Particulate chlorophyll data set from samples collected using ship's surface underway system taken on board of the R/V Oceanus OC1701A, OC1611B, OC1603B, OC1602A, OC1601A in the Oregon Coast (47-43 N, 126-124 W) from 2016 to 2017

Website: https://www.bco-dmo.org/dataset/817214
Data Type: Cruise Results
Version: 1
Version Date: 2020-06-30

Project
» Coastal Ocean Carbon Cycling during Wintertime Conditions (CCAW)

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Abstract
Particulate chlorophyll data set and added temperature and salinity from samples collected using ship's surface underway system taken on board of the R/V Oceanus OC1701A, OC1611B, OC1603B, OC1602A, OC1601A in the Oregon Coast (47-43 N, 126-124 W) from 2016 to 2017.

Table of Contents

- Coverage
- Dataset Description
  - Methods & Sampling
  - Data Processing Description
- Data Files
- Related Publications
- Parameters
- Instruments
- Deployments
- Project Information
- Funding

Coverage

Spatial Extent: **N**:45.7415 **E**:-123.97815 **S**:43.4996 **W**:-125.009
Temporal Extent: 2016-01-23 - 2017-01-16

Dataset Description

These data are part of a manuscript submitted to Continental Shelf Research:

Goñi, M.A., Welch, K.A., Alegria, E., Alleau Y., Watkins-Brandt, K., White, A.E. (submitted) Wintertime Particulate Organic Matter Distributions in Surface Waters of the Northern California Current System. Continental Shelf Research.

The data are shown in figures in the manuscript (Figure 7) and in supplementary information (Figure 4S).

Methods & Sampling

Full details for collection and analyses of underway Chl samples are provided by Goñi et al., submitted . Brief summaries are provided below.

Samples for this study were collected aboard RV Oceanus using the surface underway scientific system.

Aboard the vessel we had access to uncontaminated seawater and collected samples at specific times that allowed us to determine location (latitude and longitude) and seawater characteristics (temperature and salinity) from the ships' navigation and sensor panels. We used a semi-automated filtration system (SAFS) described by Goñi et al., (2019) connected to Oceanus surface underway water to collect particulate samples for chlorophyll analyis. Surface underway water was connected to the SAFS through a manual flow-control valve via opaque polyethylene tubing. A fly wheel flow meter was placed in-line and connected to a laptop computer using a data acquisition system to measure and record flows during the filtration stage. A switching valve with 8 ports was placed downstream from the flow meter and controlled by the laptop. Under stand-by conditions, flow was directed to the 'waste' port, which was fitted with unobstructed tubing that drained into one of the ship's sinks and flowed back to sea. For Chlorophyll (Chl) measurements, samples were collected via the SAFS using 25 mm pre-combusted GF/F membranes placed inside stainless steel filter holders. Once filters were fitted in each of the sample ports, the filtration program was started to collect samples at selected intervals.

Once the filtration run was completed, the filter housings were removed from the SAFS, opened, and each individual filter placed in a closed container and stored in -80oC freezer until analyses. Each sample was assigned a specific time stamp (start-end of filtration process) that coincided with the ship's clock and allowed us to retrieve location and oceanographic data for each sample, as well as determine an overall filtration volume, which was used to calculate total chlorophyll concentrations once analyses were completed.

Samples were processed and analyzed following the method outlined in Strickland and Parsons (1972). Brifely, chlorophyll a concentrations were determined using the method of where samples were extracted in 90% acetone for 48 hours at -20°C in the dark and measured fluorometrically using a Turner Designs 10-AU fluorometer.

References cited: Strickland & Parson, 1972; Goñi *et al.,* 2019; Goñi *et al.,* submitted.

Data Processing Description

Temperature and salinity data were acquired at approximately 1 Hz and then binned to correspond to the time stamps of discrete Chl samples collected by the semi-automated filtration system (SAFS, see above). Navigation data were integrated into the sensor data set using the sample filtration time stamps to provide latitude and longitude information for each surface underway sample.

BCO-DMO processing notes:

- Adjusted column names to comply with database requirements
- Added ISO_DateTime_UTC column
- Cleaned up Time_Date_PST column: 3916->2016, 16->2016
- Converted positive longitude values in western hemisphere to negative (-180 to 180 notation)

[table of contents | back to top]

Data Files

File
chl_concat.csv (Comma Separated Values (.csv), 16.22 KB) MD5:77301d703d42b34f8ad172b6024385eb Primary data file for dataset ID 817214

[table of contents | back to top]

Related Publications

Goñi, M. A., Corvi, E. R., Welch, K. A., Buktenica, M., Lebon, K., Alleau, Y., & Juranek, L. W. (2019). Particulate organic matter distributions in surface waters of the Pacific Arctic shelf during the late summer and fall season. Marine Chemistry, 211, 75–93. doi:10.1016/j.marchem.2019.03.010
Methods

