

HOT-239: Chief Scientist Report

Chief Scientist: Susan Curless

R/V Ka'Imikai-O-Kanaloa

January 17-21, 2012

Cruise ID: **KOK 12-01**

Departed: January 17, 2012 at 0800 (HST)

Returned: January 21, 2012 at 0745 (HST)

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

Master of the Vessel: Captain Clary Gutzeit

OTG Marine Technicians: Trevor Young and Jeff Koch

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 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 52, the site of WHOTS-8 Mooring, approximate anchor position 22°40.1572'N, 157°57.0225'W, was to 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 1000 lb. weight-test cast to 500 m, one CTD cast to 1000 m, and a Hyperpro cast were to be conducted on the afternoon of January 17th. 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 to 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 250 m, and one 1000 m cast (to collect water for the Primary Production Array). These two 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 January 19th.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on January 19th. The Gas Array was to be recovered on January 20th.

An Automated Trace Element (ATE) sampler was to be deployed the afternoon of January 18th to a depth of 10 m.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on January 18th and 19th at Station ALOHA.

The Hyperpro was to be deployed for a half-hour period near noon time on January 17th, January 18th and 20th.

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 and around noon time of January 20th.

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 January 20th.

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, and a Hyperpro cast.

Once operations at Station ALOHA 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 the underway fluorometer.

2. SCIENCE PERSONNEL

Participant	Title	Affiliation/HOT Group
Susan Curless	Research Associate	UH/BEACH
Adriana Harlan	Research Associate	UH/BEACH
Dan Sadler	Research Associate	UH/BEACH
Brett Updyke	Research Associate	UH/BEACH
Donn Viviani	Graduate Student	UH/BEACH
Blake Watkins	Marine Engineer	UH/BEACH
Sean Jungbluth	Graduate Student	UH/BEACH
Daniela del Valle	Postdoctoral Researcher	UH/CMORE
Sandra Martinez-Garcia	Postdoctoral Researcher	UH/CMORE
Jefrey Snyder	Marine Technician	UH/PO
Cameron Fumar	Research Associate	UH/PO
Fernando Santiago-Mandujano	Research Associate	UH/PO
Branden Obra	Research Technician	UH/PO
Joseph Gum	Research Technician	UH/PO
Jeff Koch	Marine Technician	OTG
Trevor Young	Marine Technician	OTG

3. GENERAL SUMMARY

Operations at Station ALOHA were conducted as planned throughout the cruise with only minor delays experienced.

One 1000 m CTD cast was completed at Station Kahe. Two near bottom CTD casts, thirteen 1000 m CTD casts, and one 250 m CTD cast were conducted at Station ALOHA. One 200 m yo-yo CTD cast was completed near the WHOTS mooring (Station 52) with five cycles completed. One near bottom cast was conducted at Station Kaena.

The Sediment Traps, Primary Production Array, and Gas Array were all deployed and recovered successfully. During the third day of the cruise both the Sediment Traps and the Gas Array traveled in a clockwise hook shaped pattern (to the NE and then wrapping around to the SW) from their respective deployment sites. The Primary Production Array drifted to the NW of its deployment site.

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

The Hyperpro was deployed and recovered successfully three times near noon.

The optical package ACS/AC9/FRRf/LISST was deployed two times during the cruise, once around noon and once in the early morning. Due to a malfunction with the DH4, data from the two deployments was compromised.

The ATE was successfully deployed, but due to communication errors with the instrument a trace metal free sample was not collected.

The thermosalinograph and the ship's anemometers ran without interruption during the cruise. The fluorometer was running throughout the cruise but was leaking from the sample cell and provided questionable measurements.

The ship's ADCP system and the Knudsen sub-bottom profiler were not operational during the cruise. The Seabeam Multi-beam system was attempted to be used to provide a bottom reading but the computer could not talk to the Seabeam controller and was therefore not operational.

Winds during the first two days of the cruise were from the South at 15-20 kts and then become light and variable during the third day. The fourth day of the cruise was dominated by East winds at 10-15 kts. The swell was 4-6 ft during the first two days, lowering to 2-3 ft on the third day and coming back up to 4ft on the fourth day of the cruise.

We arrived at Snug Harbor for off-loading on January 21st, at 0745 (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 Gutzeit and the ship's crew showed enthusiasm, concern, and dedication to our scientific mission. Since this cruise was not originally scheduled aboard the KOK, a special thank you to all the ship's crew for mobilizing and making this cruise happen on short notice.

Technical support during this cruise was good. OTG personnel were available at any time to assist in our work.

5. DAILY REPORT OF ACTIVITIES (HST)

January 17, 2012

0800- Depart Snug Harbor
0830- Fire and Abandon Ship Drills
0850- Safety Meeting with Chief Mate
1115- Arrive at Station Kahe
1130- Weight Cast to 750 m
1200- End of weight cast
1210- Hyperpro, reached 146 m
1230- End of Hyperpro
1252- S1C1 1000 m CTD
1415- End of cast
1430- Transit to Station ALOHA
2349- Arrive at Station ALOHA

January 18, 2012

0029- Deploy Sediment Traps 22° 44.968'N 158° 02.477'W
0052- S2C1 250 m CTD cast
0128- End of cast
0230- S2C2 1000 m CTD cast
0330- Raining with CTD close to the surface
0335- End of Cast
0445- Begin PP Array deployment 22° 44.92'N 158° 01.00'W
0526- PP Array Deployed 22° 45.044'N 158° 00.634'W
0545- S2C3 PO Deep Cast
0737- 6 m off the bottom 22° 44.577'N 157° 59.404'W
0919- End of cast
1011- Net Tow
1040- End of net tow
1128- S2C4 1000 m CTD (PO Shallow)
1254- End of Cast
1305- Hyperpro
1345- End Hyperpro - 2 attempts
1420- S2C5 1000 m CTD
1533- End of cast
1627- S2C6 1000 m CTD
1727- End of cast
1825- PP Array Recovery 22° 45.115'N 157° 59.008'W
1957- S2C7 1000 m CTD
2100- End of cast
2214- Net Tow
2243- End of net tow
2258- S2C8 1000 m CTD
2355- End of cast

January 19, 2012

0011- Net Tow
0045- End of net tow
0156- S2C9 1000 m CTD
0259- End of cast
0405- Gas Array Deployment 22° 46.093'N 157° 59.708'W
0430- Array deployment completed
0456- S2C10 1000 m CTD
0550- End of cast
0600- Transit to pump ship's tanks

0730- ATE 22° 45.70'N 157° 54.76'W
0800- ATE on board
0758- S2C11 1000 m CTD
0855- End of cast, