HOT-192: Chief Scientist Report

Chief Scientist: Susan Curless

HOT-192 Chief Scientist's Cruise Report
R/V Kilo Moana
June 8-11, 2007

Cruise ID: KM0707
Departed: June 8, 2007 at 0900 (HST)
Returned: June 11, 2007 at 0950
Vessel: *R/V Kilo Moana*
Operator: University of Hawaii
Master of the Vessel: Captain Rick Meyer
Chief Scientist: Susan Curless
OTG Electronics/Deck Operations Technicians: Tobin Chen and Dan Fitzgerald

1. SCIENTIFIC OBJECTIVES

The objective of the cruise was to maintain a collection of hydrographic and biogeochemical data at the Hawaii Ocean Time-series (HOT) stations. Five stations were to 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 was to be occupied on the first day of the cruise for about 2 hours.
2) Station 2, referred to as Station ALOHA 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 was to be occupied during the 2nd, 3rd, and 4th days of the cruise.
3) Station 51, is the site of the MOSEAN Mooring, located at 22° 45'N, 158° 6'W was to be occupied on the 4th day of the cruise for about 30 minutes.
4) Station 50, is the site of the WHOTS Mooring, located at 22° 45.994'N, 157° 53.992'W was to be occupied on the 4th day of the cruise for about 1 hour.
5) Station 6, referred to as Station Kaena, is located off Kaena Point at 21° 50.8'N, 158° 21.8'W was to be occupied on the 4th day of the cruise for about 2 hours.

Upon arrival to Station Kahe a 400 lb. weight-test cast, one CTD cast to 1000 m, and a PRR cast was to be conducted at this location in the afternoon of June 8th. 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 (<200 m) to collect water for incubation experiments. After this, a free-drifting array with incubation experiments (gas array) was to be deployed for 24 hours. A full-depth CTD cast was to be conducted after the deployment of the gas 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 June 10th.

One free-drifting array (primary production) was to be deployed for 12 hours for incubation experiments on June 10th. Following the depoyment of the primary production array, the gas array was to be recovered at 0700 on June 10th.

A plankton net was to be towed near noon and midnight for 30-min intervals on June 9th and 10th at Station ALOHA.

A Profiling Reflectance Radiometer (PRR) was to be deployed for half-hour periods near noon time on June 8th, 10th and 11th.

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 June 10th and 11th, and in the early morning on June 11th.

After CTD work at Station ALOHA was accomplished, the ship was to transit to recover the floating sediment trap array on June 11th.

After recovering the sediment traps, the ship was to transit to Station 51 (MOSEAN) to conduct a 200-m CTD cast, and then to Station 50 (WHOTS) for a 200-m CTD cast. After the CTD cast the ship was to transit back to Station ALOHA to conduct light casts (PRR, AC9/FRRf). Following the light casts the ship was to transit back to Station 50 for another 200-m CTD cast.

After operations at Station 50 ended, the ship was to transit to Station 6 (Kaena).

A near-bottom CTD cast (~2500 m) was to be conducted at Station 6 including salinity samples for calibration, after which the ship was to transit back to Snug Harbor.

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

2. SCIENCE PERSONNEL

BEACH group:

Cruise Participant	Title	Affiliation
Karin Bjorkman	Research Specialist	UH
Susan Curless	Chief Scientist (Res. Assoc.)	UH
Lucas Beversdorf	Graduate Student	UH
Adriana Harlan	Technician	UH
Allison Fong	Graduate Student	UH
Lance Fujieki	Computer Specialist	UH
Dan Sadler	Research Associate	UH
Donn Viviani	Graduate Student	UH
Blake Watkins	Marine Engineer	UH

PO group:

Paul Lethaby (Watch Leader)	Research Associate	UH
Fernando Santiago-Mandujano (Watch Leader)	Research Associate	UH
Nina Ribbat	Undergraduate Student	HPU
Jefrey Snyder	Marine Technician	UH
Justin Smith	Undergraduate Student	UH
Oriana Villar Allen	Volunteer	PO

Others:

