FASTA file of protein identifications from net tows during RVIB Nathaniel B. Palmer cruise NBP0601 in December of 2015

Website: https://www.bco-dmo.org/dataset/769266
Data Type: Cruise Results
Version: 1
Version Date: 2019-05-17

Project
» Controls of Ross Sea Algal Community Structure (CORSACS)

Program
» Ocean Carbon and Biogeochemistry (OCB)

Contributors	Affiliation	Role
Saito, Mak A.	Woods Hole Oceanographic Institution (WHOI)	Principal Investigator
Bender, Sara	Woods Hole Oceanographic Institution (WHOI)	Contact
York, Amber D.	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
A net tow metaproteome of a Phaeocystis antarctica bloom in the Ross Sea, mapped here to Phaeocystis metatranscriptomes analyzed by 2D LCMS, sequence file of discovered proteins, unitless.

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Coverage

Location: Ross Sea
Spatial Extent: **Lat**:-76.82 **Lon**:170.76
Temporal Extent: 2005-12-30

Dataset Description

These data are part of the Ocean Protein Portal "Ross Sea Net Tow (Bender)" dataset version 1 (https://proteinportal.whoi.edu/; Saito et al., 2020).

Methods & Sampling

Sampling was conducted with a 20 micron plankton net on 12/30/2005 at about 1am (local time), near station 137, was extracted for total protein using an SDS detergent method followed by tube gel purification,

reduction, alkylation, and tryptic digestion and analyzed on a Thermo Orbitrap Fusion using 2-dimensional separation scheme to maximize metaproteome depth. Detailed methods available in Bender et al. 2018.

This .fasta file is a standard FASTA format for sequences with first line of entry starting with ">" and a text description, followed by the associated amino acid sequence. This file is unitless (all sequence, no integers).

Organism identifier (LifeSciences Identifier, LSID):
Phaeocystis antarctica, urn:lsid:marinespecies.org:taxname:341585

Data Processing Description

Mass spectra from 2D LC-MS was peptide-to-spectrum matched using the SEQUEST algorithm within Proteome Discoverer software, followed by spectral counting with Proteome Software's Scaffold software using the FASTA generated from Phaeocystis culture transcriptome study. FASTA of discovered protein sequences exported from Proteome Software. Data processing was documented in Bender et al. 2018.

BCO-DMO Curation Notes

fasta file added to BCO-DMO data system, no changes.

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Data Files

File	
Sara_phaeo_field_161223_2d_assembly_1374_1871_V2.fasta	(FASTA, 593.07 KB) MD5:34816c895836b3e2b7552b2fa2b4405c
Primary file for dataset 769266 v1. Corresponds to Ocean Protein Portal Bender-Ross Sea data (version 1).	

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Related Publications

Bender, S. J., Moran, D. M., McIlvin, M. R., Zheng, H., McCrow, J. P., Badger, J., … Saito, M. A. (2018). Colony formation in Phaeocystis antarctica connecting molecular mechanisms with iron biogeochemistry. Biogeosciences, 15(16), 4923–4942. doi:10.5194/bg-15-4923-2018
Results

Saito, M. A., Bertrand, E. M., Duffy, M. E., Gaylord, D. A., Held, N. A., Hervey, W. J., Hettich, R. L., Jagtap, P. D., Janech, M. G., Kinkade, D. B., Leary, D. H., McIlvin, M. R., Moore, E. K., Morris, R. M., Neely, B. A., Nunn, B. L., Saunders, J. K., Shepherd, A. I., Symmonds, N. I., & Walsh, D. A. (2019). Progress and Challenges in Ocean Metaproteomics and Proposed Best Practices for Data Sharing. Journal of Proteome Research, 18(4), 1461–1476. https://doi.org/10.1021/acs.jproteome.8b00761
Methods

Saito, M. A., Saunders, J. K., Chagnon, M., Gaylord, D. A., Shepherd, A., Held, N. A., Dupont, C., Symmonds, N., York, A., Charron, M., & Kinkade, D. B. (2020). Development of an Ocean Protein Portal for Interactive Discovery and Education. Journal of Proteome Research, 20(1), 326–336. https://doi.org/10.1021/acs.jproteome.0c00382
Related Research

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Related Datasets

IsRelatedTo

Protein Portal (2024). Ocean Protein Portal. Available from https://proteinportal.whoi.edu/

Saito, M. A. (2024) **Ross Sea metaproteome peptide spectral counts searched against Phaeocystis strain transcriptome from net tows during RVIB Nathaniel B. Palmer cruise NBP0601 in December of 2015.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 2) Version Date 2024-05-24 doi:10.26008/1912/bco-dmo.768259.2 [view at BCO-DMO]
Relationship Description: Generated from the same sampling event and methodology. These data are part of the same dataset "Ross Sea Net Tow (Bender)" version 1 at the Ocean Protein Portal (https://proteinportal.whoi.edu/).

