Bulk nitrogen and organic carbon isotopes and sinking flux from a Santa Barbara Basin sediment trap time-series (1994-2017)

Website: https://www.bco-dmo.org/dataset/773318
Data Type: Other Field Results
Version: 1
Version Date: 2019-07-17

Project
» Impact of Ocean Acidification on Planktonic Foraminifera in the California Current System During the Last 300 Years (CCS-Forams)

Contributors	Affiliation	Role
Davis, Catherine	University of South Carolina at Columbia	Principal Investigator
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Abstract
This dataset includes bulk nitrogen and organic carbon isotopes and sinking flux from a Santa Barbara Basin sediment trap time-series (1994-2017).

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Coverage

Spatial Extent: **Lat**:34.2333 **Lon**:-120.0333
Temporal Extent: 1993-08-12 - 2017-10-14

Dataset Description

This dataset includes bulk nitrogen and organic carbon isotopes and sinking flux from a Santa Barbara Basin sediment trap time-series (1994-2017).

Methods & Sampling

Will be available once the paper is published.

Data Processing Description

BCO-DMO Processing Notes:
- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions
- re-formatted date from m/d/yyyy to yyyy-mm-dd

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Data Files

File
TableS1_CNflux.csv (Comma Separated Values (.csv), 20.58 KB) MD5:fe9615e957479cc7f931182499f73021 Primary data file for dataset ID 773318

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Related Publications

Davis, C. V., Ontiveros-Cuadras, J. F., Benitez-Nelson, C., Schmittner, A., Tappa, E. J., Osborne, E., & Thunell, R. C. (2019). Ongoing Increase in Eastern Tropical North Pacific Denitrification as Interpreted Through the Santa Barbara Basin Sedimentary δ15N Record. Paleoceanography and Paleoclimatology, 34(9), 1554–1567. Portico. https://doi.org/10.1029/2019pa003578 https://doi.org/10.1029/2019PA003578
Results

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Parameters

Parameter	Description	Units
Deployment	Sediment trap deployment identifier	unitless
Cup	Sediment trap cup identifier	unitless
Date_opened	First day cup was open to vertical flux	unitless
delta15N	Bulk sediment nitrogen isotopes ratio of stable isotopes 15N:14N	parts per thousand (per mil)
delta13C_org	Bulk sediment organic carbons isotopes ratio of stable isotopes 13C:12C	parts per thousand (per mil)
C_flux	Total carbon flux	grams/meter^2/day
N_flux	Total nitrogen flux	grams/meter^2/day

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Instruments

Dataset-specific Instrument Name	Perkin Elmer 2400 CHNS/O Elemental Analyzer
Generic Instrument Name	CHN Elemental Analyzer
Generic Instrument Description	A CHN Elemental Analyzer is used for the determination of carbon, hydrogen, and nitrogen content in organic and other types of materials, including solids, liquids, volatile, and viscous samples.

Dataset-specific Instrument Name	VG Isoprime IRMS
Generic Instrument Name	Mass Spectrometer
Generic Instrument Description	General term for instruments used to measure the mass-to-charge ratio of ions; generally used to find the composition of a sample by generating a mass spectrum representing the masses of sample components.

Dataset-specific Instrument Name	
Generic Instrument Name	Sediment Trap
Generic Instrument Description	Sediment traps are specially designed containers deployed in the water column for periods of time to collect particles from the water column falling toward the sea floor. In general a sediment trap has a jar at the bottom to collect the sample and a broad funnel-shaped opening at the top with baffles to keep out very large objects and help prevent the funnel from clogging. This designation is used when the specific type of sediment trap was not specified by the contributing investigator.

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Project Information

Impact of Ocean Acidification on Planktonic Foraminifera in the California Current System During the Last 300 Years (CCS-Forams)

Coverage: Southern California Margin

NSF Abstract:

More than one-quarter of anthropogenic CO2 emissions produced since the beginning of the Industrial Revolution have been incorporated into the global surface ocean causing large-scale declines in seawater pH. This phenomenon is referred to as ocean acidification (OA) and is predicted to become particularly acute in coastal regions, including the west coast of the US. As the oceans become more acidic, it will become increasingly difficult for marine calcifiers to produce their shells. This may have important consequences for the marine food web and for various commercially important marine species. This study will produce the first detailed record of changes in OA along the coast of California during the last two centuries. This will be accomplished by examining the shells of a group of calcifying plankton called foraminifera. These organisms live and produce their shells at the sea surface, with the shells sinking to the sea floor when the organism dies. Foraminiferal shells from a sediment core collected from Santa Barbara Basin will be studied in order to reconstruct changes in calcification over the last 200 years. Using these results, predictions will be made as to how calcification will continue to change through the end of the 21st century based on various scenarios for increasing atmospheric CO2.

Modeling studies suggest that the California Current System (CCS) and associated ecosystem have been and will continue to be particularly vulnerable to ocean acidification (OA). To test this concept, this study will quantify the effect of OA on calcification rates in planktonic foraminifera from the Santa Barbara Basin region of the CCS since the onset of the Industrial Revolution. A 20-year Santa Barbara Basin sediment trap time series, together with the varved sediments from the basin will be used to generate a nearly annually resolved record of changes in calcification for this group of plankton in the CCS for the last 200 years. The proposed research will take place in two phases. First, sediment trap samples and coincident water column chemistry

data will be used to calibrate the relationships among foraminiferal shell morphology (area density), shell geochemistry (B/Ca), and water column carbonate chemistry. Second, these morphologic and trace metal proxies will be used to produce two independent records of changing carbon ion concentration for the last two centuries using a 210Pb-dated varved sediment record. These sediment-derived estimates of carbon ion concentration will be compared with model estimates of this parameter for the last two centuries. Taken together, the sediment trap and core samples will provide an incomparable archive for quantifying the impact of OA on calcification in this paleoclimatically important group of plankton.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1631977

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