chone_metadata_biogeochemistry

Project Name	Start Date	End Date	Lat range	Lon range
CHONe	2016-08-23	2019-06-05	49.9994 50.2689	-66.6009 -66.0298

Role	Name	Affiliation	Email
PI	Simon Bélanger	UQAR	Simon_Belanger@uqar.ca
Database contact	Véronique Thériault	UQAR	Veronique_Theriault2@uqar.ca

Citation:
Université du Québec à Rimouski. Aquatel Laboratory. (2019). CHONe II project (Canadian Healthy Oceans Network): baseline bio-optical data in the Bay of Sept-Iles, biogeochemistry data. [Version 1.0] Data published on St. Lawrence Global Observatory-SLGO. [https://slgo.ca]. Access date: [YYYY-MM-DD].

Project Description:
The NSERC Canadian Healthy Oceans Network II (CHONe II), a strategic partnership of Canadian university researchers and government scientists, brings together 39 researchers from universities and federal research labs from coast to coast in Canada. The Network trains many interdisciplinary undergraduate and graduate students, as well as postdoctoral researchers.

CHONe II's research explores the characteristics that define how Canada's oceans will respond to management strategies such as networks of Marine Protected Areas (MPAs), spatial closures, and restoration efforts. Our research also addresses how ocean stressors such as pollution, climate change, and fishing - individually and collectively - alter ocean life and how ocean environments work, including intensively used environments that provide food and other resources.

Under this research program, 10 field campaigns were conducted in the Bay of Sept-Iles (BSI) area from 2016 to 2019 in order to establish baseline bio-optical information to promote and develop optical remote sensing tools for monitoring purposes, at the Bay scale. This particular dataset refers to the biogeochemistry parameters analyzed in the lab from water samples.

Funders:
Funded by the Natural Sciences and Engineering Research Council of Canada (NSERC) in partnership with Fisheries and Ocean Canada and the Northern Institute for Research in Environment and Occupational Health and Safety (INREST, representing the Port of Sept-Îles and City of Sept-Îles).

Datasets Table of Content

data_dictionary_biogeochemistry_chone.csv

Description:
The “data_dictionary_biogeochemistry_chone.csv” file contains the description and units of all parameters included in each dataset (each csv file). Parameter’s names are based on SeaBass standardized field names when possible (https://seabass.gsfc.nasa.gov/wiki/stdfields).

Dataset Contact:

Name	Affiliation	Email
Veronique Theriault	UQAR	veronique_theriault2@uqar.ca

Instruments:
NA

Sampling and Analysis:
NA

References:
NA

biogeochemistry_parameters_chone.csv

Description:
Various biogeochemical parameters analyzed in the lab from water samples.

Start Date: 2016-08-23
End Date: 2019-06-05

Dataset Contact:

Name	Affiliation	Email
Carlos A.S. Araujo	UQAR	araujocas81@gmail.com

Instruments:

Instrument Type	Manufacturer	Model	Instrument Features / Calibration
Salinometer	Guildline Portasal	8410A	
Autoanalyser	Bran and Luebbe	Autoanalyzer 3	
HPLC Analyser	Agilent Technologies	1200 series	
Fluorimeter	Tumer Design	TD10-AU	
TOC-Vcpn Carbon Analyser	Shimadzu	with TNM-1 module	
Flow Cytometer	Beckman Coulter	CytoFLEX	

Sampling and Analysis:
Sampling: Water samples were mainly collected with a Niskin bottle (or bucket) and were kept cool in a sun-protected container until further laboratory procedures.

Analytical procedure:
SALINITY: Salinity was measured using a Guildline Portasal model 8410A salinometer. The average of three readings was taken as the final value.

NUTRIENTS: Nutrients were analyzed by Jean-Éric Tremblay's team (Laval University, Québec, Canada). In Laval University, colorimetric determinations of nutrients were performed on an Autoanalyzer with routine methods (see Tremblay et al. 2008).

HPLC: Measurements of pigments were performed using High Performance Liquid Chromatography (HPLC) at ISMER, according to Zapata et al. (2000). Water samples were filtered and extracted, placed in the HPLC analyser and read with the EzChrome Elite Software, following the method in Galindo et la. (2017). Detection and quantification limits were estimated as described in Bidigare et al. (2005). Peaks having an area under 2000 mAU were eliminated because of identification difficulties. Some pigments where standards were absent from our database were considered as unknown and discarded from future analyses. Those unknowns were too scarce among the samples to allow proper identification. Reading of all pigments was done at 450 nm, except for phaeopigments, which were read at 412 nm because they are undetectable at 450 nm. A small variability was observed in retention time among the samples depending on the vial analyzed.

FLUORIMETER: Chlorophyll a and phaeopigments concentration in the water samples were measured in the lab with a Fluorimeter Turner Design 10-AU (Christian Nozais lab ISMER/UQAR). These parameters were measured following the filtration protocol described by Trees et al. (2002) on three samples for each sampling station. The final values are the average of those three readings, excluding those that exceeded 95% confidence interval. Then pigment concentrations are derived as recommended by Jeffrey and Humphrey (1975).

