# Stations from multiple C-MORE cruises in the north and south Pacific from 2007-2011 (C-MORE project)

**Website**: https://www.bco-dmo.org/dataset/3267
**Version**: 24 October 2011
**Version Date**: 2011-10-24

**Project**
» Center for Microbial Oceanography: Research and Education (C-MORE)

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## Dataset Description

C-MORE Stations - Stations, dates, lats, lons, casts and bottles

### Methods & Sampling

See deployments for cruise specific information

### Data Processing Description

See deployments for cruise specific information

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## Parameters

| Parameter | Description | Units |
|---|---|---|
| sta | station number | dimensionless |
| cast | cast number | dimensionless |
| date | date | YYYYMMDD GMT |
| time | time | HHMM GMT |
| lat | latitude | decimal degrees (South is negative) |
| lon | longitude | decimal degrees (West is negative) |
| depth_w | depth; water bottom | meters |
| depth | depth | meters |
| bot | rosette bottle number | dimensionless |
| depth_cast | depth of cast | meters |
| depth_n | Nominal depth | meters |
| chl_max_deep | deep chlorophyll maximum | meters |

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## Deployments

**KM0715**

| | |
|---|---|
| **Website** | https://www.bco-dmo.org/deployment/57999 |
| **Platform** | R/V Kilo Moana |
| **Report** | ftp://ftp.soest.hawaii.edu/dkarl/cmore/Cruise_Reports/bloomer1//Letelier_cmore_2_rpt.pdf |
| **Start Date** | 2007-08-09 |
| **End Date** | 2007-08-21 |
| **Description** | C-MORE BLOOMER (BLOOM Ecological Reconnaissance) C-MORE 2 cruise C-MORE August 2007 cruise objectives and logistics downloaded from C-MORE site 'Cruise objectives' document, 14 September 2009 GENERAL CRUISE OBJECTIVES The primary goal this year will be the characterization of the microbial assemblage and biogeochemical fluxes associated to summer increases in cyanobacterial biomass in the vicinity of Station ALOHA. This characterization will be compared to a sampling site where no biomass increase is detected. In addition, we will try to establish transects across a bloom region, or try to sample distinct areas where blooms are detected from remote sensing and SeaGliders, to assess the spatial heterogeneity of these blooms. GENERAL CRUISE PLAN: August 8th: Loading day August 9th, 8:00 Departure from Snug. 1st scenario: If a boom is remotely detected within 100km of Station ALOHA August 9th to August 10th at 5AM: Transit to the bloom station August 10th to August 13th in the morning: Sample and carry experiments within the bloom (considers the deployment of sediment traps for at least 72 hours on August 10th and carrying on deck incubation time series for 5 days [August 15th]) August 13th noon to August 14th evening: Series of stations to characterize the spatial heterogeneity of the bloom. August 14th evening to August 15th 5AM: Transit toward Station ALOHA or a site within 100km of this site not displaying high accumulation of chlorophyll in surface waters. August 15th to August 18th in the morning: Sample and carry experiments outside the bloom. August 19th is left as a buffer and could be used to revisit the sampling site. August 20th early morning - noon: start transit back to Honolulu. 2nd scenario: If blooms are not detected in the vicinity of Station ALOHA: August 9th to August 10th at 5AM: Transit to 24N, 158W where increase sea surface chlorophyll concentration was observed on July 18 to 28. This location could change once we have developed the full MODIS chlorophyll statistics for the month of July for the study region. We will use these statistics to assess the station that has had the largest change in chlorophyll concentration as well as the station that has not seen significant chlorophyll fluctuation within 100 to 200km radius north of Station ALOHA. These will represent our primary sampling sites, replacing the bloom and non bloom sites in the 1st scenario. As in the first scenario, we will devote August 13th and August 14th to assess the spatial heterogeneity of the sampling region. 3rd scenario: A bloom develops during the cruise. We will modify the cruise plan accordingly in order to characterize the bloom evolution. C-MORE 2 BLOOMER Cruise Reports Cruise reports available from the C-MORE ftp site: ftp://ftp.soest.hawaii.edu/dkarl/cmore/Cruise_Reports/bloomer1/ each investigator contributed a separate report. Related information sources from the C-MORE Web Site: Homepage: http://cmore.soest.hawaii.edu/cruises/cmore_2/index.htm Data: http://hahana.soest.hawaii.edu/cmorebloomer/cmorebloomer.html Cruise track: http://hahana.soest.hawaii.edu/cmorebloomer/cm2LocMap.gif Cruise objectives: http://hahana.soest.hawaii.edu/cmorebloomer/cmore_2_objectives_logistics... Cruise event sheet: http://hahana.soest.hawaii.edu/cmorebloomer/cmore_2_final_master_event_s... Cruise information and original data are available from the NSF R2R data catalog.<br><br>**Methods & Sampling**<br># Stations, dates, lats, lons, casts and bots for BLOOMER # CMORE/BLOOMER # date ingested into BCO-DMO: September 30, 2009 |