Goñi, M. A., Welch, K. A., Alegria, E., Alleau, Y., Watkins-Brandt, K., & White, A. E. (2021). Wintertime particulate organic matter distributions in surface waters of the northern California current system. Continental Shelf Research, 213, 104312. https://doi.org/10.1016/j.csr.2020.104312
Results

Strickland, J. D. H. and Parsons, T. R. (1972). A Practical Hand Book of Seawater Analysis. Fisheries Research Board of Canada Bulletin 157, 2nd Edition, 310 p.
Methods

[table of contents | back to top]

Parameters

Parameter	Description	Units
Cruise_ID	Cruise designation	unitless
Latitude	Latitude measured by ship’s navigation system for sample/data collection, southern hemisphere is negative	decimal degrees
Longitude	Longitude as measured by ship’s navigation system for sample/data collection, western hemisphere is negative	decimal degrees
Date_Time_PST	Date and time of sample and data collection (pacific standard time)	unitless
Temperature	Temperature in degrees Celsius measured at seachest in ship’s underway system at the time of sample collection	degrees Celsius (°C)
Salinity	Salinity measured by TSG lab unit in ship’s underway system at the time of sample collection	unitless
Chlorophyll	Total chlorophyll concentrations measured in filtered samples collected from ship’s undereway system using a semi-automated filtration system.	miligrams of Chl per cubic meter of water (mg/m3)
ISO_DateTime_UTC	Date and time of sample and data collection in UTC, standard ISO format (yyyy-mm-ddThh:mmZ)	unitless

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Sea-Bird SBE 38 Remote Digital Immersion Thermometer
Dataset-specific Description	Surface water temperature was measured inside the ship by a flow-through system sensor (SBE 38).
Generic Instrument Description	Sea-Bird SBE 38 Remote Digital Immersion Thermometer is a seawater temperature sensor in a 10,500 meter (34,400 ft) titanium pressure housing. Real-time temperature data is transmitted in ASCII characters (degrees C or raw counts) via an RS-232 or optional RS-485 serial interface for display or logging by PC or data logger. The SBE 38's measurement range is -5 to +35 C; absolute accuracy is better than 0.001 C (1 mK) and resolution is approximately 0.00025 C (0.25 mK).

Dataset-specific Instrument Name	
Generic Instrument Name	Sea-Bird SBE 45 MicroTSG Thermosalinograph
Dataset-specific Description	Salinity was measured by a SBE 45 thermosalinograph installed inside the ship in line with the flow-through system.
Generic Instrument Description	A small externally powered, high-accuracy instrument, designed for shipboard determination of sea surface (pumped-water) conductivity and temperature. It is constructed of plastic and titanium to ensure long life with minimum maintenance. It may optionally be interfaced to an external SBE 38 hull temperature sensor. Sea Bird SBE 45 MicroTSG (Thermosalinograph)

Dataset-specific Instrument Name	
Generic Instrument Name	Sea-Bird SBE 48 Hull Temperature Sensor
Dataset-specific Description	Surface water temperature was measured outside the ship by a hull-mounted (3 m) sensor (SBE 48).
Generic Instrument Description	The SBE 48 is a high-accuracy temperature recorder with non-volatile memory, designed for shipboard determination of sea surface temperature. Installed with magnets just below the water line, the SBE 48's temperature sensor is in contact with the inside of the ship's hull. For more information, see the SBE48 Manual.

Dataset-specific Instrument Name	
Generic Instrument Name	Turner Designs Fluorometer 10-AU
Dataset-specific Description	Chlorophyll concentrations were determined using a Turner Designs 10-AU fluorometer.
Generic Instrument Description	The Turner Designs 10-AU Field Fluorometer is used to measure Chlorophyll fluorescence. The 10AU Fluorometer can be set up for continuous-flow monitoring or discrete sample analyses. A variety of compounds can be measured using application-specific optical filters available from the manufacturer (read more from Turner Designs, turnerdesigns.com, Sunnyvale, CA, USA).

[table of contents | back to top]

Deployments

OC1701A

Website	https://www.bco-dmo.org/deployment/773050
Platform	R/V Oceanus
Report	http://datadocs.bco-dmo.org/docs/CCAW/data_docs/cruise_reports/OC1701A_PCAR_103115.pdf
Start Date	2017-01-12
End Date	2017-01-15
Description	Cruise Documents: Cruise Plan (PDF) Post Cruise Assessment Report (PDF) Additional cruise information is available from the Rolling Deck to Repository (R2R): https://www.rvdata.us/search/cruise/OC1701A

OC1611B

Website	https://www.bco-dmo.org/deployment/773033
Platform	R/V Oceanus
Report	http://datadocs.bco-dmo.org/docs/CCAW/data_docs/cruise_reports/OC1611B_PCAR_103053.pdf
Start Date	2016-12-06
End Date	2016-12-08
Description	Cruise Documents: Cruise Plan (PDF) Post Cruise Assessment Report (PDF) Additional cruise information is available from the Rolling Deck to Repository (R2R): https://www.rvdata.us/search/cruise/OC1611B

