Chlorophyll a concentrations collected from Project "DaVINCi" incubations in the Gulf of Naples, Italy from April to May 2022

Website: https://www.bco-dmo.org/dataset/984494
Data Type: Other Field Results, experimental
Version: 1
Version Date: 2025-09-17

Project
» Shunt or shuttle? Nutrient-driven biogeochemical consequences of diatom host-virus interactions (Shunt or Shuttle)

Contributors	Affiliation	Role
Thamatrakoln, Kimberlee	Rutgers University	Principal Investigator
Harvey, Elizabeth	University of New Hampshire (UNH)	Co-Principal Investigator
Rauch, Shannon	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
Chlorophyll a was measured on seawater samples collected from nutrient amendment incubation experiments conducted on surface water collected at the Long-Term Ecological Monitoring Station, MareChiara, in the Gulf of Naples, Italy, between April 20 and May 19, 2022.

Table of Contents

Coverage

Location: Station MareChiara, Gulf of Naples, Italy
Spatial Extent: **Lat**:40.81667 **Lon**:14.25
Temporal Extent: 2022-04-28 - 2022-05-19

Methods & Sampling

Samples from incubation bottle treatments were collected after gently mixing treatment bags and siphoning water into a bottle used for filtering. Chlorophyll a was measured by filtering triplicate samples of 50-100 milliliters (mL) of water through 25-millimeter (mm) glass fiber filters (GFF, Whatman) using vacuum filtration. Filters were then extracted in 5 mL of 91% ethanol for at least 12 hours in the dark at room temperature in glass test tubes. Following extraction, the relative fluorescence of each sample was read on a Turner Designs handheld fluorometer (model 8000-010) and then acidified with 2 drops of 10% hydrochloric acid and read again on the fluorometer to correct for phaeophytin (Graff & Rynearson, 2011). Chlorophyll a standards purchased from Turner were used to calibrate the fluorometer prior to measurement.

BCO-DMO Processing Description

- Imported original file "Incubations_Chlorophyll.csv" into the BCO-DMO system.
- Flagged "NA" as a missing data value (missing data are empty/blank in the final CSV file).
- Renamed fields to comply with BCO-DMO naming conventions.
- Converted Date column to YYYY-MM-DD format.
- Saved the final file as "984494_v1_chlorophyll.csv".

Problem Description

No problems were encountered with these data.

[table of contents | back to top]

Data Files

File
984494_v1_chlorophyll.csv (Comma Separated Values (.csv), 3.10 KB) MD5:bf7c1f6241f8256f9257929d73a6915c Primary data file for dataset ID 984494, version 1

[table of contents | back to top]

Related Publications

Graff, J. R., & Rynearson, T. A. (2011). Extraction method influences the recovery of phytoplankton pigments from natural assemblages. Limnology and Oceanography: Methods, 9(4), 129–139.
doi:10.4319/lom.2011.9.129
Methods

[table of contents | back to top]

Parameters

Parameter	Description	Units
Date	Date sample was collected	unitless
Incubation	Incubation number identifier	unitless
Incubation_Timepoint_d	Timepoint during the incubation the sample was collected	day
Bag	Bag number	unitless
Treatment	Nutrient status consisting of either ambient (unamended), replete (amended with 30 uM N, 1.87 uM P, and 30 uM Si), or Si-limited (amended with 30 uM N, 1.87 uM P, 10 uM Si)	unitless
Replicate_Bag	Replicate bag number	unitless
Chl_0_4_um	chlorophyll a concentration of samples collected onto 0.4 um pore-size filter	micrograms per liter (ug/L)
Chl_0_4_um_SD	standard deviation of Chl_0_4_um	micrograms per liter (ug/L)
phaeophytin_0_4_um	phaeophytin concentration of samples collected onto 0.4 um pore-size filter	micrograms per liter (ug/L)
phaeophytin_0_4_um_SD	standard deviation of phaeophytin_0_4_um	micrograms per liter (ug/L)
Chl_10_um	chlorophyll a concentration of samples collected onto 10 um pore-size filter	micrograms per liter (ug/L)
Chl_10_um_SD	standard deviation of Chl_10_um	micrograms per liter (ug/L)
phaeophytin_10_um	phaeophytin concentration of samples collected onto 10 um pore-size filter	micrograms per liter (ug/L)
phaeophytin_10_um_SD	standard deviation of phaeophytin_10_um	micrograms per liter (ug/L)

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	Turner Designs handheld fluorometer, model 8000-010
Generic Instrument Name	Fluorometer
Generic Instrument Description	A fluorometer or fluorimeter is a device used to measure parameters of fluorescence: its intensity and wavelength distribution of emission spectrum after excitation by a certain spectrum of light. The instrument is designed to measure the amount of stimulated electromagnetic radiation produced by pulses of electromagnetic radiation emitted into a water sample or in situ.

