CTD bottle data matched to dissolved, inorganic nutrient concentrations and to stable isotope measurements of particulate nitrogen and carbon rom R/V Melville cruise MV1110 in the Western Tropical North Atlantic in 2011

Website: https://www.bco-dmo.org/dataset/919848
Data Type: Cruise Results
Version: 1
Version Date: 2024-02-07

Project
» Amazon iNfluence on the Atlantic: CarbOn export from Nitrogen fixation by DiAtom Symbioses (ANACONDAS)

Programs
» Integrated Marine Biogeochemistry and Ecosystem Research -US (IMBER-US)
» Ocean Carbon and Biogeochemistry (OCB)
» Emerging Topics in Biogeochemical Cycles (ETBC)
» Marine Microbiology Initiative (MMI)

Contributors	Affiliation	Role
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Abstract
CTD bottle data matched to dissolved, inorganic nutrient concentrations and to stable isotope measurements of particulate nitrogen and carbon.

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Coverage

Spatial Extent: **N**:11.628 **E**:-44.638 **S**:5.151 **W**:-56.876
Temporal Extent: 2011-09-05 - 2011-10-06

Dataset Description

Hydrographic data and water samples collected during casts with a CTD-rosette system (SBE911plus equipped

with a fluorometer, transmissometer, oxygen sensor, and a PAR sensor)

Nutrient samples were run at sea using a Lachat QuickChem 8000 flow-injection analyzer equipped with the following methods:

Phosphate	31-115-01-1-I
Silicate	31-114-27-1-B
Nitrate+Nitrite	31-107-04-1-A
Nitrite	31-107-05-1-A

Particle (particulate N and C) samples for stable isotope (d15N, d13C) were collected and analyzed following methods in Montoya et al. 2002.

Methods & Sampling

The ship's Underway system was equipped with an in-line Seabird thermosalinograph to collect sea surface temperature (SST) and sea surface salinity (SSS) data from 5-7m below sea surface.

Nutrient samples were run at sea using a Lachat QuickChem 8000 flow-injection analyzer equipped with the following methods:

Phosphate	31-115-01-1-I
Silicate	31-114-27-1-B
Nitrate+Nitrite	31-107-04-1-A
Nitrite	31-107-05-1-A

Particle (particulate N and C) samples for stable isotope (d15N, d13C) were collected and analyzed following methods in Montoya et al. 2002.

Data Processing Description

Data processed using SeaSave v 7.21d. See seabird-format header information in the supplemental file "MV1110 CTD Header File.'

BCO-DMO Processing Description

* Sheet 2 of file "DATASET-MV1110_CTD-Nutrients+Particles.xlsx" was imported into the BCO-DMO data system. Sheet 1 metadata was added to BCO-DMO metadata fields.
** Missing data values are displayed differently based on the file format you download. They are blank in csv files, "NaN" in MatLab files, etc.
* Column names adjusted to conform to BCO-DMO naming conventions designed to support broad re-use by a variety of research tools and scripting languages. [Only numbers, letters, and underscores. Can not start with a number]

* ISO_DateTime_UTC added ISO 8601 format datetime with timezone

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Data Files

File	
919848_v1_mv1110-ctd-nutrient-particle.csv	(Comma Separated Values (.csv), 227.25 KB) MD5:ea56e4568310ae043b82574000c4ef67
Primary data file for dataset ID 919848, version 1	

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Supplemental Files

File
MV1110 CTD Header File (seabird metadata format) filename: seabird_header.txt (Plain Text, 11.78 KB) MD5:a795c8810afe9da66f5514b30a03e0be This seabird-format metadata is in xml format and contains information about the sensors such as calibration information as well as the seabird files these data were processed with.