**KM0704**

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|---|---|
| **Website** | https://www.bco-dmo.org/deployment/57997 |
| **Platform** | R/V Kilo Moana |
| **Report** | http://bcodata.whoi.edu/C-MORE/BULA1_cruise_activities.pdf |
| **Start Date** | 2007-04-19 |
| **End Date** | 2007-04-30 |
| **Description** | The BULA cruise, a transect from Suva, Fiji to Honolulu, Hawaii was the inagural cruise of the Center for Microbial Oceanography: Research and Education (C-MORE). Some of the many goals were: (1) to identify prominent trends in plankton biomass, biomass structure, and elemental stoichiometry, (2) to examine latitudinal variability in upper ocean concentrations of colored dissolved organic matter and trace metal ligands, (3) to isolate new Prochlorococcus strains, (4) to optically determine upper ocean biogeochemical variables, (5) to study the distribution, production and loss rates of dissolved hydrogen and its relationship to nitrogen fixation, (6) to study viral diversity along biogeochemical gradients, (7) to assay spatial distributions of microbial community structure based on rRNA fingerprinting and sequencing, and (8) to assess spacial variability in photophysiological responses to photoautotrophs. Original sources available from C-MORE Web Site: BULA Home page: http://cmore.soest.hawaii.edu/cruises/bula/index.htm BULA Data: http://hahana.soest.hawaii.edu/cmorebula/cmorebula.html Cruise track: http://hahana.soest.hawaii.edu/cmorebula/bula1track.gif Cruise log: http://hahana.soest.hawaii.edu/cmorebula/CMOREBULA_Cruise_Log.pdf (sample log sheets) Cruise activities: http://hahana.soest.hawaii.edu/cmorebula/Cruise_activities.pdf (Cruise Report) Cruise summary: ftp://ftp.soest.hawaii.edu/dkarl/cmore/cruise.summaries/bula1.sum (station/cast locations) Cruise information and original data are available from the NSF R2R data catalog.<br><br>**Methods & Sampling**<br># Stations, dates, lats, lons, casts and bottles for BULA # CMORE/BULA # date ingested into BCO-DMO: January 28, 2010 |

**KM0814**

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| **Website** | https://www.bco-dmo.org/deployment/58018 |
| **Platform** | R/V Kilo Moana |
| **Start Date** | 2008-07-30 |
| **End Date** | 2008-08-14 |
| **Description** | OPEREX Cruise Objective The objective of the OPEREX cruise will be to explore the potential and limitations of perturbation experiments at sea. We will follow some natural perturbations including blooms and eddies, and we will perform some of the artificial perturbation experiments including bench/lab scale incubations, ship deck incubations, and ship deck pH shift experiments. Original cruise data are available from the NSF R2R data catalog Related information from the C-MORE OPEREX cruise Web site: Homepage: http://cmore.soest.hawaii.edu/cruises/operex/index.htm Science plan: http://cmore.soest.hawaii.edu/cruises/operex/science_objective.htm Data: http://hahana.soest.hawaii.edu/cmoreoperex/operex.html Cruise track: http://hahana.soest.hawaii.edu/cmoreoperex/OPEREXtrack.gif Cruise plan: http://cmore.soest.hawaii.edu/cruises/operex/documents/km0814_cruise_pla... Cruise overview: http://hahana.soest.hawaii.edu/cmoreoperex/OPEREX_overview.pdf Cruise schedule: http://cmore.soest.hawaii.edu/cruises/operex/documents/OPPEREX_schedule.xls<br><br>**Methods & Sampling**<br># Stations, dates, lats, lons, casts and bots for OPEREX # CMORE/OPEREX # date ingested into BCO-DMO: September 02, 2010 Link to ftp site of scanned .pdf's of OPEREX Cast Sheets |