Darin Hayakawa	Technician	UH
Tracy Campbell	Technician	UH
Tobin Chen	Marine Technician	OTG
Dan Fitzgerald	Marine Technician	OTG
Kate Achilles	Scientist/Educator	CMORE
Linda Sciaroni	School Teacher	CMORE
Geoff Wolverton	Marine Technician	USCG
Daniel Smith	Marine Technician	USCG

3. GENERAL SUMMARY

CTD operations were suspended the evening of June 9th after mechanical problems with the CTD winch prevented a safe environment for personnel and safe deployment and recovery of equipment. Back deck work operations continued to recover arrays, conduct optics casts and net tows till those operations were complete. The ship then returned to port one day early on June 11th, 2007.

One 1000-m CTD cast was conducted at Station Kahe (1). One near-bottom deep cast, three 1000-m CTD casts, and two 200-m casts were conducted at Station ALOHA (2). The CTD wire was reterminated one time during the course of the cruise.

The array of floating sediment traps and the gas array were deployed and recovered without any major incidents. The arrays drifted NW of ALOHA.

Six net tows were completed, three net tows at night and three during the day.

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

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

Winds were from the east between 15-20 knots during the course of the cruise.

We arrived at Snug Harbor on June 11th, at 0950.

Missed science operations include: one AC9/FRRf cast, one PRR cast, deployment and recovery of the primary production array, 14 CTD casts, and 11 hours of sampling time for the sediment trap array.

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

Despite having encountered CTD winch failure on this cruise, the R/V Kilo Moana continues to maintain excellent ship support for our work.
The Captain and crew were most helpful and accommodating thoroughout the mechanical issues we encountered. They were very flexible in receiving changes to our operational schedule. The crew (especially the engineers) did not hesitate to work long hours in efforts of fixing the winch for our operations but could not over come the mechanical issues despite their best efforts.

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)

June 6, 2007 - Van Loading

The HOT radiation van was loaded on this day.

June 7, 2007 - Loading Day

Heavy equipment and the blue storage van loaded during this day.

June 8, 2007

R/V Kilo Moana departed Snug Harbor at 0902.

Safety and Science briefing meeting held at 0945.

Fire and abandon ship drill conducted at 1015. (All new to ship members of science party met with chief mate for immersion suit training: Linda, Kate, Oriana, Nina, Geoff, and Dan)

Arrived at St. Kahe 1130, conducted a 400lb weight cast at 1145, a PRR at 1220, and a 1000m CTD cast at 1251.

- During the cast it was noted that despite the ISUS being connected to the CTD for power, it was not displaying data on the console. Later investigations found that the currently mounted CTD on the carousel had not been used with the ISUS before and that the power cable connection was not providing the ISUS with power. No ISUS data collected on this cast.

Underway to Station ALOHA 1420, OTG deployed the magnetometer at 1430.

Arrived at Station ALOHA 2157 and the magnetometer was recovered. Based on current and wind data moved ship 1 mile southwest of the center for the deployment of the sediment traps.

Sediment traps (2 crosses) deployed at 2259. Release position: 22°44.327'N 158°0.742'W

One 200m CTD cast conducted at 2330 to collect water for the gas array experiment.

June 9th, 2007

One 200m CTD cast conducted at 0112 to finish collecting water for the gas array experiment.

Gas array deployed at Station ALOHA 0340. Release position: 22°46.000'N 158°0.023'W

Near bottom deep PO/CTD cast started one hour ahead of schedule at 0410.

The 36 burst period started at 1100 with the deployment of the first 1000m CTD cast.

- The ISUS was mounted on the CTD along with the battery pack on the carousel after the first CTD cast of the burst period. The ISUS was then working properly and displaying data on the console.

The ATE was deployed at 1230 and a sample was successfully collected.

Two net tows, one at 1000 and one at 1315, were conducted by Blake Watkins.

Weather conditions observed at Station ALOHA at 1400 were: east winds of 17 knots with 5-7ft seas and a 6/8 cloud cover.

1400 – During the deployment of the third 1000m CTD of the burst period, a compromised section of the wire was noticed by the AB running the winch. The section of wire was not kinked, but looked as though it had been pulled while there was pressure on the wire and thus twisted apart compromising the integrity and strength of the wire. Deployment of the cast was stopped and the wire re-terminated.