Saito, M. A. (2024) **Ross Sea metaproteome protein spectral counts searched against Phaeocystis strain transcriptome from net tows during RVIB Nathaniel B. Palmer cruise NBP0601 in December of 2015.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2024-04-29 doi:10.26008/1912/bco-dmo.768237.1 [view at BCO-DMO]
Relationship Description: Generated from the same sampling event and methodology. These data are part of the same dataset "Ross Sea Net Tow (Bender)" version 1 at the Ocean Protein Portal (https://proteinportal.whoi.edu/).

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Parameters

Parameters for this dataset have not yet been identified

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Instruments

Dataset-specific Instrument Name	Thermo Scientific Q-Exactive Orbitrap mass spectrometer with a Michrom Advance CaptiveSpray source
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.

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Deployments

NBP0601

Website	https://www.bco-dmo.org/deployment/57985
Platform	RVIB Nathaniel B. Palmer
Report	http://data.bco-dmo.org/CORSACS/cruises/Dunbar_Hydrography_report_NBP0601.pdf
Start Date	2005-12-17
End Date	2006-01-30
Description	This was the first of two Controls of Ross Sea Algal Community Structure (CORSACS) project cruises and was funded by the NSF Office of Polar Programs. The NBP0601 cruise was conducted in the Ross Sea in December 2005 and January 2006, Ross Sea, ca. 65.21°S-78.65°S, 164.98°E-164.70°W, and supported by NSF research grant, OPP-0338097. The 'Science Pan and Project Description' document includes details of the cruise sampling strategy. Related Files: Science Plan and Project Descriptions (PDF file) Cruise track map (PDF file) Photo of Ice Breaker Nathaniel B. Palmer on station near Beaufort Island (JPG image) Related Sites: MGDS catalog: http://www.marine-geo.org/tools/search/entry.php?id=NBP0601

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Project Information

Controls of Ross Sea Algal Community Structure (CORSACS)

Website: http://www.whoi.edu/sites/corsacs

Coverage: Ross Sea Southern Ocean

Project summary

The Controls of Ross Sea Algal Community Structure (CORSACS) project was funded by the NSF Office of Polar Programs as "Collaborative Research: Interactive Effects of Iron, Light and Carbon Dioxide on Phytoplankton Community Dynamics in the Ross Sea". Two cruises were completed in 2006 to investigate the interactions between the primary productivity of the Ross Sea and pCO2, iron and other trace elements. Data sets of carbon, nutrient, metal, and biological measurements will be reported.

The main objective in the proposed research was to investigate the relative importance and potential interactive effects of iron, light and CO2 levels in structuring algal assemblages and growth rates in the Ross Sea. The investigators hypothesized that the interaction of these three variables largely determines the bottom-up control on these two dominant Southern Ocean phytoplankton taxa. While grazing and other loss processes are important variables in determining the relative dominance of these two taxa, the CORSACS research project was designed to focus on the bottom-up control mechanisms. It is important to understand such environmentally-driven taxonomic shifts in primary production, since they are expected to impact the fixation and export of carbon and nutrients, and the production of DMS, thus potentially providing both positive and negative feedbacks on climate.

The CORSACS investigators considered a range of ambient iron, light and pCO2 levels that span those typically observed in the Ross Sea during the growing season. That is, dissolved iron ranging from ~0.1 nM (low iron) to greater than 1 nM (high iron) (Fitzwater et al. 2000; Sedwick et al. 2000); mean irradiance (resulting from vertical mixing/self shading) ranging from less than 10% Io (low light) to greater than 40% (high light) (Arrigo et al., 1998, 1999), possibly adjusted based on field observations during the CORSACS cruises; and pCO2 ranging (Sweeney et al. 2001) from ~150 ppm (low CO2) to the probable higher levels of pCO2 - 750 ppm as a conservative estimate - that are likely to be attained later this century due to anthropogenic perturbation of the global carbon cycle (IPCC, 2001).

