HOT-203: Chief Scientist Report

Chief Scientist: Susan Curless

R/V Kilo Moana

July 25-29, 2008

Cruise ID: KM0813
Departed: July 25, 2008 at 0855 (HST)
Returned: July 29, 2008 at 0800 (HST)
Vessel: ***R/V Kilo Moana***
Operator: University of Hawaii
Master of the Vessel: Captain Brian Wehmeyer
Chief Scientist: Susan Curless
OTG Electronics/Deck Operations Technicians: Kuhio Vellalos and Tobin Chen

1. SCIENTIFIC OBJECTIVES

The objective of the cruise is to maintain a collection of hydrographic and biogeochemical data at the Hawaii Ocean Time-series (HOT) stations. Three stations will be occupied during the cruise, in the following order:

1) Station 1, referred to as Station Kahe, is located at 21° 20.6'N, 158° 16.4'W and will be occupied on the first day of the cruise for about 2.5 hours.
2) Station 2, referred to as Station ALOHA (A Long Term Oligotrophic Habitat Assessment) is defined as a circle with a 6 nautical mile radius centered at 22° 45'N, 158°W. This is the main HOT station and will be occupied during the 2nd, 3rd, and 4th days of the cruise.
3) Station 50, is the site of the WHOTS Mooring, located at 22° 46'N, 157° 53.83'W and will be occupied on the 4th day of the cruise for about 1 hour.

Upon arrival at Station Kahe, two 1,300 lb. weight-test casts to 1000m were to be conducted to test the gear box replacement on the CTD winch. Normal HOT cruise protocol would have been to have one weight-test cast at Station Kahe to 500m. Two casts to 1000m were added and scheduled by the science party to thoroughly test the major repairs before using the winch to deploy our rosette.

After the weight casts were completed and proved successful operation of the CTD winch, one CTD cast to 1000m, and a PRR cast were to be conducted at this location on the afternoon of July 25th. The single CTD cast was to be conducted to collect continuous profiles of various physical and chemical parameters. Water samples were to be collected at discrete depths for biogeochemical measurements. After these operations were satisfactorily completed, the ship was to proceed to Station ALOHA.

Upon arrival at Station ALOHA, the free-drifting sediment trap array was to be deployed. The sediment trap array was to stay in the water for about 52 hours. This was to be

followed by two shallow CTD casts (one to 200m and one to 250m) and one 1000 m cast to collect water for the Primary Production Array. This was to be followed by the deployment of the free-drifting primary productivity array to incubate insitu for 12 hours. A full-depth (~4740m) CTD cast was to be conducted after the deployment of the Primary Production array, followed by 1000-m CTD casts at strict 3 hour intervals for at least 36 hours for continuous and discrete data collection, ending with another full-depth CTD cast on July 27th.

Another free-drifting array (gas array) was to be deployed for 24 hours for incubation experiments on July 27th. The gas array was to be recovered at 0800 on July 28th.

A plankton net was to be towed between near noon and midnight for 30-min intervals on July 26th and July 27th at Station ALOHA.

A trace metal sampler was to be deployed on July 26th to collect a trace metal clean surface seawater sample.

A Profiling Reflectance Radiometer (PRR) was to be deployed for half-hour periods near noon time on July 25th, 27th, 28th.

A package including a Wet Labs AC9, a Chelsea Fast Repetition Rate Fluorometer (FRRf), and a SeaBird Seacat was to be used to profile the upper 200 m at Station ALOHA around noon time on July 27th and in the early morning and around noon on July 28th.

After the 36 hour burst period of CTD work at Station ALOHA was accomplished, the ship was to transit to recover the floating sediment trap array and the gas array on July 28th.

After recovering the arrays, the ship was to transit to Station 50 to conduct a one-hour 200m CTD yo-yo cast after which the ship was to re-position within Station ALOHA to conduct light casts (one PRR cast, and two AC9/FRRf casts).

After the light cast operations were complete, the ship was to complete cruise CTD operations with a 3000m deep cast at Station ALOHA.

Once the deep cast was complete, the ship was to transit to the eastern edge of the WHOTS mooring watch circle and weather permitting, attempt to recover Sea Glider #146. In conjuncture with the recovery of Sea Glider #146 was to be the deployment of Sea Glider #148.