**MV1015**

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| **Website** | https://www.bco-dmo.org/deployment/58647 |
| **Platform** | R/V Melville |
| **Report** | http://cmore.soest.hawaii.edu/cruises/big_rapa/ |
| **Start Date** | 2010-11-18 |
| **End Date** | 2010-12-14 |
| **Description** | The South East Pacific (SEP) is characterized by very high nutrient concentrations in the waters adjacent to the Chilean coast, but very low nutrient concentrations (oligotrophic) in the mid- South Pacific Subtropical Gyre (SPSG), near Easter Island. The steep gradient in nutrient concentrations across the region affects the level of marine production, the composition of the microbial community, and the operation of major biogeochemical cycles in ways that are not fully understood. Despite the remarkable diversity of trophic conditions, strong gradients and even some unique singularities, the SEP is still the most sparsely sampled oceanic region of the global ocean from hydrodynamic, biological and biogeochemical points of view. The SPSG is also the most oligotrophic of all sub-tropical gyres. Previous expeditions and remote sensing studies have describes the nutrient and chlorophyll field, but there have been few simultaneous measurements of chemical properties with microbial community structure and function. This expedition is designed to investigate the impact of elemental nutrient (nitrogen, phosphorus, iron, silicon, carbon) ratios on marine productivity and microbial community composition. We propose to sample along a line extending from the Chilean coast near Arica to Easter Island. We will occupy three major "process" stations for up to five days each; a high productivity, near shore station, a mid-cruise station in the nutrient transition zone, and a low productivity, mid-gyre station near Easter Island. In between these stations, we will briefly sample at additional "survey" stations at lower intensity along the cruise track. Cruise information and original data are available from the NSF R2R data catalog. BiG RAPA Home project Web site with additional information<br><br>**Methods & Sampling**<br>BiG RAPA cruise events and cast info CMORE/BiGRAPA Chief Scientist: Dan Repeta (WHOI) Information taken from the ship's event log and cast logs Date ingested into BCO-DMO: April 21 2011 Link to scanned .pdf's of BiG-RAPPA Cast Sheets Link to BiG-RAPPA Bridge Logs<br><br>**Processing Description**<br>BiG RAPA cruise events and cast info CMORE/BiGRAPA Chief Scientist: Dan Repeta (WHOI) Information taken from the ship's event log and cast logs Date ingested into BCO-DMO: April 21 2011 http://cmore.soest.hawaii.edu/cmoredata/logs/BiG-RAPA/BiGRAPA-Cast_Sheet... to scanned .pdf's of BiG-RAPPA Cast Sheets http://cmore.soest.hawaii.edu/cmoredata/logs/BiG-RAPA/MV1015%20Bridge_PD... to BiG-RAPPA Bridge Logs |

**KM1125**

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|---|---|
| **Website** | https://www.bco-dmo.org/deployment/58729 |
| **Platform** | R/V Kilo Moana |
| **Start Date** | 2011-09-06 |
| **End Date** | 2011-09-21 |
| | */ BioLINCS (Biosensing Lagrangian Instrumentation and Nitrogen Cycling Systems — Tracking nitrogen in the open ocean) 06–21 September, 2011 • North of Station ALOHA Objective: Researchers on the BioLINCS cruise will use a variety of drifting instruments to study how marine microbes take up and transform nitrogen compounds in the open ocean. About the cruise: During the BioLINCS cruise, the research vessel Kilo Moana will spend 14 days near a patch of open ocean about 200 miles north of Oahu. Conditions in this area are similar to those at Station ALOHA, a mid-ocean research site that for almost 25 years has provided researchers with a wealth of background information about the chemistry, biology, and currents of the open Pacific. Researchers on the Kilo Moana will conduct a number of experiments to study marine bacteria and archaea. (Archaea are single celled organisms that look similar to bacteria, but which are in an entirely separate biological domain.) The BioLINCS |