From the information previously available from both field observations and experiments, the investigators formulated the following specific hypotheses regarding the interactive role of iron, light and CO2 in regulating algal composition in the Ross Sea: diatoms bloom in the southern Ross Sea only under optimum conditions of high iron, light and pCO2; colonial Phaeocystis dominate under conditions of high iron with either (or both) low

light or low pCO2; and solitary Phaeocystis are predominant under conditions of low iron with either (or both) low light or low pCO2.

References:

Fitzwater, S.E., K.S. Johnson, R.M. Gordon, K.H. Coale, and W.O. Smith, Jr. (2000). Trace metal concentrations in the Ross Sea and their relationship with nutrients and growth. Deep-Sea Research II, 47: 3159-3179.

Martin JH, Gordon RM, Fitzwater SE. Iron in Antarctic waters. Nature 1990 ;345(6271):156-158. Martin JH. 1990. Glacial-interglacial CO2 change: The iron hypothesis. Paleoceanography 5(1):1-13

P. N. Sedwick, G. R. DiTullio, and D. J. Mackey, Iron and manganese in the Ross Sea, Antarctica: Seasonal iron limitation in Antarctic shelf waters, Journal of Geophysical Research, 105 (C5), 11,321-11,336, 2000.

Sweeney, C. K. Arrigo, and G. van Gijken (2001). Prediction of seasonal changes in surface pCO2 in the Ross Sea, Antarctica using ocean color satellite data. 2001 Annual AGU meeting, San Fransisco, CA Dec. 10-15.

IPCC, 2001: Climate Change 2001: Synthesis Report. A Contribution of Working Groups I, II, and III to the Third Assessment Report of theIntegovernmental Panel on Climate Change [Watson, R.T. and the Core Writing Team (eds.)]. Cambridge University Press, Cambridge,United Kingdom, and New York, NY, USA, 398 pp.

Publications

Saito, M. A., Goepfert, T. J., Noble, A. E., Bertrand, E. M., Sedwick, P. N., and DiTullio, G. R.: A seasonal study of dissolved cobalt in the Ross Sea, Antarctica: micronutrient behavior, absence of scavenging, and relationships with Zn, Cd, and P, Biogeosciences, 7, 4059-4082, doi:10.5194/bg-7-4059-2010, 2010 (http://www.biogeosciences.net/7/4059/2010/bg-7-4059-2010.html)

Bertrand EM, Saito MA, Lee PA, Dunbar RB, Sedwick PN and DiTullio GR (2011) Iron limitation of a springtime bacterial and phytoplankton community in the Ross Sea: implications for vitamin B12 nutrition. Front. Microbio. 2:160. doi: 10.3389/fmicb.2011.00160 (http://www.frontiersin.org/Aquatic_Microbiology/10.3389/fmicb.2011.00160/abstract)

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Program Information

Ocean Carbon and Biogeochemistry (OCB)

Website: http://us-ocb.org/

Coverage: Global

The Ocean Carbon and Biogeochemistry (OCB) program focuses on the ocean's role as a component of the global Earth system, bringing together research in geochemistry, ocean physics, and ecology that inform on and advance our understanding of ocean biogeochemistry. The overall program goals are to promote, plan, and coordinate collaborative, multidisciplinary research opportunities within the U.S. research community and with international partners. Important OCB-related activities currently include: the Ocean Carbon and Climate Change (OCCC) and the North American Carbon Program (NACP); U.S. contributions to IMBER, SOLAS, CARBOOCEAN; and numerous U.S. single-investigator and medium-size research projects funded by U.S. federal agencies including NASA, NOAA, and NSF.

The scientific mission of OCB is to study the evolving role of the ocean in the global carbon cycle, in the face of environmental variability and change through studies of marine biogeochemical cycles and associated ecosystems.

The overarching OCB science themes include improved understanding and prediction of: 1) oceanic uptake and release of atmospheric CO2 and other greenhouse gases and 2) environmental sensitivities of biogeochemical cycles, marine ecosystems, and interactions between the two.

The OCB Research Priorities (updated January 2012) include: ocean acidification; terrestrial/coastal carbon fluxes and exchanges; climate sensitivities of and change in ecosystem structure and associated impacts on biogeochemical cycles; mesopelagic ecological and biogeochemical interactions; benthic-pelagic feedbacks on biogeochemical cycles; ocean carbon uptake and storage; and expanding low-oxygen conditions in the coastal and open oceans.

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Funding

Funding Source	Award
NSF Office of Polar Programs (formerly NSF PLR) (NSF OPP)	OPP-0338097

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