

Bottle sampling from 2012 to 2019 in the Gulf of Maine

Website: <https://www.bco-dmo.org/dataset/843467>

Data Type: Cruise Results

Version: 1

Version Date: 2021-03-05

Project

» [WHCOHH - Physiological and behavioral plasticity in harmful algal bloom dynamics: variation across different habitats](#) (WHCOHH Algal Bloom Dynamics)

Program

» [Woods Hole Center for Oceans and Human Health](#) (WHCOHH)

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|---|---|---------------------------|
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Abstract

Bottle sampling from 2012 to 2019 in the Gulf of Maine.

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Coverage

Spatial Extent: N:44.983 E:-66.113 S:41.528 W:-70.793

Temporal Extent: 2012-05-23 - 2019-08-12

Methods & Sampling

Sea-Bird SBE 9 CTD data measurements using Sea-Bird Software SBE Seasave at standard CTD stations: profiles (down casts) with water sampling (up casts).

Data Processing Description

Sea-Bird Software SBE Data Processing

BCO-DMO Processing notes:

- Adjusted station numbers (everything ending with .0 to integer) to join with location file

- Concatenated all bottle files, added file names as Cruise IDs
- Adjusted headers to comply with database requirements
- Rounded fields to 3 and 4 decimales
- Converted dates to ISO format

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Data Files

| File | |
|---|--|
| bottle_data_all.csv | (Comma Separated Values (.csv), 905.89 KB) MD5:32cbb1e1606d89b06a20d3dbc0a9319a |
| Primary data file for dataset ID 843467 | |
| WHCOHH_Bottle_Data | (ZIP Archive (ZIP), 241.70 KB) MD5:fed265e022c6fa21c290e6dd79614df2 |
| filename: CTD_BTL_data.zip | |
| Bottle data from 2012 to 2019 related to the Woods Hole Center for Ocean and Human Health project | |

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Parameters

| Parameter | Description | Units |
|------------------|---|---------------------------------------|
| Cruise_ID | Ship ID, year and cruise number | unitless |
| CTD_Cast_Number | description | unitless |
| Latitude | latitude | degN |
| Longitude | longitude | degW |
| Bottle | niskin number | unitless |
| Sal00 | salinity | unitless |
| Sigma_00 | sigma-theta density | kg/m ³ |
| Sbeox0 | dissolved oxygen concentration | ml/L |
| TimeS | elapsed time | sec |
| PrDM | pressure | db |
| T090C | temperature | degC |
| C0 | conductivity | S/m |
| WetStar | fluorescence 1 | mg/m ³ |
| Sbeox0V | raw oxygen | V |
| Scan | scan number | unitless |
| Ph | pH | unitless |
| CStarTr0 | Beam Transmission, WET Labs C-Star | % |
| AltM | altimetry | m |
| Par | PAR/Irradiance | microEinsteins/m ² /second |
| FIECO_AFL | fluorescence 2 | mg/m ³ |
| SeaTurbMtr | turbidity | NTU |
| Spar | SPAR/Surface Irradiance | microEinsteins/m ² /second |
| Xmiss | beam transmission, Chelsea/Seatech | % |
| ISO_DateTime_UTC | DateTime of sampling in UTC timezone and in ISO format (yyyy-mm-ddThh:mm:ssZ) | unitless |

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Instruments

| | |
|---|--|
| Dataset-specific Instrument Name | Sea-Bird SBE 9 |
| Generic Instrument Name | CTD Sea-Bird 9 |
| Dataset-specific Description | Sea-Bird SBE 9 CTD data measurements |
| 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

CT2015-01

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/846019 |
| Platform | R/V Connecticut |
| Start Date | 2015-05-07 |
| End Date | 2015-05-07 |

CT2015-04

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/846022 |
| Platform | R/V Connecticut |
| Start Date | 2015-08-06 |
| End Date | 2015-08-07 |

CT2016-01

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/846024 |
| Platform | R/V Connecticut |
| Start Date | 2016-05-03 |
| End Date | 2016-05-05 |

CT2016-02

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/846026 |
| Platform | R/V Connecticut |
| Start Date | 2016-07-19 |
| End Date | 2016-07-20 |

