Seawater carbonate chemistry and dissolved oxygen of discrete samples taken in Puget Sound, WA during R/V Clifford A. Barnes cruises CB1073 and CB1078 in 2017.

Website: https://www.bco-dmo.org/dataset/842728
Data Type: Cruise Results
Version: 1
Version Date: 2021-03-01

Project
» Consequences of hypoxia on food web linkages in a pelagic marine ecosystem (PelagicHypoxia)

Contributors	Affiliation	Role
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Abstract
Seawater carbonate chemistry and dissolved oxygen of discrete samples taken in Puget Sound, WA during R/V Clifford A. Barnes cruises CB1073 and CB1078 in 2017.

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Coverage

Spatial Extent: **N**:47.896 **E**:-122.454 **S**:47.277 **W**:-123.133
Temporal Extent: 2017-06-24 - 2017-09-01

Acquisition Description

Discrete water samples were collected with Niskin bottles. Depths for discrete samples were chosen to characterize the shape of the vertical profile at each station, as determined by the CTD (see CTD data for full profiles). In some cases carbonate chemistry parameters and dissolved oxygen were not measured at the same depth. Temperature and salinity measurements are from the CTD; total dissolved inorganic carbon (CT), total alkalinity (AT), and dissolved oxygen (DO) were measured; pH and *p*CO2 were calculated.

Processing Description

All carbonate chemistry samples were collected and analyzed according to Dickson et al. (2007). Total alkalinity was measured by open-cell potentiometric titration and total dissolved inorganic carbon was measured by acidification and quantification using a CO2 coulometer (UIC model CM5015) at the University of Washington's School of Oceanography. Certified Reference Materials were analyzed as an independent verification of instrument calibrations (Dickson et al. 2007). pH and pCO2 were calculated from AT and CT using the R package *seacarb* and constants from Lueker et al. (2000) and the total pH scale.

Dissolved oxygen was measured by the modified Winkler titration method (Carpenter 1965).

BCO-DMO processing notes:

- Adjusted parameter names to comply with database requirements

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Related Publications

CARPENTER, J. H. (1965). THE CHESAPEAKE BAY INSTITUTE TECHNIQUE FOR THE WINKLER DISSOLVED OXYGEN METHOD. Limnology and Oceanography, 10(1), 141–143. doi:10.4319/lo.1965.10.1.0141
Methods

Dickson, A.G., Sabine, C.L. and Christian, J.R. (Eds.) 2007. Guide to Best Practices for Ocean CO2 Measurements. PICES Special Publication 3, 191 pp https://isbnsearch.org/isbn/1-897176-07-4
Methods

Lueker, T. J., Dickson, A. G., & Keeling, C. D. (2000). Ocean pCO2 calculated from dissolved inorganic carbon, alkalinity, and equations for K1 and K2: validation based on laboratory measurements of CO2 in gas and seawater at equilibrium. Marine Chemistry, 70(1-3), 105–119. doi:10.1016/s0304-4203(00)00022-0 https://doi.org/10.1016/S0304-4203(00)00022-0
Methods

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Parameters

Parameter	Description	Units
ISO_Date	Date sample was collected in ISO format (yyy-mm-dd)	unitless
Station	Station code wwhere sampling occurred	unitless
Latitude	Latitude of station, south is negative	decimal degrees
Longitude	Longitude of station, west is negative	decimal degrees
Depth	Depth of collection	meters (m)
Temperature	In situ temperatures measured by CTD	degrees Celsius (°C)
Salinity	In situ salinity measured by CTD	units
Total_dissolved_inorganic_carbon	Total dissolved inorganic carbon	umol per kilogram (umol/kg)
Total_dissolved_inorganic_carbon_duplicate	Duplicate analysis for Total dissolved inorganic carbon	umol per kilogram (umol/kg)
Alkalinity	Total alkalinity	umol per kilogram (umol/kg)
pH	Calculated pH	total scale
pCO2	Calculated pCO2	micro atmosphere (uatm)
Dissolved_oxygen	Dissolved oxygen measured by Winkler titration	milligrams per liters (mg/L)
Dissolved_oxygen_duplicate	Duplicate oxygen measured by Winkler titration	milligrams per liters (mg/L)
Dissolved_oxygen_triplicate	Triplicate oxygen measured by Winkler titration	milligrams per liters (mg/L)