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Related Publications

Gruber, N., & Sarmiento, J. L. (1997). Global patterns of marine nitrogen fixation and denitrification. Global Biogeochemical Cycles, 11(2), 235–266. Portico. https://doi.org/10.1029/97gb00077
https://doi.org/10.1029/97GB00077
Methods

Montoya, J. P., Carpenter, E. J., & Capone, D. G. (2002). Nitrogen fixation and nitrogen isotope abundances in zooplankton of the oligotrophic North Atlantic. Limnology and Oceanography, 47(6), 1617–1628. doi:10.4319/lo.2002.47.6.1617
Results

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Parameters

Parameter	Description	Units
Cruise	Cruise Identifier	unitless
Anaconda_Num	Internal reference number for samples.	unitless
Niskin_Bottle	description	unitless
CTD_Cast	description	unitless
Station	description	unitless
StnEvent	description	unitless
Longitude	Longitude	decimal degrees
Latitude	Latitude	decimal degrees
Yearday	description	unitless
Date	Date (GMT)	unitless
Month	Month (GMT)	unitless
Day	Day (GMT)	unitless
Year	Year (GMT)	unitless
Time	Time (GMT)	unitless
Hour	Hour (GMT)	unitless
Minute	Minute (GMT)	unitless
ISO_DateTime_UTC	DateTime with time zone in ISO 8601 format	unitless
prDM	Pressure, Digiquartz	decibars (db)

Average_prDM	Average pressure, Digiquartz	decibars (db)
depSM	Depth (salt water)	meters (m)
Average_depSM	Average depth (salt water)	meters (m)
t190C	Temperature, 2 (ITS-90)	degrees C, Celsius
Average_t190C	Average temperature, 2 (ITS-90)	degrees C, Celsius
Potential_Temperature	Potential temperature	degrees C, Celsius
Average_Potential_Temperature	Average potential temperature	degrees C, Celsius
sal00	Salinity, Practical	Practical Salinity Units (PSU)
Average_sal00	Average salinity, Practical	Practical Salinity Units (PSU)
Sigma_theta	Sigma-theta potential density	kilograms per cubic meter(kg/m^3)
Average_Sigma_theta	Average sigma-theta potential density	kilograms per cubic meter(kg/m^3)
sbeox0Mm_Kg	Dissolved oxygen (sbeox0Mm/Kg), SBE 43	micromoles per kilogram (umol/kg)
Average_sbeox0Mm_Kg	Average dissolved oxygen (sbeox0Mm/Kg) , SBE 43	micromoles per kilogram (umol/kg)
Oxygen_Saturation	Oxygen saturation	percent (%)
Average_Oxygen_Saturation	Average oxygen saturation	percent (%)
Beam_Transmission	Beam transmission	percent (%)
Average_Beam_Transmission	Average beam transmission	percent (%)
Beam_Attenuation	Beam attenuation	per meter (1/m)
Average_Beam_Attenuation	Average beam attenuation	per meter (1/m)
Fluorescence	Fluorescence	migrograms per cubic meter (mg/m^3)
Average_Fluorescence	Average flourescence	migrograms per cubic meter (mg/m^3)
PAR	PAR (Photosynthetically active radiation)	microEinsteins per meter squared per second (uEm-2sec-1)
Average_PAR	Average PAR (Photosynthetically active radiation). (depth average)	microEinsteins per meter squared per second (uEm-2sec-1)
Mean_PO4	Mean phosphate (PO4). (depth average)	micromolar (uM)

Mean_Si	Mean silicate, silicon dioxide, SiO2. (depth average)	micromolar (uM)
Mean_NO3_NO2	Mean NO3+NO2 (depth average)	micromolar (uM)
Mean_N	Mean N* . N* is the deficit of nitrogen (NOx, NO3 +NO2) relative to phosphorus (P) compared to the Redfield ratio, calculated: (NOx - (16*PO4)+2.9)* 0.87) .Equation (13) from Gruber and Sarmiento 1997.	unknown
d15N	d15N	permil (0/00)
d13C	d13C	permil (0/00)
C_to_N	Ratio C:N	unitless
Total_Particulate_N	Total particulate nitrogen	micromolar (uM)
Total_Particulate_C	Total particulate carbon	micromolar (uM)

