HOT-198: Chief Scientist Report

Chief Scientist: Susan Curless

HOT-198 Chief Scientist's Cruise Report
R/V Kilo Moana
December 19-23, 2007

Cruise ID: KM0724
Departed: December 19, 2007 at 0842 (HST)
Returned: December 23, 2007 at 0758 (HST)
Vessel: ***R/V Kilo Moana***
Operator: University of Hawaii
Master of the Vessel: Captain Richard Meyer
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. Four 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 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 52, is the site of the WHOTS Mooring, located at 22° 40.208'N, 157° 57.001'W and will be occupied on the 4th day of the cruise for about 1 hour.
4) Station 6, referred to as Station Kaena, is located off Kaena Point at 21° 50.8'N, 158° 21.8'W will be occupied on the 4th day of the cruise for about 3 hours.

Upon arrival to Station Kahe a 1,300 lb. weight-test cast to 500 m, one CTD cast to 1000 m, and a PRR cast was to be conducted at this location in the afternoon of December 19th. 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 one shallow CTD casts to 200 m, one 1000 m cast to collect water for the Primary Production Array, and another 200 m cast to collect water for incubation experiments. After this, the free-drifting primary productivity array was to be deployed for 12 hours. A full-depth CTD cast was to be conducted after the deployment of the

primary prodcution 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 December 22nd.

Another free-drifting array (gas array) was to be deployed for 24 hours for incubation experiments on December 21st. The gas array was to be recovered at 0800 on December 22nd.

A plankton net was to be towed near noon and midnight for 30-min intervals on December 20th and 21st at Station ALOHA.

A Profiling Reflectance Radiometer (PRR) was to be deployed for half-hour periods near noon time on December 19th, 21st, and 22nd.

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 December 21st and in the early morning and around noon on December 22nd.

After CTD work at Station ALOHA was accomplished, the ship was to transit to recover the floating sediment trap array and the gas array on December 22nd.

After recovering the arrays, the ship was to transit back to Station ALOHA to conduct light casts (PRR, AC9/FRRf).

After operations at Station ALOHA ended, the ship was to transit to Station 52 to conduct a one-hour 200-m CTD yo-yo cast, after which the ship was to transit to Station Kaena.

Two free drifting ARGO floasts were to be deployed upon departure from Station ALOHA on Decemer 22nd.

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, two anemometers, and the pCO2 system.

2. SCIENCE PERSONNEL

BEACH group:

Cruise Participant	Title	Affiliation
Karin Björkman	Research Specialist	UH/BEACH
Matthew Church	Assistant Researcher	UH/BEACH
Susan Curless	Chief Scientist – Res. Assoc.	UH/BEACH
Ken Doggett	Research Associate	UH/BEACH
Lance Fujieki	Computer Specialist	UH/BEACH
Adriana Harlan	Research Associate	UH/BEACH
Dan Sadler	Research Associate	UH/BEACH
Brett Updyke	Technician	UH/BEACH
Donn Viviani	Graduate Student	UH/BEACH
Blake Watkins	Marine Engineer	UH/BEACH
Sam Wilson	Scientist	UH/CMORE

PO group:

Paul Lethaby (Watch Leader)	Research Associate	UH
Jefrey Snyder (Watch Leader)	Marine Technician	UH
Justin Smith	Undergraduate Student	UH
Christin Shacat	Research Associate	UH
Ben Pittenger	Teacher (Volunteer)	UH
Camilla Voeltz	Graduate Student	UH
Jeff Sevadjian	Graduate Student	UH

Others:

KuhioVellalos	Marine Technician	OTG
Tobin Chen	Marine Technician	OTG
Dana Swift	Engineer	UW

3. GENERAL SUMMARY

Most of the operations during the cruise were conducted as planned and only minor delays were experienced.

One 500 m weight cast was performed with a 1,300 lb. weight and one 1000-m CTD cast was conducted at Station Kahe (1). Two near-bottom deep casts, thirteen 1000-m CTD casts, and two 200-m casts were conducted at Station ALOHA (2). A one hour 300 m yo-yo cast (with the last downcast to 500 m) was conducted near the WHOTS mooring (Station 52).

The array of floating sediment traps, the gas array, and the primary production array were deployed and recovered without any major incidents.
Due to a strong northward surface current, the arrays all drifted far distances to the N of ALOHA.

Primary Production Array – 7nm to the north of the center
Gas Array – 18nm 21°T from the center
Sediment Trap Array – 23.4nm 339°T from the center

The recovery of the Gas Array was re-scheduled to occur before the Sediment Trap Array due to the far distances the arrays travelled and the need to recover the incubation experiment in pre-dawn lighting conditions.