1608 – Deployment of the third 1000m CTD cast of the burst period.
-Winch brake issues were noticed during the deployment and recovery of the CTD. The brake was not engaging when the operational joystick was in the neutral position and the winch drum rotated freely before the winch operator was able to use reverse to re-gain control of the winch drum.
- Engineering looked at the issue and lubricated the winch and checked out all moving parts of the winch. Captain and Chief Engineer cleared the winch and crane for operations.

1854 – Deployment of the fourth 1000m CTD cast of the burst period.
- Further issues with the winch were experienced.
- More work done by the engineers on the winch.
2110 – Weight cast conducted to test the winch after repairs by engineering.
- During recovery the winch brake seized and stopped the weight recovery three feet below the deck rail. Articulation of the crane was used to bring the weight on board.

2215 – CTD operations cancelled by Captain
– Engineering cited electrical problems and began working further on the winch.

2230 – Blake Watkins conducted three night time net tows.

June 10th, 2007

0035 – Engineering states that they have successfully gotten the brake un-seized and cleaned up and were about the put the brake back on the winch. Within 2 hours a decision on the ability to use the winch will be made based on testing of the repair.

0245 – Weight cast conducted to test the repairs. System checked out all right and cleared by Captain and Chief Engineer.

0340 – Attempting to deploy a 1000m CTD cast resulted in the winch brakes seizing again.

- The Captain and I decided that the fixes attempted by engineering were no longer within the boundaries of maintaining the safety of personnel and the safety of the equipment and that CTD operation should cease indefinitely.

- The Captain gave permission to engineering to continue their efforts in fixing the winch issues, and possible weight casts may occur in the early hours of the morning to test their efforts, but no data collecting CTD casts will occur.

0400 – AC9/FRRF night cast deployed

-A revised schedule was drawn up to schedule remaining back deck work: recovery of the gas array, two day time net tows, the PRR, back to back AC9/FRRF casts, and the recovery of the sediment traps.

0600 – Gas array recovered from 11 nautical miles NW of the center.
Recovery Position: 22°54.5'N 158°6.4'W

0800 – Three 300m weight casts were conducted using the winch to test various control module repairs done by the engineers.

0900 – A meeting was held with the Captain to discuss the results of the weight cast testing. Reports from the engineering department, Chief Mate, and AB's running the tests indicated that the repairs had significantly improved the operation of the winch, but that the brake issues described above were still observed throughout some of the testing. With the winch still not 100%, both the Captain and myself confirmed that CTD operations would remain suspended and once the remaining deck work was completed we would return to Snug Harbor.

1000 – Net tow conducted by Blake Watkins.

1200 – PRR cast

1300 – Beginning of the back to back AC9/FRRF casts.

1430 – End of AC9/FRRF work.

1450 – Small plankton net deployed off back deck by Kate Achilles.

1500 – Transit to the sediment traps.

1630 – Sediment trap recovery from 13 nautical miles NW of the center.

- One tube was completely lost from the HOT cross and one tube was found to be empty upon recovery. Another tube was too mixed to find the density differential in the tube. In all, three sediment trap tubes were compromised. The steep line angle upon recovery could have contributed to the spilling and mixing of the samples.

Recovery Position: 22°55.14'N 158°8.7'W

Transit Snug Harbor

1945 – Magnetometer deployed by OTG.

Observed weather conditions at 2000 on June 10th: winds from the east at 16 knots, seas of 5-7 feet, with a cloud cover of 2/8 on the twilight sky.

June 11th, 2007

0012 – Magnetometer recovered.

0950 – Arrived at Snug Harbor.

June 12th, 2007

0900- 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 and O isotopes/UW
Penny Chisholm	Prochlorococcus population dynamics/MIT
Zehr/Church/Montoya	Diversity and activities of nitrogen-fixing microorganisms/UH

Additional programs

Investigator:	Project/Institution:
Mike Rappe	Marine bacterioplankton community structure/UH
Ed Delong	Microbial RNA/DNA collection/CMORE
CMORE	Teacher at sea program/CMORE