DOC / TOC / DN / TN: DOC concentration was measured in triplicates using a Shimadzu TOC-Vcpn carbon analyzer equipped with a TNM-1 module (Total Nitrogen Measurement unit) simultaneously measuring the dissolved nitrogen concentration (DN, inorganic plus organic). The coefficient of variation on three replicates injections was typically <2% for DOC and <5% for DN.

FLOW CYTOMETRY: Cyanobacteria and prokaryotes were counted with a CytoFLEX flow cytometer (Beckman Coulter). For each analysis, duplicate 4 ml subsamples were fixed with glutaraldeide in the dark room, flash-frozen and then stored at -80 degrees Celsius until analysis. See Belzile et al. (2008) and Kirk (1994).

SPM / PIM: SPM were measured according to Neukermans et al., (2012). Known volume of seawater was filtered in triplicate through pre-ashed and pre-weighed glass fiber filters at low vacuum. Each filter was then rinsed with Milli-Qwater, and dried prior to weighing under a dry atmosphere to obtain the SPM concentration. Organic matter loss on ignition (LOI) was determined after baking the filters for 3h at 500 degrees Celsius, weighted again, giving the concentration of particulate inorganic matter (PIM). The final values are considered the averages of the triplicate (excluding those that exceeded 95% confidence interval).

References:

- Belzile C. S, Brugel ., Nozais Y, Gratton and S Demers, 2008. Variations of the abundance and nucleic acid content of heterotrophic bacteria in Beaufort Shelf waters during winter and spring. J. Mar. Syst. 74: 946-956

- Bidigare RR, Van Heukelem L, Trees CC, 2005. Analysis of algal pigments by high-performance liquid chromatography. In: Andersen RA (ed) Algal culturing techniques. Elsevier Academic Press, Burlington, MA, p 327_346
- Galindo V, Gosselin M, Lavaud J, Mundy CJ and others, 2017. Pigment composition and photoprotection of Arctic sea ice algae during spring. Mar Ecol Prog Ser 585:49-69.
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- Neukermans, G, K Ruddick, H Loisel, and P Roose. 2012. “Optimization and Quality Control of Suspended Particulate Matter Concentration Measurement Using Turbidity Measurements.” *Limnology and Oceanography: Methods* 10: 1011–23. https://doi.org/10.4319/lom.2012.10.1011.
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- Zapata M, Rodriguez F and Garrido JL, 2000. Separation of chlorophylls and carotenoids from marine phytoplankton: a new HPLC method using a reversed phase C8 column and pyridine-containing mobile phases. Marine Ecology Progress Series 195: 29 to 45. http://www.jstor.org/stable/24855008

ad_long_chone.csv

ag_long_chone.csv

ap_long_chone.csv

Description:
CDOM absorption coefficient (ag), particular absorption coefficient (ap) and non-algal particles absorption coefficient (ad, often called anap) measured in the lab from water samples. Refer to the “biogeochemistry_chone.csv” dataset for additional parameters analyzed for the same water samples (based on “sample_id”) and/or station (based on “station_id”).

Start Date: 2016-08-23
End Date: 2019-06-05

Dataset Contact:

Name	Affiliation	Email
Carlos A.S. Araujo	UQAR	araujocas81@gmail.com

Instruments:

Instrument Type	Manufacturer	Model	Instrument Features / Calibration
Spectrophotometer	Perkin Elmer	Lambda-850	Integrating sphere for particles

Sampling and Analysis:
Sampling: Water samples were mainly collected with a Niskin bottle (or bucket) and were kept cool in a sun-protected container until further laboratory procedures.

Analytical procedure: Ag, ap and ad were measured following the same method as described in Bélanger et al. 2017 and Araujo and Bélanger 2022. CDOM absorbance (ag) was measured with a Perkin Elmer double-beam Lambda-850 spectrophotometer using a 10 cm quartz cell between 220 and 800 nm against nano pure water. Measurements of ap and ad were done using the integrating sphere and the filter-pad technique described in Röttgers and Gehnke (2012) and Stramski et al. (2015).

References:

- Bélanger S, Carrascal-Leal C, Jaegler T, Larouche P, and Galbraith P, 2017. Assessment of Radiometric Data from a Buoy in the St. Lawrence Estuary. Journal of Atmospheric and Oceanic Technology. 34. 10.1175/JTECH-D-16-0176.1
- Carlos A.S. Araújo, Simon Bélanger, 2022. Variability of bio-optical properties in nearshore waters of the estuary and Gulf of St. Lawrence: Absorption and backscattering coefficients, Estuarine, Coastal and Shelf Science, Volume 264,2022,107688,ISSN 0272-7714,https://doi.org/10.1016/j.ecss.2021.107688.
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