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Instruments

Dataset-specific Instrument Name	Seabird SBE 11plus v5.2 for CTD bottle data. Individual sensor details and calibration info provided in the “notes” sheet of the excel file.
Generic Instrument Name	CTD Sea-Bird SBE 911plus
Dataset-specific Description	Seabird SBE 11plus v5.2 for CTD bottle data. Individual sensor details and calibration info provided in the Supplemental File seabird_header.txt
Generic Instrument Description	The Sea-Bird SBE 911 plus is a type of CTD instrument package for continuous measurement of conductivity, temperature and pressure. The SBE 911 plus includes the SBE 9plus Underwater Unit and the SBE 11plus Deck Unit (for real-time readout using conductive wire) for deployment from a vessel. The combination of the SBE 9 plus and SBE 11 plus is called a SBE 911 plus. The SBE 9 plus uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 plus and SBE 4). The SBE 9 plus CTD can be configured with up to eight auxiliary sensors to measure other parameters including dissolved oxygen, pH, turbidity, fluorescence, light (PAR), light transmission, etc.). more information from Sea-Bird Electronics

Dataset-specific Instrument Name	Micromass Optima or Isoprime 100
Generic Instrument Name	Isotope-ratio Mass Spectrometer
Dataset-specific Description	Stable isotopes were measured using continuous-flow isotope-ratio mass spectrometry (CF-IRMS) on either a Micromass Optima or Isoprime 100. Both instruments were interfaced to a Carlo Erba elemental analyzer.
Generic Instrument Description	The Isotope-ratio Mass Spectrometer is a particular type of mass spectrometer used to measure the relative abundance of isotopes in a given sample (e.g. VG Prism II Isotope Ratio Mass-Spectrometer).

Dataset-specific Instrument Name	Lachat Quikchem 8000 Series
Generic Instrument Name	Lachat QuikChem 8000 flow injection analyzer and Ion Chromatography (IC) system
Dataset-specific Description	Lachat Quikchem 8000 Series for dissolved, inorganic nutrients
Generic Instrument Description	The Lachat QuikChem 8000 can operate flow injection analysis and ion chromatography simultaneously and independently on the same instrument platform. Instrument includes sampler, dilutor, sampling pump, electronics unit, and data station. Analysis takes 20-60 seconds, with a sample throughput of 60-120 samples per hour. Measurements are in the range of parts per trillion to parts per hundred.

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Deployments

MV1110

Website	https://www.bco-dmo.org/deployment/58945
Platform	R/V Melville
Start Date	2011-09-03
End Date	2011-10-08
Description	ANACONDAS: Amazon iNfluence on the Atlantic: CarbOn export from Nitrogen fixation by DiAtom SymbiosesROCA: River Ocean Continuum of the Amazon Original data are available from the NSF R2R data catalog Cruise Track over Salinity Climatology (Image from Dr. Ajit Subramaniam)

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Project Information

Amazon iNfluence on the Atlantic: CarbOn export from Nitrogen fixation by DiAtom Symbioses (ANACONDAS)

Website: http://amazoncontinuum.org/

Coverage: Amazon River plume; NE coast of South America; Western Tropical North Atlantic - 15N-Equator and 60W to 45W - Region surrounding the Amazon River Plume

ANACONDAS is an IMBER endorsed project.
View list of all IMBER endorsed projects

View the ANACONDAS project GCMD DIF record

The ANACONDAS project was funded as part of the US National Science Foundation (NSF) Emerging Topics in Biogeochemical Cycles (ETBC) program (Directorate for Geosciences, NSF 07 -049, September 19, 2007) explicitly intended to support emerging areas of interdisciplinary research. The ETBC program aimed to foster transformational advances in the quantitative or mechanistic understanding of biogeochemical cycles that integrated physical-chemical-biological processes over the range of temporal and/or spatial scales in Earth's environments. The program especially sought proposals that addressed emerging topics in biogeochemical

cycles, the water cycle or their coupling, across the interfaces of atmosphere, land, and oceans.