Once Sea Glider operations were completed, testing of the winch pump off the port side of the back deck was to occur. The submersible pump and CTD package of the winch pump were to be delpoyed to various depths with a maximum depth of 200m to test the continuity of the wire, and the ability of the sumbersible pump to bring water from any depth up to the deck.

Once winch pump testing was complete, the ship was to transit back to Snug Harbor.

The following instruments were to collect data throughout the cruise: shipboard ADCP, thermosalinograph, underway fluorometer, two anemometers, and the pCO2 system.

2. SCIENCE PERSONNEL

Cruise Participant	Title	Affiliation
Matthew Church	Scientist	UH/BEACH
Tara Clemente	Research Associate	UH/BEACH
Susan Curless	Chief Scientist – Res. Assoc.	UH/BEACH
Lance Fujieki	Computer Specialist	UH/BEACH
Adriana Harlan	Research Associate	UH/BEACH
Binglin Li	Graduate Student	UH/BEACH
Dan Sadler	Research Associate	UH/BEACH
Brett Updyke	Research Associate	UH/BEACH
Brenner Wai	Intern/Undergraduate Student	UH/CMORE
Sam Wilson	Scientist	UH/CMORE
Jay Wheeler	Research Associate	UH/BEACH
Paul Lethaby	Research Associate	UH/PO
Fernando Santiago-Mandujano	Research Associate	UH/PO
Christin Shacat	Research Associate	UH/PO
Jefrey Snyder	Marine Technician	UH/PO
Gayle Philip	Volunteer	UH/PO
Eric Liaw	High School Student	UH/PO
Erica Goetze	Scientist	UH
Jamie Becker	Graduate Student	CMORE
Mar Nieto-Cid	Scientist	CMORE
Kuhio Vellalos	Marine Technician	OTG
Tobin Chen	Marine Technician	OTG

3. GENERAL SUMMARY

Unfavorable weather conditions on July 28th forced the cancellation of sea glider operations. Most of the other cruise operations were conducted as planned and only minor delays and schedule changes were experienced.

Two 1000 m weight casts were performed with a 1,300 lb. weight, and one 1000-m CTD cast were conducted at Station Kahe (1). The PRR cast scheduled at Station Kahe was cancelled to allow for intensive weight cast testing of the new gear boxes installed on the .322 CTD winch.

Two near-bottom deep casts, one 3000m deep cast, thirteen 1000m CTD casts, one 250m cast, and one 200m cast were conducted at Station ALOHA (2). One one hour 200m yo-yo cast (6 cycles) was conducted near the WHOTS mooring (Station 50).

The array of floating sediment traps, the gas array, and the primary production array were deployed and recovered without any major incidents.
All of the arrays drifted NW of the center of Station ALOHA.

Eight net tows were completed, three were conducted during the day, and five during the night.

The AC9/FRRf was deployed around noon three times, and one time at night.

The PRR was deployed two times around noon.

A trace metal sample was taken (ATE) on July 27th.

The winch pump was tested as planned. The package (submersible pump and SBE-9) was lowered to 300m and then retrieved. The continuity of the cable was tested with the ship's mega ohm meter to determine that the three phase internal power lines were operational. The package was then re-deployed to 100m and the pump was turned on. Water was pumped up to the deck at approximately 1.3L/minute and remained constant for all depths as the package was lowered to a final testing depth of 300m.

The ADCP ran without interruption throughout the cruise, as well as the pCO2 system, thermosalinograph, underway fluorometer, and the ship's two anemometers.

Winds were from the east between 15-20 knots during the course of the cruise with seas between 5-8ft.

We arrived at Snug Harbor for off-loading on July 29th, at 0800 (HST).

4. R/V KILO MOANA, OFFICERS AND CREW, TECHNICAL SUPPORT

The R/V Kilo Moana continues to maintain excellent ship support for our work. A big Mahalo goes to the engineering crew for the long hours spent installing the new gear boxes on the CTD winch before the departure of our cruise. Our cruise would not have been as successful without their diligent repairs.
Another big Mahalo goes to Gray Drewry, Tim McGovern, and Kuhio Vellalos for not only keeping us informed of the progress on winch repairs, but for allowing discussion of contingency plans and re-arrangement of our science gear on the back deck. Due to those discussions our science team was ready and prepared for CTD operations on either the .322 wire or the .681 wire. Their time and shared concern was greatly appreciated.

