Lab measurements of the maximum lengths of different phytoplankton chains collected by phytonet tows from BIOSWOT-Med study in the Northwest Mediterranean Sea during May 2023

Website: https://www.bco-dmo.org/dataset/1001364
Data Type: Cruise Results
Version: 1
Version Date: 2026-06-18

Project
» Zooglider assessment of zooplankton frontal gradients across the BIOSWOT-Med region (BIOSWOT-Med)

Contributors	Affiliation	Role
Ohman, Mark D.	University of California-San Diego Scripps (UCSD-SIO)	Principal Investigator
Leblanc, Karine	Aix-Marseille University (AMU)	Co-Principal Investigator
Rauch, Shannon	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
These phytoplankton measurements are related to the deployment of the Scripps Zooglider in collaboration with the French-led BIOSWOT-Med study in the Northwestern Mediterranean Sea in Spring 2023. This study was one of the Adopt-a-Crossover field studies carried out around the world in synchrony with the launch by NASA/CNES of the new SWOT satellite for enhanced ocean altimetry. The data archived here are measurements of the maximum lengths of different phytoplankton chains that were collected by phytonet tows from 0-150 meters depth in the vicinity of Zooglider dives. Samples analyzed here were taken from R/V L'Atalante between 2-12 May 2023 at three oceanographic stations (M, M2, B3). Measurements were made by optical and electronic (SEM) microscopy by Dr. Karine Leblanc of Aix-Marseille University. These measurements were compared with measurements of comparable chain types imaged in situ by the Zoocam on Zooglider.

Table of Contents

Coverage

Location: NW Mediterranean Sea
Spatial Extent: **N**:40.782 **E**:5.149 **S**:39.494 **W**:3.958
Temporal Extent: 2023-05-02 - 2023-05-12

Methods & Sampling

During BioSWOT-Med, vertical phytonet hauls were performed from the R/V L'Atalante at three locations near water parcels sampled by *Zooglider*, two south of Menorca (Stas. M, M2) and one in the eddy (Sta. B3, Fig. 1a, Suppl. Table S1). Each haul was from 0-150 meters (m) with a 20-micrometer (µm) mesh net. Net collector

contents were diluted to 1 liter (L) with filtered seawater. Two samples (60 milliliters (mL)) were fixed with acidified Lugols solution and buffered formaldehyde for light microscopy observations. One mL of the fresh net material was filtered onboard without fixative at low vacuum onto a 25-millimeter (mm) polycarbonate membrane and rinsed with MilliQ water, dried for 3 hours at 50 degrees Celsius (°C), then kept at room temperature for subsequent SEM analyses. Phytoplankton diversity was assessed by cell counts in light microscopy (Nikon TE200) while SEM samples were gold coated and analyzed on a Phenom ProX benchtop SEM. From the samples, diatom identification and measurements were made of the longest chains visible for each genus or species that was relatively abundant.

Data Processing Description

Data were tabulated in a spreadsheet.

BCO-DMO Processing Description

- Loaded sheet 3 from Excel file "BCO-DMO-DATASET_Lab_maximum_chain_lengths.xlsx" into the BCO-DMO system.
- Renamed columns to comply with BCO-DMO naming conventions.
- Saved the final file as "1001364_v1_maximum_chain_lengths.csv".

Problem Description

In some cases, where only individual cells or very short chains were found, an assumption of a maximum of 20 cells per chain was made for maximal length estimates, based on individual cell dimensions and from typical maximum chain lengths that can be observed in phytonets.

[table of contents | back to top]

Related Datasets

IsRelatedTo

Ohman, M. D., Leblanc, K., Ellen, J. S., & Gastauer, S. (2026). *Large phytoplankton chain lengths from BIOSWOT-Med Zooglider deployment in the Northwest Mediterranean Sea during March to May 2023* (Version 1) [Dataset]. Biological and Chemical Oceanography Data Management Office (BCO-DMO). https://doi.org/10.26008/1912/bco-dmo.999115.1

[table of contents | back to top]

Parameters

Parameter	Description	Units
Station	Oceanographic station where phytonet sample was taken	unitless
ISO_DateTime_UTC	Start date/time for phytonet sample (UTC)	unitless
Latitude	North latitude	degrees
Longitude	East longitude	degrees
Taxon	Phytoplankton chain taxonomic category	unitless
Maximum_length_mm	Maximum length of chains of this taxonomic designation measured in the laboratory from this station. * = In some cases, where only individual cells or very short chains were found, an assumption of a maximum of 20 cells per chain was made for maximal length estimates, based on individual cell dimensions.	millimeters (mm)
Comments	Explanation when maximum chain length estimated rather than measured. In some cases, where only individual cells or very short chains were found, an assumption of a maximum of 20 cells per chain was made for maximal length estimates, based on individual cell dimensions.	unitless
Corresponding_Zoocam_Category	Assignment of each phytoplankton type measured in the laboratory to 1 of 5 phytoplankton categories recognized from in situ imaging by Zoocam on Zooglider	unitless

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	Nikon TE200
Generic Instrument Name	Microscope - Optical
Dataset-specific Description	Phytoplankton diversity was assessed by cell counts in light microscopy (Nikon TE200).
Generic Instrument Description	Instruments that generate enlarged images of samples using the phenomena of reflection and absorption of visible light. Includes conventional and inverted instruments. Also called a "light microscope".