The ANACONDAS investigators hypothesize that large tropical river plumes with low N: P ratios provide an ideal niche for diatom-diazotroph assemblages (DDAs). They suggest that the ability of these organisms to fix N2 within the surface ocean is responsible for significant C export in the Amazon River plume. Their previous observations in the Amazon River plume helped reveal that blooms comprised of the endosymbiotic N2-fixing cyanobacterium Richelia and its diatom hosts (e.g. Hemiaulus) were a significant source of new production and carbon export. The previous work focused largely on the sensitivity of DDAs to external forcing from dust and riverine inputs, so the ecology of these organisms and the fate of their new production were largely unstudied. It is now known that DDAs are responsible for a significant amount of CO2 drawdown in the Amazon River plume, and floating sediment traps at 200 m measured 4x higher mass fluxes beneath the plume than outside the plume. This led the researchers to hypothesize that this greater export is due either to aggregation and sinking of DDAs themselves or to grazing of DDAs by zooplankton.

In this study the researchers will undertake a suite of field, satellite and modeling studies aimed at understanding the ecology and tracing the fate of C and N fixed by DDAs and other phytoplankton living in the plume. By examining C and silicate (Si) export from offshore surface waters, through the upper oceanic food web, the mesopelagic, and down to the deep sea floor, they will quantify the impact of the Amazon River on biological processes that control C sequestration and the implications of these regional processes on C, N and Si budgets. The study will go beyond previous research because they will quantify 1) the distribution, nutrient demands, and activity of DDAs in the context of phytoplankton species succession, 2) the sensitivity of the CO2 drawdown to the mix of phytoplankton, 3) the grazing and aggregation processes contributing to the sinking flux, 4) the composition of this flux, and 5) the proportion of this material that reaches the seafloor. This effort truly represents a measure of C sequestration and pump efficiency. Ecological modeling will be used to place observational results from field studies and satellites into the context of the larger Atlantic basin with tropical climate variability on interannual and longer time scales.

Three cruises were carried out during the ANACONDAS project:
AN10/KN197-08 - R/V KNORR - May/June 2010 - Cruise Track over Salinity Climatology *(Image: Yager, et al, 2007)*
AN11/MV1110 - R/V MELVILLE - September/October 2011 - Cruise Track over Salinity Climatology *(Image: Yager, et al, 2007)*
AN12/AT21-04 - R/V ATLANTIS - July/2012 - Cruise Track over Salinity Climatology *(Image: Yager, et al, 2007)*

The ANACONDAS project builds on observations made by MANTRA/PIRANA in 2001 and 2003 (RV Knorr and Seward Johnson I cruises to the same region) to address specifically 1) how carbon cycling and sequestration in the western tropical North Atlantic (WTNA) is influenced by the Amazon River through its impact on pelagic ecosystem dynamics and 2) the sensitivity of this ecosystem to anthropogenic climate change. PIRANA revealed the importance of both riverine and atmospheric inputs for driving the high productivity of the WTNA through N2-fixation, and demonstrated the significance of the region to basin-wide biogeochemistry and C cycling. ANACONDAS will now focus on what drives phytoplankton community succession through the plume, light and nutrient requirements, factors limiting productivity, and the fate of production. These components are critical to understand the role of the plume in the regional C cycle, and to predict its response to climate variability and change.

The NSF-funded ANACONDAS project will also serve as a platform for additional measurements supported by the Gordon and Betty Moore Foundation's Marine Microbiology Initiative. ROCA (River-Ocean Continuum of the Amazon) brings additional focus on marine microbial community structure and activities, along with high-resolution measurements of organic matter along the river-ocean continuum.

ANACONDAS: Amazon iNfluence on the Atlantic: CarbOn export from Nitrogen fixation by DiAtom Symbioses
ROCA: River Ocean Continuum of the Amazon

The project is funded by NSF-OCE-0934095 and NSF-OCE-0934036: Collaborative Research: ETBC: Amazon iNfluence on the Atlantic: CarbOn export from Nitrogen fixation by DiAtom Symbioses and by the Gordon and Betty Moore Foundation through GBMF-MMI-2293: River Ocean Continuum of the Amazon.