The Captain and ship's crew were most helpful and accommodating throughout the cruise. They were very flexible in receiving changes to our operational schedule. Throughout our cruise, the entire crew showed enthusiasm, concern, and dedication to our scientific mission.
Technical support during this cruise was excellent. OTG personnel were available at any time to assist in our work and helped keep operations running smoothly.

5. DAILY REPORT OF ACTIVITIES (HST)

July 24th, 2008 – Loading Day
0900 - Cruise equipment was loaded this day. The .332 CTD wire was reterminated by Jefrey Snyder.

July 25th, 2008
0855- depart Snug Harbor
0945- Science meeting, followed by abandon ship and fire drills
1200- Arrive Station Kahe, begin 1st weight cast
1330- Begin second weight cast
1501- S1C1
1630- Begin transit to Station ALOHA

July 26th, 2008
0020- Arrive Station ALOHA, positioned 1 mile west of the center.
0107- Sediment Trap array deployed 22°45.975'N 158°1.074'W
0123- S2C1 (200m cast)
0247- S2C2 Primary Production Cast
0452- S2C3 (250m cast)
0550- primary production array deployed 22°44.998'N 158°0.512'W
0617- S2C4 PO deep cast
0946- end of S2C4
0950- transit to pump ships tanks
1030- net tow
1156- S2C5
1330- net tow
1432- S2C6
1555- Transit to pump ship's tanks
1710- S2C7
1926- Primary Production Array Recovered 22°48.90'N 158°2.43'W
2006- S2C6
2132- Transit to pump ship's tanks
2207- net tow
2309- S2C9

Weather conditions were east winds at 14 knots with seas of 4-6 feet under a 1/8 cloud covered sky.

July 27th, 2008
0028- net tow
0113- net tow
0201- S2C10
0421- Gas Array deployed 22°45.16'N 158°0.53'W
0453- S2C11
0610- Transit to pump ship's tanks
0757- S2C12
0915- ATE
1000- net tow
1055- S2C13
1220- PRR
1257- AC9/FRRF
1354- S2C14
1519- transit to pump ship's tanks
1702- S2C15
1954- S2C16
2128- net tow
2230- net tow
2330- S2C17- second deep cast

Weather conditions at Station ALOHA were east winds at 15 kts with 4-6ft seas under a 2/8 cloud covered sky.

July 28th, 2008
0316- end of deep cast
0330- AC9/FRRF
0430- transit to recover sediment traps
0630- recovery of the sediment traps 22°56.6'N 158°8.8'W 14nm NW of the center
0755- recovery of the gas array 22°53.0'N 158°3.6'W 8.6nm NW of the center
0931- S50C1 6 cycles to 200m
1100- PRR
1130- AC9/FRRF
1230- AC9/FRRF
1330- AC9/FRRF operations complete, transit to pump ship's tanks
1435- S2C18
1700- Begin winch-pump testing
1915- End winch-pump testing
1925- Begin transit to Snug Harbor

Weather at Station ALOHA was scattered squalls under a 8/8 cloud cover, 6-8ft seas, and east winds at 17 kts, gusting up to 22kts.

July 29th, 2008
0800- Arrive at Snug Harbor for full off load.

HOT program sub-components:

Investigator:	Project/Institution:
Dave Karl	Core Biogeochemistry/UH
Roger Lukas	Hydrography/UH
Bob Bidigare	HPLC pigments/UH
Mike Landry	Zooplankton dynamics/UH
Mark Abbott/Ricardo Letelier	Optical measurements/OSU

Ancillary programs:

Investigator:	Project/Institution:
Charles Keeling	CO2 dynamics and intercalibration/SIO
Paul Quay	DI13C
Penny Chisholm	Prochlorococcus population dynamics/MIT
Zehr/Church/Montoya	Diversity and activities of nitrogen-fixing microorganisms/UH
Various CMORE PI's	Microbial RNA/DNA collection/CMORE
Mark Brzezinski	Silica production and dissolution rate measurments/UCSB

Additional programs:

Investigator:	Project/Institution:
Edward Boyle	Trace metals/MIT
Sam Wilson	Reduced gases in the upper ocean: The cycling of methane, sulfide and nitrous oxide/CMORE/UH
Erica Goetze	Phylogenomics of marine phytoplankton/UH
Jamie Becker/Mar Nieto-Cid	Fractionation and composition of dissolved organic matter/CMORE/WHOI/MIT