

Cruise log from R/V Gaia cruises in nearshore Southern California between April 22nd and October 4th, 2016

Website: <https://www.bco-dmo.org/dataset/716431>

Data Type: Cruise Results

Version: 2

Version Date: 2018-10-25

Project

» [RAPID: Nearshore settlement and hydrodynamics in Southern California during El Nino, and the transition to normal ocean conditions: boom and bust?](#) (RAPID_Settlement_Hydrodynamics)

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Coverage

Spatial Extent: N:32.81113 E:-117.26421 S:32.79629 W:-117.2807

Temporal Extent: 2016-04-22 - 2016-10-04

Dataset Description

Cruise log of R/V Gaia plankton cruises in the nearshore Southern California region between April 22nd and October 4th of 2016.

Methods & Sampling

Cruise area is Southern California nearshore, depths 0~14 m water depth.

Offshore Calumet Park, La Jolla, Southern California, USA within the box delimited by the following points:

NE 32° 48.677'N, 117° 16.195'W
SE 32° 48.568'N, 117° 16.145'W
SW 32° 48.421'N, 117° 16.738'W
NW 32° 48.619'N, 117° 16.842'W

Notes:

* In the "comment" column, "swell" is an identifier of conditions (higher wave conditions, but this is a subjective identifier). * 'rep' indicates a replicate and refers to when we replicated the entire sampling scheme

(corresponds to a different date).

Data Processing Description

BCO-DMO data manager processing notes:

Data version 1: 2017-10-06

- * Added ISO 8601 formatted timestamp.
- * rounded depth three decimal places.
- * rounded lat/lon to five decimal places.
- * added the original sheet names from original .xls file as the column "comment"

Data version 2: 2017-10-22

- * Data the same as version 1 but sorted by timestamp

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Data Files

File
cruise_log.csv (Comma Separated Values (.csv), 12.85 KB) MD5:c9d3a70c7e463987be1217d4036032b8 Primary data file for dataset ID 716431

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Parameters

Parameter	Description	Units
ISO_DateTime.UTC	ISO timestamp based on the ISO 8601:2004(E) standard in format YYYY-mm-ddTHH:MMZ (UTC)	unitless
date	Date (UTC) in format yyyy-mm-dd	unitless
time_local	Time (local; UTC-7) in format HH:MM	unitless
time_GMT	Time (UTC) in format HH:MM	unitless
cruise	Cruise identifier	unitless
station	Station identifier	unitless
lat	Latitude	decimal degrees
long	Longitude	decimal degrees
depth	Depth	meters
filename	Associated original CTD filename	unitless
comment	Comment	unitless

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Deployments

Reyns RAPID_2016

Website	https://www.bco-dmo.org/deployment/687011
Platform	R/V Gaia
Start Date	2016-04-22
End Date	2016-10-04

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Project Information

RAPID: Nearshore settlement and hydrodynamics in Southern California during El Nino, and the transition to normal ocean conditions: boom and bust? (RAPID_Settlement_Hydrodynamics)

Coverage: Southern California

NSF Award Abstract:

Understanding how larvae are transported in the coastal ocean is key for characterizing the population fluctuations of marine organisms. Studies demonstrate that larvae of species that inhabit shallow waters can behaviorally respond to changing oceanographic conditions by moving vertically into currents that can promote their transport to coastal, nearshore habitats where they settle to bottom habitats and complete their life cycle. However, the oceanographic mechanisms that promote such transport, and how they might be impacted by infrequent events such as El Niño, are poorly resolved. Given that El Niño events might increase in frequency and magnitude under climate change, it is imperative to assess how El Niño affects larval transport and larval settlement. To this end, this study will use an unprecedented set of nearshore biological and physical measurements spanning pre-El-Niño, during El Niño, and the predicted return to El Niño neutral conditions, to test mechanistically how larval transport and settlement respond in a nearshore coastal environment. This project will also provide educational and research opportunities for students at the University of San Diego, a liberal arts university. At least one laboratory exercise demonstrating the impacts of El Niño on larval transport and settlement will be developed for undergraduate students, and students will be recruited to participate in all aspects of the project to provide them with hands-on research experience. This research will form the basis for the thesis work of at least one M.S. graduate student. Finally, given that the research falls within a Marine Protected Area, results will be broadly disseminated and shared with coastal managers and the CA Department of Fish and Wildlife.

Larval transport and settlement are fundamental processes for understanding the population dynamics of benthic invertebrates. Previous studies and unpublished observations indicate that El Niño events profoundly impact community and population processes, and in Southern California, El Niño effects range from alteration of larval transport and settlement of local populations, to the geographic expansion of subtropical species. This research will test the hypothesis that the current (2015-2016) El Niño event will result in a reduction of barnacle larval transport and settlement in Southern California nearshore habitats. Two mechanisms might be involved; first, a deepening of the thermocline forced by El Niño would result in reduction of larval transport by internal tidal bores, a mechanism that requires shallowing of the thermocline. Second, the distribution of larvae of littoral barnacles would be deeper, more offshore, and less constrained to nearshore habitats during El Niño than in El Niño neutral conditions, resulting in a reduction of nearshore larval abundance and settlement. The effects of El Niño on nearshore circulation, hydrography, larval transport and settlement in Bird Rock, Southern California, will be measured by a) deploying an array of instrumentation to measure temperature, pressure (waves) and currents; b) measuring daily barnacle larval settlement, and; c) assessing cross-shore and depth distribution of invertebrate larvae. These observations will be contrasted with two years of comparable observations taken at Bird Rock in 2014 (El Niño neutral conditions) and 2015 (during El Niño). Additionally, the investigators will measure weekly settlement at Bird Rock, and at Dike Rock, a site 7 km to the north, where previous observations at the end of the 1997/1998 El Niño indicated that barnacle settlement was very high. This will enable the evaluation of the generality of the settlement response as El Niño conditions eclipse, and examination of how settlement varies along a coastline.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1630474
NSF Division of Ocean Sciences (NSF OCE)	OCE-1630459

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