Planned Cruise Sampling

Water Column Characterization (hydrographic sampling with CTD/Rosette):
Nutrient (NO2, NO2+NO3, PO4, SiO4) concentrations
Chlorophyll a and pigments concentrations
Inorganic carbon (discrete DIC, ALK, underway pCO2)
Organic carbon, nitrogen, phosphorus

Phytoplankton and Diazotroph Abundance (using rosette and also small nets to collect)
Carbon and Nitrogen Fixation by plankton
Kinetic and Physiological Measurements of phytoplankton
Stable Isotopic Measurements of particulate material
Microbial heterotrophy
Microbial community structure and gene expression
Organic carbon and biomarker characterization

MOCNESS tows for zooplankton
Zooplankton collection for abundance and biomass
Zooplankton grazing and POC flux measurements

Multicorer for deep sea sediment analyses
Solid phase analysis
Pore water chemistry
Isotopic composition (Pb, Th, C)

Other instrumentation over the side:
The in-water light field will be characterized with a free-falling 14 channel spectroradiometer
Two "Carbon Explorers" - autonomous Sounding Oceanographic Lagrangian Observer profilers
Sediment Trap Studies (using 48h deployments of floating Particle Interceptor Traps; PITs)
Surface water pumps - directly bring large volumes of surface water to the deck of the ship for processing.

Shipboard Instrumentation:
ADCP 75 kHz
Bathymetry System 12 kHz
Bathymetry System 3.5 kHz
Deionized Water System
Fume Hood
HiSeasNet
Multibeam
Uncontaminated Seawater System
CTD/Water Sampling: 911+ Rosette 24-position, 10-liter bottle Rosette with dual T/C sensors
Biospherical underwater PAR (1000m depth limit)
SBE43 oxygen sensor
Wet Labs C*Star transmissometer (660nm wavelength)
Wet Labs ECO-AFL fluorometer
Dissolved Oxygen Titration System (Portable modified Winkler titration system)

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Program Information

Integrated Marine Biogeochemistry and Ecosystem Research -US (IMBER-US)

Website: http://www.imber.info/

Coverage: global

The BCO-DMO database includes data from IMBER endorsed projects lead by US funded investigators. There is no dedicated US IMBER project or data management office. Those functions are provided by US-OCB and BCO-DMO respectively.

The information in this program description pertains to the Internationally coordinated IMBER research program. The projects contributing data to the BCO-DMO database are those funded by US NSF only. The full IMBER data catalog is hosted at the Global Change Master Directory (GCMD).

IMBER Data Portal: The IMBER project has chosen to create a metadata portal hosted by the NASA's Global Change Master Directory (GCMD). The GCMD IMBER data catalog provides an overview of all IMBER endorsed

and related projects and links to datasets, and can be found at URL http://gcmd.nasa.gov/portals/imber/.

IMBER research will seek to identify the mechanisms by which marine life influences marine biogeochemical cycles, and how these, in turn, influence marine ecosystems. Central to the IMBER goal is the development of a predictive understanding of how marine biogeochemical cycles and ecosystems respond to complex forcings, such as large-scale climatic variations, changing physical dynamics, carbon cycle chemistry and nutrient fluxes, and the impacts of marine harvesting. Changes in marine biogeochemical cycles and ecosystems due to global change will also have consequences for the broader Earth System. An even greater challenge will be drawing together the natural and social science communities to study some of the key impacts and feedbacks between the marine and human systems.

To address the IMBER goal, four scientific themes, each including several issues, have been identified for the IMBER project: Theme 1 - Interactions between Biogeochemical Cycles and Marine Food Webs; Theme 2 - Sensitivity to Global Change: How will key marine biogeochemical cycles, ecosystems and their interactions, respond to global change?; Theme 3 - Feedback to the Earth System: What are the roles of the ocean biogeochemistry and ecosystems in regulating climate?; and Theme 4 - Responses of Society: What are the relationships between marine biogeochemical cycles, ecosystems, and the human system?

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.

Emerging Topics in Biogeochemical Cycles (ETBC)

Website: http://www.nsf.gov/pubs/2007/nsf07049/nsf07049.jsp

Coverage: global

The original call for proposals for Emerging Topics in Biogeochemical Cycles (ETBC) was issued in September 2007 by the US NSF Directorate for Geosciences (NSF 07-049).