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Instruments

Dataset-specific Instrument Name	Niskin bottles
Generic Instrument Name	Niskin bottle
Dataset-specific Description	Sea-Bird SBE9 CTD profiler equipped with Niskin bottles
Generic Instrument Description	A Niskin bottle (a next generation water sampler based on the Nansen bottle) is a cylindrical, non-metallic water collection device with stoppers at both ends. The bottles can be attached individually on a hydrowire or deployed in 12, 24, or 36 bottle Rosette systems mounted on a frame and combined with a CTD. Niskin bottles are used to collect discrete water samples for a range of measurements including pigments, nutrients, plankton, etc.

Dataset-specific Instrument Name	Sea-Bird SBE9 CTD profiler
Generic Instrument Name	CTD Sea-Bird 9
Dataset-specific Description	Sea-Bird SBE9 CTD profiler equipped with Niskin bottles
Generic Instrument Description	The Sea-Bird SBE 9 is a type of CTD instrument package. The SBE 9 is the Underwater Unit and is most often combined with the SBE 11 Deck Unit (for real-time readout using conductive wire) when deployed from a research vessel. The combination of the SBE 9 and SBE 11 is called a SBE 911. The SBE 9 uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 and SBE 4). The SBE 9 CTD can be configured with auxiliary sensors to measure other parameters including dissolved oxygen, pH, turbidity, fluorometer, altimeter, etc.). Note that in most cases, it is more accurate to specify SBE 911 than SBE 9 since it is likely a SBE 11 deck unit was used. more information from Sea-Bird Electronics

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Deployments

CB1073

Website	https://www.bco-dmo.org/deployment/841303
Platform	R/V Clifford A. Barnes
Start Date	2017-06-23
End Date	2017-07-01

CB1078

Website	https://www.bco-dmo.org/deployment/841305
Platform	R/V Clifford A. Barnes
Start Date	2017-08-25
End Date	2017-09-02

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Project Information

Consequences of hypoxia on food web linkages in a pelagic marine ecosystem (PelagicHypoxia)

Coverage: Puget Sound, WA (47 N, 123 W)

Description from NSF award abstract:
Low dissolved oxygen (hypoxia) is one of the most pronounced, pervasive, and significant disturbances in marine ecosystems. Yet, our understanding of the ecological impacts of hypoxia on pelagic food webs is incomplete because of our limited knowledge of how organism responses to hypoxia affect critical ecosystem processes. In pelagic food webs, distribution shifts of mesozooplankton and their predators may affect predator-prey overlap and dictate energy flow up food webs. Similarly, hypoxia may induce shifts in zooplankton community composition towards species that impede energy flow to planktivorous fish. However, compensatory responses by species and communities might negate these effects, maintaining trophic coupling and sustaining productivity of upper trophic level species. The PIs propose to answer the question "Does hypoxia affect energy flow from mesozooplankton to pelagic fish?" They approach this question with a nested framework of hypotheses that considers two sets of processes alternatively responsible for either changes or maintenance of pelagic ecosystem energy flows. They will conduct their study in the Hood Canal, WA. Unlike most hypoxia-impacted estuaries, hypoxic regions of Hood Canal are in close proximity to sites that are not affected. This makes it logistically easier to conduct a comparative study and reduces the number of potential confounding factors when comparing areas that are far apart.

Improved understanding of how hypoxia impacts marine ecosystems will benefit the practical application of ecosystem-based management (EBM) in coastal and estuarine ecosystems. Effective application of EBM requires that the impacts of human activities are well understood and that ecological effects can be tracked using indicators. This project will contribute to both of these needs. The PIs will share their findings on local and national levels with Federal, State, Tribal, and County biologists. To increase exposure of science to underrepresented groups, the PIs also will provide Native American youth with opportunities to participate in field collections and laboratory processing through summer internships. The PIs will collaborate with the NSF-funded Pacific Northwest Louis Stokes Alliance for Minority Participation and tribes from the Hood Canal region to recruit and mentor students for potential careers in marine science. This project will support several undergraduate researchers, two Ph.D. students, a post-doc, and two early-career scientists.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1154648

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