

HOT-222: Chief Scientist Report

Chief Scientist: Susan Curless

R/V Ka'Imikai-O-Kanaloa

June 7-11, 2010

Cruise ID: **KOK-1013**

Departed: June 7, 2010 at 0810 (HST)

Returned: June 11, 2010 at 1130 (HST)

Vessel: ***R/V Ka'Imikai-O-Kanaloa***

Operator: University of Hawaii

Master of the Vessel: Captain Ross Barnes

Chief Scientist: Susan Curless

OTG Technicians: Justin Smith and Ben Colello

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. Four 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 2.5 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 was to be occupied during the 2nd, 3rd, and 4th days of the cruise.
- 3) Station 52, is the site of the WHOTS-6 Mooring, located at 22° 39.989'N, 157° 56.961'W will be occupied on the 4th day of the cruise for about one hour.
- 4) Station 6, referred to as Station Kaena, is located off Kaena Point at 21° 50.8'N, 158° 21.8'W and will be occupied on the 4th day of the cruise for approximately 3 hours.

Upon arrival to Station Kahe a 500 lb. weight-test cast to 1000 m, one CTD cast to 1000 m, and a Hyperpro cast were to be conducted at this location on the afternoon of June 7th. 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 cast to 200 m, one 1000 m cast (to collect water for the Primary Production Array), and a second 200 m CTD cast. These three casts were to be followed by the deployment of the free-drifting Primary Productivity Array to incubate insitu for 12 hours. A full-depth (~4740 m) 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 at 2300 on June 9th.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on June 9th. The Gas Array was to be recovered on June 10th.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 min intervals on June 8th and 9th at Station ALOHA.

The ATE was to be deployed at 1300 on June 8th to collect a trace metal free water sample.

The Hyperpro was to be deployed for half-hour periods near noon time on June 7th, 9th, and 10th.

A package including a Wet Labs AC9, a Chelsea Fast Repetition Rate Fluorometer (FRRf), a SeaBird Seacat, and a LISST particle size and distribution analyzer was to be used to profile the upper 200 m at Station ALOHA in the early morning of June 10th and around noon time on June 9th and 10th.

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 the morning of June 10th.

After recovering the arrays, the ship was to transit to Station 52 to conduct a one-hour 200 m CTD yo-yo cast. Once operations at Station 52 were complete, the ship was to re-position within Station ALOHA to conduct an ACS/AC9/FRRf/LISST cast, a Hyperpro cast, and one 500 m 'W' yo-yo CTD cast.

Once those operations were complete, the ship was to transit to Station 6, referred to as Station Kaena where a near-bottom CTD cast (~2500 m) was to be conducted to collect salinity and chlorophyll samples for calibration.

After Station Kaena operations were complete, the ship was to transit back to Snug Harbor.

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

2. SCIENCE PERSONNEL

Participant	Title	Affiliation/HOT Group
Daniela Böttjer	Post-doc	UH/CMORE
Karin Björkman	Research Specialist	UH/BEACH
Susan Curless	Chief Scientist – Res. Assoc.	UH/BEACH
Lance Fujieki	Computer Specialist	UH/BEACH
Scott Grant	Graduate Student	UH/CMORE
Adriana Harlan	Research Associate	UH/BEACH
Dan Sadler	Research Associate	UH/BEACH
Donn Viviani	Graduate Student	UH/BEACH
Blake Watkins	Marine Engineer	UH/BEACH
Cameron Fumar	Research Associate	UH/PO
Bo Keopaseut	Research Associate	UH/PO
Paul Lethaby	Research Associate	UH/PO
Jefrey Snyder	Marine Technician	UH/PO
Craig Nosse	Research Associate	UH/PO
Sherry Chou	Graduate Student	UH/PO
Adam Jenkins	Graduate Student	UH/PO
Chris Schvarcz	Graduate Student	UH
John Bullister	Scientist	NOAA/PMEL
Dave Wisegarver	Technician	NOAA/PMEL
Justin Smith	Marine Technician	OTG
Ben Colello	Marine Technician	OTG

3. GENERAL SUMMARY

Operations during the cruise were conducted as planned without any major delays. Two planned objectives were not completed on HOT 222.

The 1000m CTD cast at Station Kahe was cancelled due the wire being fouled on the crane boom chain bindings during the deployment of the weight cast. Re-termination of the wire was needed and was completed during the transit to Station ALOHA.

The ATE trace metal sampler did not operated correctly and failed to complete a bench test before its scheduled deployment time and was consequently not deployed. Communication between the sampler and computer could not be re-established after the bench test was attempted.

Two near bottom CTD casts, thirteen 1000 m and two 200 m CTD casts were conducted at Station ALOHA. Two yo-yo CTD casts were completed; one 200 m yo-yo CTD cast near the WHOTS mooring (Station 52), and one 500 m ‘W’ yo-yo cast at Station ALOHA. One near bottom CTD cast was completed at Station Kaena.

The floating sediment trap array, primary production array, and gas array were all deployed and recovered successfully. All three arrays drifted to the east of the center of ALOHA with the sediment traps, primary production, and gas array each drifting approximately 22, 7, and 14 miles respectively.

Six net tows for the core HOT zooplankton collection were completed successfully, three during the day, and three during the night.

One additional net tow to 25 m with a 20 um net was added for Chris Schvarcz on the afternoon of June 8th.

The Hyperpro was deployed three times around noon.

The optical package ACS/AC9/FRRf/LISST was deployed three times during the cruise, twice around noon and once in the early morning.

The ISUS did not work correctly on the first 200 m CTD cast at Station ALOHA. Cleaning and reseating the cables after the cast fixed the problem.

The ADCP, thermosalinograph, fluorometer, and the ship's meteorological system ran without interruption throughout the cruise.