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| **Description** | researchers are particularly interested in how these microbes take up nitrogen and convert it into different forms (nitrogen cycling). These experiments involve deploying a variety of research equipment in the ocean and allowing this equipment to drift with the currents for days at a time. Some of these drifting ("Lagrangian") instruments are incubators, which allow researchers to run experiments on microbes in the environment from which the microbes were collected (in situ). One of the largest of these drifting instruments is called the Environmental Sample Processor (ESP). The ESP will allow researchers to use the DNA of marine microbes to figure out what organisms are present. It will also be used to determine the abundances of genes necessary for taking up dissolved nitrogen gas from seawater—a process known as "nitrogen fixation." While the Kilo Moana follows these arrays of drifting instruments, researchers on the ship will collect water samples at various depths and acquire physical, chemical, and biological data throughout the water column. They will also conduct incubation experiments on board the ship using the collected seawater. The water-column data, shipboard measurements, and incubation experiments will allow researchers on the ship to understand the biological-chemical links (or "biogeochemical processes") occurring in the water column. The water-column data will also become part of the long-term scientific record for Station ALOHA. About the science: Conditions around Station ALOHA are typical of the mid-Pacific, with extremely clear water and low populations of microscopic photosynthetic organisms (primary producers), which form the basis for marine food webs. Primary producers are relatively sparse in the open ocean because the surface water contains very low concentrations of the chemicals (nutrients) that they need to grow. Oceanographers use the term "oligotrophic" to describe such low-nutrient waters, thus the acronym forStation ALOHA: "A Long-term Oligotrophic Habitat Assessment.' One of the most important nutrients for primary producers is nitrogen, which can take several different chemical forms (nitrate, nitrite, ammonium, etc.). Different types of marine microbes use different forms of nitrogen as "fertilizer." In the open ocean, the "waste" from one group of microbes typically serves as an energy source or as a nutrient for another group of microbes. This biologically-controlled process of converting compounds from one form to another is called "biogeochemical cycling." During the BioLINCS cruise, researchers will focus on learning about the biogeochemical cycling of nitrogen compounds. Nitrogen gas is the only form of nitrogen that is available in high concentrations near the sea surface. However, only a few organisms exist that can take up nitrogen gas. These organisms "fix" nitrogen, converting nitrogen gas into energy-rich, "reduced" forms of nitrogen, such as ammonium, which can be utilized by other organisms. Thus nitrogen-fixing organisms can be thought of as providing fertilizer for other organisms. In fact, nitrogen fixation by microbes fuels most of the primary production in the surface waters of the open ocean. In addition to being used by primary producers, nitrogen compounds are also nutrients for other marine microbes that do not necessarily rely on sunlight and photosynthesis for survival. These microbes get their energy not from light, but rather by absorbing reduced chemicals directly from seawater. In doing so, they convert these compounds from one chemical form to another. This is analogous to animals eating food (which contains reduced carbon) and converting it to carbon dioxide (an oxidized form of carbon), which is then released to the atmosphere Although population densities of primary producers are relatively low in open-ocean areas, these areas cover much of the Earth's surface. As the dominant organisms in this immense environment, marine microbes are critically important in maintaining the climate of the Earth. They also supply approximately a third of the oxygen in the our atmosphere. In addition to providing oxygen, marine microbes have other important effects the atmosphere. Some of them release nitrous oxide (N2O), which is a greenhouse gas. Others release compounds such as dimethyl sulfide (DMS), which influence the formation of clouds. Because of all these interactions between the open ocean and the atmosphere, studying the nitrogen cycle of the open ocean is more than an academic exercise. The results from the BioLINCS experiments could help improve computer models that predict how life in the oceans will respond to increasing carbon dioxide in the atmosphere, global warming, and ocean acidification. Related Files: BioLINCS Home C-MORE BioLINCS Site (no login required) C-MORE BioLINCS Members Site (login required) Cruise information and original data are available from the NSF R2R data catalog.<br><br>**Methods & Sampling**<br># Stations, dates, lats, lons, casts and bots for BioLINCS # CMORE/BioLINCS # date ingested into BCO-DMO: November 02, 2011 Link to ftp site of scanned .pdf's of BioLINCS Cast Sheets |