CT2018-01

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/846028 |
| Platform | R/V Connecticut |
| Start Date | 2018-04-30 |
| End Date | 2018-05-02 |

CT2018-02

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/846030 |
| Platform | R/V Connecticut |
| Start Date | 2018-07-18 |
| End Date | 2018-07-19 |

CT2019-01

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/846032 |
| Platform | R/V Connecticut |
| Start Date | 2019-06-12 |
| End Date | 2019-06-17 |

CT2019-02

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/846034 |
| Platform | R/V Connecticut |
| Start Date | 2019-07-09 |
| End Date | 2019-07-11 |

CT2019-03

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/846035 |
| Platform | R/V Connecticut |
| Start Date | 2019-08-13 |
| End Date | 2019-08-13 |

GC2016-01

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/846037 |
| Platform | R/V Gulf Challenger |
| Start Date | 2016-10-05 |
| End Date | 2016-10-07 |

TI603

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/845975 |
| Platform | R/V Tioga |
| Start Date | 2012-05-23 |
| End Date | 2012-05-25 |

TI606

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/845977 |
| Platform | R/V Tioga |
| Start Date | 2012-06-11 |
| End Date | 2012-06-11 |

TI623

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/845979 |
| Platform | R/V Tioga |
| Start Date | 2012-08-04 |
| End Date | 2012-08-05 |

TI661

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/845981 |
| Platform | R/V Tioga |
| Start Date | 2013-04-28 |
| End Date | 2013-04-28 |

TI667

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/845983 |
| Platform | R/V Tioga |
| Start Date | 2013-05-14 |
| End Date | 2013-05-16 |

TI670

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/845985 |
| Platform | R/V Tioga |
| Start Date | 2013-05-30 |
| End Date | 2013-05-31 |

TI672

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/845987 |
| Platform | R/V Tioga |
| Start Date | 2013-06-12 |
| End Date | 2013-06-13 |

TI677

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/845989 |
| Platform | R/V Tioga |
| Start Date | 2013-07-08 |
| End Date | 2013-07-09 |

TI691

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/845991 |
| Platform | R/V Tioga |
| Start Date | 2013-08-03 |
| End Date | 2013-08-07 |

TI747

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/845993 |
| Platform | R/V Tioga |
| Start Date | 2014-05-02 |
| End Date | 2014-05-03 |

TI751

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/845995 |
| Platform | R/V Tioga |
| Start Date | 2014-05-20 |
| End Date | 2014-05-22 |

TI752

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/845997 |
| Platform | R/V Tioga |
| Start Date | 2014-06-06 |
| End Date | 2014-06-06 |

TI758

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/845999 |
| Platform | R/V Tioga |
| Start Date | 2014-06-15 |
| End Date | 2014-06-17 |

TI762

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/846001 |
| Platform | R/V Tioga |
| Start Date | 2014-07-10 |
| End Date | 2014-07-12 |

TI770

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/846003 |
| Platform | R/V Tioga |
| Start Date | 2014-07-25 |
| End Date | 2014-07-27 |

TI813

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/846006 |
| Platform | R/V Tioga |
| Start Date | 2015-06-17 |
| End Date | 2015-06-18 |

TI817

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/846008 |
| Platform | R/V Tioga |
| Start Date | 2015-07-07 |
| End Date | 2015-07-08 |

TI831

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/846011 |
| Platform | R/V Tioga |
| Start Date | 2015-08-02 |
| End Date | 2015-08-05 |

TI906

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/846013 |
| Platform | R/V Tioga |
| Start Date | 2016-10-20 |
| End Date | 2016-10-20 |

TI972

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/846015 |
| Platform | R/V Tioga |
| Start Date | 2017-07-17 |
| End Date | 2017-07-22 |

TI978

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/846017 |
| Platform | R/V Tioga |
| Start Date | 2017-08-09 |
| End Date | 2017-08-11 |

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Project Information

WHCOHH - Physiological and behavioral plasticity in harmful algal bloom dynamics: variation across different habitats (WHCOHH Algal Bloom Dynamics)