OC1603B

Website	https://www.bco-dmo.org/deployment/772986
Platform	R/V Oceanus
Report	http://datadocs.bco-dmo.org/docs/CCAW/data_docs/cruise_reports/OC1603B_PCAR_102465.pdf
Start Date	2016-03-11
End Date	2016-03-17
Description	Cruise Documents: Cruise Plan (PDF) Post Cruise Assessment Report (PDF) Additional cruise information is available from the Rolling Deck to Repository (R2R): https://www.rvdata.us/search/cruise/OC1603B

OC1602A

Website	https://www.bco-dmo.org/deployment/772960
Platform	R/V Oceanus
Report	http://datadocs.bco-dmo.org/docs/CCAW/data_docs/cruise_reports/OC1602A_PCAR_102454.pdf
Start Date	2016-02-15
End Date	2016-02-20
Description	Cruise Documents: Cruise Plan (PDF) Post Cruise Assessment Report (PDF) Additional cruise information is available from the Rolling Deck to Repository (R2R): https://www.rvdata.us/search/cruise/OC1602A

OC1601A

Website	https://www.bco-dmo.org/deployment/772909
Platform	R/V Oceanus
Report	http://datadocs.bco-dmo.org/docs/CCAW/data_docs/cruise_reports/OC1601A_PCAR_102438.pdf
Start Date	2016-01-22
End Date	2016-01-26
Description	Cruise Documents: Cruise Plan (PDF) Post Cruise Assessment Report (PDF) Additional cruise information is available from the Rolling Deck to Repository (R2R): https://www.rvdata.us/search/cruise/OC1601A

[table of contents | back to top]

Project Information

Coastal Ocean Carbon Cycling during Wintertime Conditions (CCAW)

Coverage: Oregon Coast (47-43 N, 126-124 W)

NSF Award Abstract:
As is true for many coastal regions worldwide, the Pacific Northwest margin is characterized by intense seasonal contrasts in conditions controlling carbon flux between the atmosphere, land, and ocean. During the wintertime, rapid and intense flooding of small coastal rivers and the associated inputs of freshwater, nutrients, and organic matter are commonplace in the Pacific Northwest. Impacts of these wintertime terrestrial-ocean transfers by small, flood-prone rivers on the upwelling regions, such as the Pacific Northwest, have been underestimated at both global and regional scales. In order to gain a complete and predictive understanding of carbon cycling in ocean margins, the biogeochemistry of periods of intense terrestrial-ocean transfers needs to be comprehensively studied. This project will evaluate the dynamics of organic matter cycling along an upwelling-dominated margin during the wintertime period of active terrestrial inputs and biological cycling using a combination of shipboard, glider, moored and remote measurements. New developments in ocean observational technologies through the Ocean Observatories Initiative (OOI)* and existing scientific infrastructure along the Oregon coast will be instrumental in achieving this goal. This work will provide research opportunities for undergraduate and graduate students, and outreach will be conducted through the Centers for Ocean Science Education Excellence Pacific Partnership, local coastal community colleges, and interpretative centers such as Oregon State University Hatfield Center, the Umpqua Discovery Center, and Oregon Coast Aquarium in an effort to educate students and the public about the research.

Globally, most studies of carbon cycling in eastern boundary regimes have focused on the upwelling phase during the summer months, resulting in a much poorer understanding of non-upwelling periods. As is many coastal upwelling systems, wintertime conditions along the Pacific Northwest margin are characterized by southerly, downwelling-favorable winds and moisture-laden storms that result in seasonal flooding by the numerous small to medium-sized rivers in the region. Elevated discharges by these coastal rivers translate into large inputs of land-derived biogeochemical relevant constituents, including freshwater, dissolved inorganic nutrients, and dissolved and particulate organic matter, which collectively rival or exceed those of the Columbia River. To understand the impact of flood-derived terrestrial inputs on the biogeochemistry of the coastal zone along the Pacific Northwest margin, researchers will conduct a detailed investigation of biogeochemical processes in the water column along the Newport Hydrographic Line off the central Oregon coast during fall/winter conditions. The project includes an intensive field effort that takes advantage of ship-based and autonomous platforms to gain comprehensive wintertime coverage. Among the project outcomes, this effort will lead to a revised paradigm of the biogeochemical drivers of carbon cycling in coastal margins.

*The Ocean Observatories Initiative (OOI) is an NSF-funded, networked infrastructure of science-driven sensor systems to measure the physical, chemical, geological and biological variables in the ocean and seafloor. For more information about OOI, please visit the website: www.oceanobservatories.org

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1459480

[table of contents | back to top]