, Engineering and Education for Sustainability NSF-Wide Investment (SEES): Ocean Acidification (formerly CRI-OA) (SEES-OA)

Website: https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503477

Coverage: global

NSF Climate Research Investment (CRI) activities that were initiated in 2010 are now included under Science, Engineering and Education for Sustainability NSF-Wide Investment (SEES). SEES is a portfolio of activities that highlights NSF's unique role in helping society address the challenge(s) of achieving sustainability. Detailed information about the SEES program is available from NSF (https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504707).

In recognition of the need for basic research concerning the nature, extent and impact of ocean acidification on oceanic environments in the past, present and future, the goal of the SEES: OA program is to understand

(a) the chemistry and physical chemistry of ocean acidification; (b) how ocean acidification interacts with processes at the organismal level; and (c) how the earth system history informs our understanding of the effects of ocean acidification on the present day and future ocean.

Solicitations issued under this program:
NSF 10-530, FY 2010-FY2011
NSF 12-500, FY 2012
NSF 12-600, FY 2013
NSF 13-586, FY 2014
NSF 13-586 was the final solicitation that will be released for this program.

PI Meetings:
1st U.S. Ocean Acidification PI Meeting(March 22-24, 2011, Woods Hole, MA)
2nd U.S. Ocean Acidification PI Meeting(Sept. 18-20, 2013, Washington, DC)
3rd U.S. Ocean Acidification PI Meeting (June 9-11, 2015, Woods Hole, MA – Tentative)

NSF media releases for the Ocean Acidification Program:

Press Release 10-186 NSF Awards Grants to Study Effects of Ocean Acidification

Discovery Blue Mussels "Hang On" Along Rocky Shores: For How Long?

Discovery nsf.gov - National Science Foundation (NSF) Discoveries - Trouble in Paradise: Ocean Acidification This Way Comes - US National Science Foundation (NSF)

Press Release 12-179 nsf.gov - National Science Foundation (NSF) News - Ocean Acidification: Finding New Answers Through National Science Foundation Research Grants - US National Science Foundation (NSF)

Press Release 13-102 World Oceans Month Brings Mixed News for Oysters

Press Release 13-108 nsf.gov - National Science Foundation (NSF) News - Natural Underwater Springs Show How Coral Reefs Respond to Ocean Acidification - US National Science Foundation (NSF)

Press Release 13-148 Ocean acidification: Making new discoveries through National Science Foundation research grants

Press Release 13-148 - Video nsf.gov - News - Video - NSF Ocean Sciences Division Director David Conover answers questions about ocean acidification. - US National Science Foundation (NSF)

Press Release 14-010 nsf.gov - National Science Foundation (NSF) News - Palau's coral reefs surprisingly resistant to ocean acidification - US National Science Foundation (NSF)

Press Release 14-116 nsf.gov - National Science Foundation (NSF) News - Ocean Acidification: NSF awards $11.4 million in new grants to study effects on marine ecosystems - US National Science Foundation (NSF)

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1416837
NSF Division of Environmental Biology (NSF DEB)	DEB-1212124

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