Number of new fronds recorded at the kelp forest mooring (36° 37.297’ N, 121° 54.102’ W.) at Hopkins Marine Station recorded from July to August 2018.

Website: https://www.bco-dmo.org/dataset/822535
Data Type: Other Field Results
Version: 1
Version Date: 2020-08-29

Project
» Collaborative Research: RUI: Building a mechanistic understanding of water column chemistry alteration by kelp forests: emerging contributions of foundation species (Kelp forest biogeochemistry)

Contributors	Affiliation	Role
Nickols, Kerry J.	California State University Northridge (CSUN)	Principal Investigator, Project Coordinator
Dunbar, Robert B.	Stanford University	Co-Principal Investigator
Hirsh, Heidi	Stanford University	Scientist, Contact
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Mucciarone, David	Stanford University	Scientist
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Traiger, Sarah	United States Geological Survey (USGS)	Scientist
Soenen, Karen	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
Number of new fronds recorded at the kelp mooring (Central CA Macrocystis pyrifera forest, 36° 37.297’ N, 121° 54.102’ W) from July to August 2018.

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Coverage

Spatial Extent: **Lat**:36.6216167 **Lon**:-121.9017
Temporal Extent: 2018-07-02 - 2018-08-06

Dataset Description

These data are published in Hirsh *et al.*, see related publications section.

Methods & Sampling

Central CA Macrocystis pyrifera forest, 36° 37.297’ N, 121° 54.102’ W. New fronds were recorded on each kelp sporophyte within a 3.2 m radius of the kelp mooring (10 sporophytes). At the start of the study period (July 2, 2018), all fronds greater than 0.5 m length were tagged on each sporophyte.

New fronds (> 0.5 m) were counted and tagged on each sporophyte weekly through August 6, 2018.

Data Processing Description

Raw data, no processing

BCO-DMO processing notes:

- Converted Date to ISO format (yyyy-mm-dd) and timezone from Pacific Standard Time (PST) to UTC
- Added latitude and longitude of sampling location

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Data Files

File
new_fronds.csv (Comma Separated Values (.csv), 239 bytes) MD5:e52640804b6f6bcb19afe2d187ae6a38 Primary data file for dataset ID 822535

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Related Publications

Hirsh, H. K., Nickols, K. J., Takeshita, Y., Traiger, S. B., Mucciarone, D. A., Monismith, S., & Dunbar, R. B. (2020). Drivers of Biogeochemical Variability in a Central California Kelp Forest: Implications for Local Amelioration of Ocean Acidification. Journal of Geophysical Research: Oceans, 125(11). Portico. https://doi.org/10.1029/2020jc016320 https://doi.org/10.1029/2020JC016320
Results

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Parameters

Parameter	Description	Units
Date	Sampling date in ISO format (yyyy-mm-ddZ) in UTC (coordinated Universal Time)	unitless
New_Fronds	New fronds on each kelp sporophyte	count
Latitude	Latitude of sampling location, south is negative	decimal degrees
Longitude	Longitude of sampling location, west is negative	decimal degrees

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Deployments

KELP

Website	https://www.bco-dmo.org/deployment/826373
Platform	Mooring - Hopkins Marine Station
Start Date	2018-06-08
End Date	2018-10-04
Description	This deployment represents the mooring itself and data that has been acquired at this site or in close proximity of it, and are considered samples "inside a kelp forest": ADCP data:

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Project Information

Collaborative Research: RUI: Building a mechanistic understanding of water column chemistry alteration by kelp forests: emerging contributions of foundation species (Kelp forest biogeochemistry)

Coverage: Central California 36.6 N 122 W

NSF Award Abstract:
Kelp forest ecosystems are of ecological and economic importance globally and provide habitat for a diversity of fish, invertebrates, and other algal species. In addition, they may also modify the chemistry of surrounding waters. Uptake of carbon dioxide (CO2) by giant kelp, Macrocystis pyrifera, may play a role in ameliorating the effects of increasing ocean acidity on nearshore marine communities driven by rising atmospheric CO2. Predicting the capacity for kelp forests to alter seawater chemistry requires understanding of the oceanographic and biological mechanisms that drive variability in seawater chemistry. The project will identify specific conditions that could lead to decreases in seawater CO2 by studying 4 sites within the southern Monterey Bay in Central California. An interdisciplinary team will examine variations in ocean chemistry in the context of the oceanographic and ecological characteristics of kelp forest habitats. This project will support an early career researcher, as well as train and support a postdoctoral researcher, PhD student, thesis master's student, and up to six undergraduate students. The PIs will actively recruit students from underrepresented groups to participate in this project through Stanford University's Summer Research in Geosciences and Engineering (SURGE) program and the Society for Advancement of Hispanics/Chicanos and Native Americans in Science (SACNAS). In addition, the PIs and students will actively engage with the management community (Monterey Bay National Marine Sanctuary and California Department of Fish and Wildlife) to advance products based on project data that will assist the development of management strategies for kelp forest habitats in a changing ocean.

This project builds upon an extensive preliminary data set and will link kelp forest community attributes and hydrodynamic properties to kelp forest biogeochemistry (including the carbon system and dissolved oxygen) to understand mechanistically how giant kelp modifies surrounding waters and affects water chemistry using unique high-resolution measurement capabilities that have provided important insights in coral reef biogeochemistry. The project sites are characterized by different oceanographic settings and kelp forest characteristics that will allow examination of relationships between kelp forest inhabitants and water column chemistry. Continuous measurements of water column velocity, temperature, dissolved oxygen, pH, and photosynthetically active radiation will be augmented by twice-weekly measurements of dissolved inorganic carbon, total alkalinity, and nutrients as well as periods of high frequency sampling of all carbonate system parameters. Quantifying vertical gradients in carbonate system chemistry within kelp forests will lead to understanding of its dependence on seawater residence time and water column stratification. Additional biological sampling of kelp, benthic communities, and phytoplankton will be used to 1) determine contributions of understory algae and calcifying species to bottom water chemistry, 2) determine contributions of kelp canopy growth and phytoplankton to surface water chemistry, and 3) quantify the spatial extent of surface chemistry alteration by kelp forests. The physical, biological, and chemical data collected across multiple forests will allow development of a statistical model for predictions of kelp forest carbonate system chemistry alteration in different locations and under future climate scenarios. Threshold values of oceanographic

conditions and kelp forest characteristics that lead to alteration of water column chemistry will be identified for use by managers in mitigation strategies such as targeted protection or restoration.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1737096
NSF Division of Ocean Sciences (NSF OCE)	OCE-1737176

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