Winds were from the east throughout the cruise, building throughout the first day at ALOHA from 16 kts to sustained 20-25 kts with gusts up to 30 kts. The seas were also from the east, building from 3 ft to 6 ft during the first day, and remained at 6 ft for the duration of the cruise. The easterly swell also increased during the first day from 4-6 ft to 8-10 ft. The swell increased again on the third day to 10-12 ft and then remained at 10-14 ft for the remainder of the cruise.

Due to slower transit time caused by starboard engine failure at Station Kaena, we arrived at Snug Harbor for off-loading on June 11th, at 1130 (HST).

4. R/V *Ka'Imikai-O-Kanaloa* OFFICERS AND CREW, TECHNICAL SUPPORT

The R/V *Ka'Imikai-O-Kanaloa* continues to maintain excellent ship support for our work. Captain Ross and the ship's 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.

5. DAILY REPORT OF ACTIVITIES (HST)

June 7, 2010

0810- Depart Snug Harbor

0847- Fire and abandon ship drills

0900- Safety and science briefing

1110- Arrive at Station Kahe

1120- Weight cast -CTD wire was fouled by binding chain upon deployment

1153- End of weight cast -wire needs re-termination, CTD cast at Kahe is cancelled.

1207- Hyperpro cast

1228- End of Hyperpro cast

1245- Transit ALOHA

2245- Arrived at Station ALOHA, 3 miles west of center.

2327- Sediment traps deployed 22° 45.097'N 158° 03.150'W

June 8, 2010

0017- S2C1 200 m CTD cast for OA experiment -ISUS not working -cable reseated

0115- S2C2 1000 m CTD cast for Primary Production -ISUS ok, with spikes in profile

0330- S2C3 200 m CTD cast for CMORE DNA/RNA collection
0430- Primary Production Array deployed, 2 miles west of center 22° 45.16'N 158° 02.00'W
0450- Transit to Center of ALOHA
0515- S2C4 PO deep cast
0649- Bottom of cast 22° 44.884'N 157° 59.310'W
0835- End of Deep Cast
1013- Net Tow (BW)
1020- ISUS cable cleaned, dried, and reseated
1100- S2C5 1000 m CTD cast PO Shallow
1210- End of cast
1215- Net Tow (BW)
1300- Net Tow to 25 m for Chris S. (20um)
1405- S2C6 1000 m CTD cast
1657- S2C7 1000 m CTD cast
1758- End of cast
1930- Recovery of the Primary Production Array 22° 44.417'N 157° 53.351'W the array traveled ~7 miles to the east of the center of ALOHA.
2003- S2C8 BEACH cast 1000 m CTD
2210- Net tow (BW)
2302- S2C9 1000 m CTD cast

June 9, 2010

0015- Net Tow (BW)
0159- S2C10 1000 m CTD cast
0255- End of cast
0405- Deployment of the Gas Array 22° 44.14'N 158° 00.89'W
0500- S2C11 1000 m CTD cast
0800- S2C12 1000 m CTD cast
0855- End of cast
1005- Net Tow (BW)
1100- S2C13 1000 m CTD cast
1200- End of cast
1210- Hyperpro cast
1240- AC9/FRRf cast
1400- S2C14 1000 m CTD cast
1658- S2C15 1000 m CTD cast
2001- S2C16 1000 m CTD cast
2200- Net tow (BW)
2300- S2C17 PO 2nd Deep cast

June 10, 2010

0048- 9 m off the bottom 22° 44.706'N 157° 58.995'W
0222- End of cast
0310- AC9/FRRf
0354- Transit to Sediment Traps
0700- Recovery of the Sediment Traps 22° 46.60'N 157° 38.58'W, the array drifted approximately 22 miles from the center of ALOHA.
1734- Transit to the Gas Array
0915- Gas Array recovered 22° 43.51'N 157° 46.48'W, approximately 14 miles from the center.

0930- Transit to Station 52
1127- S52C1 200 m yo-yo cast
1226- End of cast
1315- Hyperpro
1343- AC9/FRRf
1437- S2C18 500 m 'W' cast
1545- Transit to Station Kaena
2230- Arrive Station Kaena
2236- S6C1 ~2500 m deep cast

June 11, 2010

0030- End of cast
0040- Underway for Snug Harbor with only port main engine on line.
1130- Arrived at Snug Harbor for full offload.

HOT program sub-components:

Investigator	Project	Institution
Matt Church	Core Biogeochemistry	UH
Roger Lukas	Hydrography	UH
Mike Landry	Zooplankton dynamics	SIO
Ricardo Letelier	Optical measurements	OSU
Ancillary programs:		
Charles Keeling	CO ₂ dynamics and intercalibration	SIO
Paul Quay	DI ¹³ C	UW
Penny Chisholm	Prochlorococcus population dynamics	MIT
Matt Church	Diversity and activities of nitrogen-fixing microorganisms	UH
Various CMORE PI's	Microbial RNA/DNA collection	UH/CMORE
Additional programs:		
Dave Karl (via Sam Wilson)	Reduced gases in the upper ocean: The cycling of methane, sulfide and nitrous oxide.	UH
Grieg Steward (via Chris Schvarcz)	Virus collection and concentration from Station ALOHA waters.	UH/CMORE
Dave Karl (via Daniela del Valle)	Radio labeled methylphosphonate method developing analysis.	UH
Scott Grant	Virus free water filtrate collected to be used for culture work.	UH
John Bullister	Dissolved CFCs and SF6 at Station ALOHA	NOAA/PMEL
Ken Doggett	Flow cytometry testing with ALOHA waters.	UH
Matt Church (via Donn Viviani, Daniela Böttjer, and Dan Sadler)	Carbon dioxide ocean perturbation experiment.	UH