The goal of this project is to identify commonalities and differences in regional bloom dynamics for two key harmful algal bloom (HAB) taxa, *Alexandrium fundyense* and *Pseudo-nitzschia* spp. *The project's **central hypothesis** is that HAB global biogeography and variable bloom and toxin dynamics are determined by a common repertoire of physiological and behavioral responses to environmental forcings and that the ability to understand, forecast, and mitigate HAB events requires a deep understanding of the plasticity of these repertoires within species and between populations.* Novel, targeted, efficient, and data-rich *in situ* sampling paradigms developed with previous WHCOHH funding have revealed numerous unforeseen aspects of *A. fundyense* dynamics in the Nauset Marsh (NM), a long-studied inshore “model” bloom habitat. It is now clear that accurate rate estimates and behavioral patterns are needed for modeling and forecasting, and that these need to be generated as much as possible through *in situ* observation, a recognized strength of the WHCOHH. In this project, the approach includes deployments of a portable, solar-powered observatory platform supporting remotely controlled instruments and profiling capabilities, the centerpiece being the IFCB, a unique autonomous underwater microscope for the *in situ* detection of rates of growth, accumulation, mortality, and life cycle stage conversions. Variability in environmental forcing across years and among habitats provides a proxy for future climate scenarios, revealing the responses of these key HAB organisms under natural conditions. These novel observational and analytical approaches will be used to characterize the

behaviors and responses of *A. fundyense* across a range of other habitats and environmental regimes. They will also be directed towards *Pseudo-nitzschia* spp., a group that presents a growing public health threat to the northeast U.S. Improved understanding of critical physiological and behavioral features of both taxa are essential for accurate predictions of their climate responses and assessment of short- and long-term human health impacts.

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Program Information

Woods Hole Center for Oceans and Human Health (WHCOHH)

Website: <https://www2.whoi.edu/site/whcohh/>

Coverage: Western N. Atlantic, Arctic

NSF Award Abstract

The mission of the Woods Hole Center for Oceans and Human Health is to protect the public health through enhanced understanding of how oceanic and environmental processes including climatic variation affect the population dynamics of toxin producing organisms, and the risks from exposure to their potent neurotoxins. Factors affecting the distribution, survival, proliferation, and toxicity of harmful algal bloom (HAB) species still are poorly known, despite their enormous consequences for human health. Three research projects and two cores comprise the Center. The Center structure will facilitate the integration among projects, and the integration of research with education and community engagement activities. The Center will engage stakeholders, facilitate education on HAB science at many academic levels, and strengthen public knowledge about HAB blooms and their impacts. The Center is jointly supported by NSF and by the National Institute for Environmental Health Sciences (NIEHS).

The research activities of the Center will focus on two key HAB taxa: Alexandrium fundyense that produces the saxitoxins responsible for paralytic shellfish poisoning (PSP), and Pseudo-nitzschia spp. that produce domoic acid responsible for the amnesic shellfish poisoning (ASP) syndrome. Novel, targeted, efficient, and data-rich sampling approaches developed by the applicants and applied in situ have revealed that critical aspects of A. fundyense dynamics in natural settings differ dramatically from those inferred from laboratory studies, indicating plasticity in response to climate. The research proposed will build on these new and fundamental insights into what regulates blooms, and on the Center's established strengths in ocean observation technologies and modeling, to predict how environmental variables may influence population dynamics of known and emerging HAB threats. Hindcast simulations compared with climate data records in the Gulf of Maine will assess model performance and uncertainty. Forecasts run for a range of potential climate scenarios can help quantify future public health risks. Similarly, specific cells have been identified in the developing brain that are targets of HAB toxins, findings giving insights into developmental toxicological mechanisms. These will guide studies to address the scope of toxin effect in the developing central nervous system, potentially linking developmental exposures to adult consequences. Studies of new mechanisms of toxin action will include determination of the effects of combined or repeated exposure to sub-lethal levels of saxitoxin and domoic acid, and possible silent neurotoxicity, at different life stages in the zebrafish model.

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.

The data management plan for the program can be found [here](#).

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Funding

| Funding Source | Award |
|--|---------------------------------|
| NSF Division of Ocean Sciences (NSF OCE) | OCE-1314642 |
| NSF Division of Ocean Sciences (NSF OCE) | OCE-1840381 |
| National Institutes of Health (NIH) | NIH-P01ES021923 |
| National Institutes of Health (NIH) | NIH-P01ES028938 |

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