Cruise track showing station locations from multiple C-MORE cruises in the north and south Pacific from 2007-2011 (C-MORE project)

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

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Dataset Description

Maps of C-MORE cruise tracks showing station locations; one per cruise

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Parameters

Parameters for this dataset have not yet been identified

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Deployments

KM0704

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.

KM0817

Website	https://www.bco-dmo.org/deployment/57998
Platform	R/V Kilo Moana
Report	http://data.bco-dmo.org/C-MORE/SUPER_HI-CAT_Chief_Scientist_Report.pdf
Start Date	2008-08-25
End Date	2008-09-05

Description	Preliminary Cruise Report from: http://cmore.soest.hawaii.edu/cruises/super/cruisereport.htm C-MORE science and volunteer crew reported to Snug Harbor at 0630 on Monday, 25 August, 2008. After fueling the ship, the R/V Kilo Moana departed from Honolulu, HI at approximately 1630. Starting at 2200 on this first day and for the duration of the cruise, daily and nightly underway samples were collected from the ship's flow-through system. Water collected from this system was processed for particulates, nutrients, ATP, chlorophyll, and a suite of other analyses for contextual data. The cruise track began with a northeasterly course from Oahu to 34° N, 151° W. Six stations were visited before heading east, approximately tracing 35° N latitude, along which 10 additional stations were taken. This track took us 27 hours off of the great circle path between Honolulu and Port Hueneme. The total distance of the sample transect was 2115 km. The first station consisted of a single CTD cast at 1300 on Tuesday, 26 August to collect water for a mixing experiment (mixing deep water with surface water to change nutrient concentrations). From Wednesday, 27 August to Monday, 1 September, two to three stations were visited per day, during which the manta trawl was deployed for 1.5 hours, the CTD rosette was cast to the deep chlorophyll maximum, and the HyperPro profiler and LISST particle analyzer were deployed to approximately 125m depth. Upon recovery of the manta trawl, the net was rinsed with sea water, and the cod end was detached and placed in a bucket on deck. The cod end was then taken to Lab 2, where the contents were sieved through three filters of the following mesh sizes: 5mm, 2mm, and 0.2mm. Large pieces that were not kept for later use were measured and photographed (the upper size limit for whether a sample was retained was determined by the size of the largest storage containers). The presence and abundance of fauna collected in the net were recorded. The metazoan community consisted primarily of Valella valella, Porpita porpita, Halobates, Janthina, isopods, copepods, amphipods, and small crabs. In the following summary of sample allocations, the "large" size class refers to plastic pieces >5mm; "medium" refers to 2-5mm sized pieces, and "small" refers to 0.2-2mm sized pieces. For each sample, 30-100 pieces of plastic were collected from the large and medium size classes for DNA and RNA analyses. For chlorophyll extractions, 3 large, 6 medium, and 30 small pieces were placed in acetone and refrigerated (each size class was divided into 3 tubes, for a total of 9 chlorophyll samples per station). For ATP, 5 large, 15 medium, and 50 small pieces were boiled in TRIS buffer and then frozen (each size class was divided into 5 tubes, yielding a total of 15 ATP tubes per station). From 6 of the 14 trawl collections,between 14-19 large and medium pieces were used for incubation experiments. The remaining plastic pieces were sorted by size class and stored in 5% formalin. All of the 2-5mm and >5mm sized pieces were counted, and as many of the 0.2-2mm sized pieces were counted as time allowed. In addition to these collections, an incubation experiment was conducted in which microbial processes were examined in treatments without plastic particles, with sterilized plastic particles, and with "in situ" (non-sterilized) plastic particles. The combined density of plastic particles in the 2-5mm and >5mm size classes ranged from 0.35-3.71 pieces m-3 across all sampling stations. Integrated over the top 0.5m of the ocean, the particle concentrations along the transect ranged from 174,000 to 1.85 million plastic fragments km-2. Related information from the C-MORE SUPER cruise Web site: Homepage: http://cmore.soest.hawaii.edu/cruises/super/index.htm Cruise Report: http://cmore.soest.hawaii.edu/cruises/super/cruisereport.htm Science plan: http://cmore.soest.hawaii.edu/cruises/super/science.htm Data: http://hahana.soest.hawaii.edu/cmoresuperhicat/superhicat.html Chief Scientist Report: http://hahana.soest.hawaii.edu/cmoresuperhicat/SUPER_HI-CAT_Chief_Scient... Cruise track: http://hahana.soest.hawaii.edu/cmoresuperhicat/super1track.gif Cruise plan: http://hahana.soest.hawaii.edu/cmoresuperhicat/SUPER_HI-CAT_final_cruise... Cruise information and original data are available from the NSF R2R data catalog. **Methods & Sampling** downloaded from C-MORE SUPER cruise Web site: SUPER site: http://cmore.soest.hawaii.edu/cruises/super/index.htm

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. **Methods & Sampling** Downloaded from the C-MORE BLOOMER Web site: BLOOMER site: http://cmore.soest.hawaii.edu/cruises/cmore_2/index.htm

KM0814

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 **Processing Description** downloaded from C-MORE SUPER cruise Web site: http://cmore.soest.hawaii.edu/cruises/super/index.htm"> SUPER site: http://cmore.soest.hawaii.edu/cruises/operex/index.htm

KM1125

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 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-

Description	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. **Methods & Sampling** Downloaded from the C-MORE BioLINCS Web site: BioLINCS Home

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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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