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| **Website** | https://www.bco-dmo.org/deployment/516667 |
| **Platform** | R/V Ka`imikai-O-Kanaloa |
| **Report** | http://cmore.soest.hawaii.edu/cmoredata/logs/BAG/BAG1/BAG1_Post_Cruise_Summation.pdf |
| **Start Date** | 2011-12-03 |
| **End Date** | 2011-12-13 |
| **Description** | BAG EM UP (Biogeochemistry and Genomes (BAG-1) Mesocosm Experiment: Experimental Long term ocean ecology characterization is predicated on a variety of in situ shorter term experiments and field exercises. These shorter term experiments can be generally classed in one of two ways. The first way of approach is to observe or capture physical or biogeochemical ocean events that are short term in duration or in location. We would consider the use of the research vessel or autonomous vehicle, or sediment trap part of this first approach. The second type of experiment is also an in situ approach, where one perturbs a “subset” of the natural ecosystem by manipulating or isolating various features (and/or processes) to test a hypothesis. This is illustrated with the use of instruments such as the wave pump (transport mechanism) or with our current effort to utilize a system of larger ‘bags’ called mesocosms (larger volume subset ) to induce a phytoplankton response. Historically, the mesocosm is akin to the use of lakes or ponds to test the growth response (negative or positive) of an ecosystem when artificially exposed to a variety of chemical substances. The mesocosm does enclose a larger mass of water but it is different from a pond or lake, in that the ratio of the vertical depth (benthic) to the horizontal affords the user unique opportunities to simulate depth or measure stratified characteristics of plankton communities. In this particular cruise experiment, IFM-GEOMAR and C-MORE are partnering together to utilize three mesocosms in the open ocean to study the biogeochemical effects to Deep Sea Water (DSW) nutrient additions. This exercise has both engineering and scientific components. The first part is to test the feasibility of deploying and successfully maintaining large scale mesocosms in the open ocean. This mesocosm design has been successfully used in the Arctic region: Ny-Alosund \| Svalbard, so our goal is to extend its usage into more potential hostile conditions. The second part is to measure the surface response of the phytoplankton when deep water macro and micro nutrients are added in. Website Introduction Post Cruise Summary Cruise Log Bridge Log Cast Sheets<br><br>**Methods & Sampling**<br>BAG-1 station locations, dates, casts, depths and bottles<br><br>**Processing Description**<br># C-MORE BAG-1 stations # Laboratory for Microbial Oceanography, University of Hawaii # Steve Poulos # CMORE/BAG-1 # date ingested into BCO-DMO: June 6 2014 |

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## Project Information

**Center for Microbial Oceanography: Research and Education (C-MORE)**

**Website**: http://cmore.soest.hawaii.edu/

**Coverage**: North Pacific Subtropical Gyre (large region around 22 45 N, 158 W)

## Project summary

The **Center for Microbial Oceanography: Research and Education** (C-MORE) is a recently established (August 2006; NSF award: EF-0424599) NSF-sponsored Science and Technology Center designed to facilitate a more comprehensive understanding of the diverse assemblages of microorganisms in the sea, ranging from the genetic basis of marine microbial biogeochemistry including the metabolic regulation and environmental controls of gene expression, to the processes that underpin the fluxes of carbon, related bioelements and

energy in the marine environment. Stated holistically, C-MORE's primary mission is: *Linking Genomes to Biomes*.

We believe that the time is right to address several major, long-standing questions in microbial oceanography. Recent advances in the application of molecular techniques have provided an unprecedented view of the structure, diversity and possible function of sea microbes. By combining these and other novel approaches with more well-established techniques in microbiology, oceanography and ecology, it may be possible to develop a meaningful predictive understanding of the ocean with respect to energy transduction, carbon sequestration, bioelement cycling and the probable response of marine ecosystems to global environmental variability and climate change. The strength of C-MORE resides in the synergy created by bringing together experts who traditionally have not worked together and this, in turn, will facilitate the creation and dissemination of new knowledge on the role of marine microbes in global habitability.

The new Center will design and conduct novel research, broker partnerships, increase diversity of human resources, implement education and outreach programs, and utilize comprehensive information about microbial life in the sea. The Center will bring together teams of scientists, educators and community members who otherwise do not have an opportunity to communicate, collaborate or design creative solutions to long-term ecosystem scale problems. The Center's research will be organized around four interconnected themes:

- (Theme I) microbial biodiversity,
- (Theme II) metabolism and C-N-P-energy flow,
- (Theme III) remote and continuous sensing and links to climate variability, and
- (Theme IV) ecosystem modeling, simulation and prediction.

Each theme will have a leader to help coordinate the research programs and to facilitate interactions among the other related themes. The education programs will focus on pre-college curriculum enhancements, in service teacher training and formal undergraduate/graduate and post-doctoral programs to prepare the next generation of microbial oceanographers. The Center will establish and maintain creative outreach programs to help diffuse the new knowledge gained into society at large including policymakers. The Center's activities will be dispersed among five partner institutions:

- Massachusetts Institute of Technology,
- Woods Hole Oceanographic Institution,
- Monterey Bay Aquarium Research Institute,
- University of California at Santa Cruz and
- Oregon State University

and will be coordinated at the University of Hawaii at Manoa.

**Related Files:**

Strategic plan (PDF file)

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## Funding


| Funding Source | Award |
|---|---|
| NSF Division of Biological Infrastructure (NSF DBI) | DBI-0424599 |


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