Dataset-specific Instrument Name	Phytoplankton Net
Generic Instrument Name	Phytoplankton Net
Dataset-specific Description	Phytonet of diameter 0.57 m, mesh 20 um, retrieved vertically from 150-0 m.
Generic Instrument Description	A Phytoplankton Net is a generic term for a sampling net having mesh size of 150 microns or less that is used to collect phytoplankton. It is used only when detailed instrument documentation is not available.

Dataset-specific Instrument Name	Phenom ProX benchtop SEM
Generic Instrument Name	Scanning Electron Microscope
Dataset-specific Description	SEM samples were gold coated and analyzed on a Phenom ProX benchtop SEM
Generic Instrument Description	A scanning electron microscope (SEM) scans a focused electron beam over a surface to create an image. The electrons in the beam interact with the sample, producing various signals that can be used to obtain information about the surface topography and composition.

Dataset-specific Instrument Name	Zooglider
Generic Instrument Name	Zooglider
Dataset-specific Description	Measurements in this dataset were compared with measurements of comparable chain types imaged in situ by the Zoocam on Zooglider.
Generic Instrument Description	Zooglider, designed and built at the Scripps Institution of Oceanography, as described in Ohman et al. (2019. Limnology and Oceanography-Methods 17: 69-86 doi 10.1002/lom3.10301). It is based on a Spray glider hull (Sherman et al. 2002. IEEE Journal of Oceanic Engineering 26: 437-446 doi 10.1109/48.972076), modified with custom optical and acoustic sampling instruments.

[table of contents | back to top]

Deployments

BioSWOT-Med

Website	https://www.bco-dmo.org/deployment/962207
Platform	R/V L'Atalante
Start Date	2023-04-21
End Date	2023-05-15
Description	French-led BIOSWOT-Med study in the Northwestern Mediterranean Sea in Spring 2023. This study was one of the Adopt-a-Crossover field studies carried out around the world in synchrony with the launch by NASA/CNES of the new SWOT satellite for enhanced ocean altimetry.

[table of contents | back to top]

Project Information

Zooglider assessment of zooplankton frontal gradients across the BIOSWOT-Med region (BIOSWOT-Med)

Coverage: NW Mediterranean Sea

NSF Award Abstract:
Ocean fronts are regions of sharp horizontal discontinuities that can alter phytoplankton growth rates and community composition, zooplankton distributions and grazing activity, and predator foraging success. This study is using Zooglider, an autonomous ocean sampler equipped with a range of sensors and capitalizing on a unique opportunity to investigate frontal gradients and plankton communities in the western Mediterranean Sea. It is timed to coincide with a rapid crossover phase of a new NASA satellite mission. The combination of satellite and field-collected data will provide high resolution of the bio-physical consequences of oceanic frontal processes. The project incorporates training for graduate and undergraduate students as well as public outreach. Results are broadly communicated by partnering with a major public aquarium that serves 450,000 visitors per year, including by exhibiting novel porcelain 'Zooware' meant to convey the sensory experience of exploring the ocean's planktonic fauna.

This project focuses on advancing understanding of frontal processes in the western Mediterranean Sea, at a 'crossover' site where NASA's new Surface Water Ocean Topography (SWOT) satellite is making high-frequency sea surface height measurements using a high-resolution sensor. Measurements from the SWOT satellite are resolving small changes in sea-surface height, making it possible to follow the development and temporal progression of ocean frontal systems. The investigator is assessing the consequences of these frontal systems by testing the hypotheses that 1) zooplankton, marine snow particles, and predators are altered in these ocean frontal regions with a size-dependent or trait-dependent response; 2) particle-grazing zooplankton are more closely associated with layers of marine snow than with layers of living phytoplankton; 3) vertical thin layers of zooplankton are more likely to form in frontal than non-frontal regions; and 4) higher predators such as zooplanktivorous fish and marine mammals are more detectable in frontal regions The project makes use of an autonomous ocean instrument, the Zooglider. It includes a shadowgraph imaging Zoocam for resolving zooplankton and marine snow; a dual frequency Zonar to resolve mesozooplankton and larger sources of acoustic backscatter; and a sensitive hydrophone for recording ambient sounds, especially from marine mammals and fishes. These autonomous measurements are coordinated with complementary measurements from a ship-based sampling program, other autonomous vehicles, and satellite remote sensing.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-2243190
French National Research Agency (ANR)	ANR-23-CE01-0027

[table of contents | back to top]