[table of contents | back to top]

Project Information

Shunt or shuttle? Nutrient-driven biogeochemical consequences of diatom host-virus interactions (Shunt or Shuttle)

Coverage: Gulf of Naples, Italy approx. 40 degrees N, 14 degrees E

NSF abstract:

Diatoms are a type of microscopic marine algae that form the base of the ocean food web and generate about 20% of the oxygen on the planet. Admired since the Victorian age, these organisms are often referred to as the ‘glass houses of the sea’ because of the intricate architecture of their cell walls made of silicon dioxide, or glass. When these organisms die, the cellular-associated carbon and other elements can be either recycled and reused by other phytoplankton or, because glass is heavier than seawater, lost by sinking out of the surface ocean. Thus, the contribution diatoms make to carbon cycling is dictated by the balance between the factors that facilitate recycling and those that stimulate export. As the most abundant entity in the ocean, viruses have, for decades, been characterized as efficient recyclers, acting as ‘shunts’ by preventing the transfer of energy up the food chain through host mortality and lysis. However, it has been suggested that viruses may also act as ‘shuttles’ to the deep ocean, stimulating cellular processes that facilitate sinking. This project is testing this emerging hypothesis and determining how different nutrient regimes influence the fate of diatoms through impacts on viral infection dynamics and death. This is particularly timely given major national and international initiatives currently seeking to quantify how ecosystem interactions regulate carbon export in the ocean. Results of this project have the potential to challenge the canonical role of diatom viruses in carbon cycling and transform the understanding of host-virus interactions in the ocean. This project provides critical funding support for a soft-money, underrepresented, female oceanographer, as well a graduate student and undergraduates. Proposed fieldwork leverages a Rutgers and European Union-funded project, fostering ongoing collaborations with researchers at the Stazione Zoologica Anton Dohrn in Naples, Italy. To facilitate ocean literacy, the PIs are working with the Rutgers’ Education and Outreach team to conduct a series of Teen Cafes focused on carbon cycling, phytoplankton, and viruses utilizing the ‘Tools of Science’ (ToS), a series of educational videos and lesson plans designed to introduce middle, high school, and undergraduate students in underrepresented and underserved communities to core scientific practices.

Diatoms contribute almost 40% of marine primary productivity, dominating the biological pump and disproportionately contributing to carbon export due to the ballasted nature of a silica-based cell wall. The contribution of diatoms to carbon sequestration is dictated by the balance between upper ocean remineralization and sinking, yet we still cannot explain widespread spatio-temporal variability in diatom-mediated export. As the most abundant predatory entities in the ocean, viruses play a critical role in shaping microbial ecosystems and driving global biogeochemical cycles. The premise of this proposal is that nutrient regimes drive the biogeochemical consequences of diatom host-virus interactions. For decades, the role of viruses as ‘shunts’, redirecting particulate matter away from higher trophic levels and into the dissolved fraction through host lysis, has dominated microbial ecology and marine virology. However, the idea that viruses may also act as ‘shuttles’, facilitating carbon export by stimulating aggregation and/or ballast production, is now emerging as a potential mechanism for carbon flux. This project is conducting laboratory-

based studies on diverse diatom host-virus systems and manipulative studies on natural diatom communities to compare the impact of viral infection on processes that facilitate sinking – mineral ballast production and particle aggregation – to those that stimulate remineralization – bacterial-mediated hydrolysis and subsequent remineralization of diatom particulate organic matter and silica. Taken together, this work is characterizing the relative balance between these diametrically opposing outcomes within the ecophysiological context of nutrient regime (specifically, silicon and iron limitation), ultimately elucidating the impact of viral infection on the fate of diatom organic matter in the ocean.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-2049386

[table of contents | back to top]