

CTD data collected during R/V Gaia cruises in nearshore Southern California between July 20th and October 4th, 2016

Website: <https://www.bco-dmo.org/dataset/687012>

Data Type: Cruise Results

Version:

Version Date: 2017-04-06

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:32.811283 E:-117.269083 S:32.807017 W:-117.2807

Temporal Extent: 2016-07-20 - 2016-10-04

Dataset Description

These CTD data include depth, temperature, salinity taken during R/V Gaia cruises in the nearshore Southern California region between July 20th to October 4th of 2016.

Methods & Sampling

Repeated CTD casts were taken from ~5m depth while anchored.

Data Processing Description

No processing has been completed, these are raw CTD data.

BCO-DMO data manager processing notes:

- * Split date time field into date, and time, and added ISO 8601 formatted timestamp.
- * rounded depth, temp, and salinity to three decimal places.

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 (GMT) in format yyyy-mm-dd	unitless
Time	Time (GMT) in format HH:MM	unitless
Depth	Depth	meters
Temperature	Temperature	degrees Celsius
Salinity	Salinity	practical salinity units (PSU)
filename	original Castaway CTD filename	unitless

Instruments

Dataset-specific Instrument Name	SonTek CastAway
Generic Instrument Name	CTD - profiler
Generic Instrument Description	The Conductivity, Temperature, Depth (CTD) unit is an integrated instrument package designed to measure the conductivity, temperature, and pressure (depth) of the water column. The instrument is lowered via cable through the water column. It permits scientists to observe the physical properties in real-time via a conducting cable, which is typically connected to a CTD to a deck unit and computer on a ship. The CTD is often configured with additional optional sensors including fluorometers, transmissometers and/or radiometers. It is often combined with a Rosette of water sampling bottles (e.g. Niskin, GO-FLO) for collecting discrete water samples during the cast. This term applies to profiling CTDs. For fixed CTDs, see https://www.bco-dmo.org/instrument/869934 .

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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