The Geosciences Directorate (GEO) is substantially augmenting our past funding sources to explicitly support emerging areas of interdisciplinary research. We seek to foster transformational advances in our quantitative or mechanistic understanding of biogeochemical cycles that integrate physical-chemical-biological processes over the range of temporal and/or spatial scales in Earthâ€™s environments. We encourage submission of proposals that address emerging topics in biogeochemical cycles, the water cycle or their coupling, across the interfaces of atmosphere, land, and oceans. Proposals must cross the disciplinary boundaries of two or more divisions in Geosciences (e.g. ATM, EAR, OCE) or of at least one division in Geosciences and a division in another NSF directorate.

Although funding programmatic disciplines continues to provide a robust and adaptable framework to build our understanding of the geosciences and the earth as a system, there are classes of emerging and challenging problems that require integration of concepts and observations across diverse fields. Our goal is to enhance such integration. Successful proposals need to develop intellectual excitement in the participating disciplinary communities. Also encouraged are proposals that have broader educational, diversity, societal, or infrastructure impacts that capitalize on this interdisciplinary opportunity.

Marine Microbiology Initiative (MMI)

Website: https://www.moore.org/initiative-strategy-detail?initiativeId=marine-microbiology-initiative

A Gordon and Betty Moore Foundation Program.

Forging a new paradigm in marine microbial ecology:

Microbes in the ocean produce half of the oxygen on the planet and remove vast amounts of carbon dioxide, a greenhouse gas, from the atmosphere. Yet, we have known surprisingly little about these microscopic organisms. As we discover answers to some long-standing puzzles about the roles that marine microorganisms play in supporting the ocean’s food webs and driving global elemental cycles, we realized that we still need to learn much more about what these organisms do and how they do it—including how they evolved and contribute to our ocean's health and productivity.

The Marine Microbiology Initiative seeks to gain a comprehensive understanding of marine microbial communities, including their diversity, functions and behaviors; their ecological roles; and their origins and evolution. Our focus has been to enable researchers to uncover the principles that govern the interactions among microbes and that govern microbially mediated nutrient flow in the sea. To address these opportunities, we support leaders in the field through investigator awards, multidisciplinary team research projects, and efforts to create resources of broad use to the research community. We also support development of new instrumentation, tools, technologies and genetic approaches.

Through the efforts of many scientists from around the world, the initiative has been catalyzing new science through advances in methods and technology, and to reduce interdisciplinary barriers slowing progress. With our support, researchers are quantifying nutrient pools in the ocean, deciphering the genetic and biochemical bases of microbial metabolism, and understanding how microbes interact with one another. The initiative has five grant portfolios:

Individual investigator awards for current and emerging leaders in the field.
Multidisciplinary projects that support collaboration across disciplines.
New instrumentation, tools and technology that enable scientists to ask new questions in ways previously not possible.
Community resource efforts that fund the creation and sharing of data and the development of tools, methods and infrastructure of widespread utility.
Projects that advance genetic tools to enable development of experimental model systems in marine microbial ecology.
We also bring together scientists to discuss timely subjects and to facilitate scientific exchange.

Our path to marine microbial ecology was a confluence of new technology that could accelerate science and an opportunity to support a field that was not well funded relative to potential impact. Around the time we began this work in 2004, the life sciences were entering a new era of DNA sequencing and genomics, expanding possibilities for scientific research – including the nascent field of marine microbial ecology. Through conversations with pioneers inside and outside the field, an opportunity was identified: to apply these new

sequencing tools to advance knowledge of marine microbial communities and reveal how they support and influence ocean systems.

After many years of success, we will wind down this effort and close the initiative in 2021. We will have invested more than $250 million over 17 years to deepen understanding of the diversity, ecological activities and evolution of marine microbial communities. Thanks to the work of hundreds of scientists and others involved with the initiative, the goals have been achieved and the field has been profoundly enriched; it is now positioned to address new scientific questions using innovative technologies and methods.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0934025

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