Five net tows were completed, three were conducted at night, and two during the day.

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

The PRR was deployed three times around noon.

A trace metal sample was taken (ATE).

The deployments of the two ARGO floats were re-scheduled based on opportune times in ship transiting. The first float was deployed during the cruise, one to the north of the circle on December 20th, and the second float was deployed close to the center of the circle on December 22nd.

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

Winds were from the northeast between 15-20 knots during the course of the cruise with swells between 5-7ft. A strong northward surface current persisted throughout out time at Station ALOHA.

We arrived at Snug Harbor on December 23rd, at 0758 (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.

The Captain and 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)

December 18, 2007 – Loading Day

1000 - Heavy equipment and the blue storage van loaded during this day.

CTD wire was reterminated.

December 19, 2007

0847 – ***RV Kilo Moana*** left Snug Harbor
0915 – Safety briefing and science meeting
0945 – Abandon ship drill with Chief Mate for all science personnel
1115 – Arrive Station Kahe
1130 - Start of 500 m 1,300 lb. weight cast.
Jefrey Snyder inspected the wire throughout the cast.
1218 – PRR cast
0100 – S1C1
1420 – Transit to Station ALOHA
1945 – Arrive at Station ALOHA
2047 – Sediment trap array deployed approx 1 mile west of center
22°44.934'N 158°1.112'W
2300 – S2C1

December 20, 2007

0115 – S2C2 for Primary Production array
0330 – S2C3 for Donn Viviani and Matt Church experiment
0450 – Deployment of PP array 22°45.019'N 157°58.886'W
ISUS removed from rosette in preparation for the deep cast
0510 – S2C4 – PO deep cast
1015 – deployment of ARGO float #1 22°46.65 157°55.95'W
1042 – Net tow
1115 – S2C5 – ISUS back on rosette
1303 – Net tow
1343 – ATE
1415 – S2C6
1645 – S2C7
1900 – Primary Production Array recovered at 22°53.4'N 157°59.65'W ~approx 7 miles due north from the deployment site.
2000 – S2C8
2200 – Net tow
2300 – Winch control issues during deployment of S2C9
- The control box located on the winch itself was malfunctioning to the point of commands to pay out wire and haul in wire were being responded to with the same action from the winch drum. Commands from remote winch stations were fine, so winch control

for the cast was relocated to remote stations on the back deck and the doghouse on the O2 deck. Chief engineer was called to look into it.
2320 – S2C9 deployed

December 21, 2007

0110 – Net tow
0200 – Gas array cast S2C10
0420 – Gas Array Deployed 22°40.97'N 157°59.96'W
0450 – S2C11
0756 – S2C12
1000 – Net tow
1054 – S2C13
1230 – PRR cast
1300 – AC9/FRRf cast
1330 – Net tow cancelled because of late start with the optics cast
1356 – S2C14
1700 – S2C15
2000 – S2C16
2200 – Net tow
2315 – S2C17 – PO second Deep Cast

December 22, 2007

0310 – AC9/FRRf cast
0420 – Transit to gas array
0555-0611 – Gas Array Recovery - 23°1.943'N 157°53.076'W
– 18nm, 21°T from center of ALOHA
0801 – Sediment Trap Recovery - 23°6.797'N 158°9.283'W
– 23.4nm, 339°T from center of ALOHA
1035 – Deployed second ARGO float - 22°45.33'N 157°59.83'W
1125 – PRR cast
1150 – AC9/FRRf cast #1
1240 – AC9/FRRf cast #2
1326 – Station 52 yo-yo cast started. Maximum depth changed from 200m to 300m and the final downcast went to 500m in efforts of seeing a feature we saw earlier at ALOHA. Although there doesn't seem to be anything on the depth traces of the CTD, filtration of 300m water produces a very thick layer of brownish orange color. This was first seen on the PC/PN cast (#6) and has been seen on other casts as well earlier in the cruise.
1545 – Transit Ka'ena
2115 – Ka'ena Cast

December 23, 2007

0700 - Sea buoy
0758 - Tied up 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 and O isotopes/UW
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

Additional programs

Investigator:	Project/Institution:
Edward Boyle	Trace metals
Dana Swift/Steve Riser	ARGO float/UW
Sam Wilson	Reduced gases in the upper ocean: The cycling of methane, sulfide and nitrous oxide/CMORE/UH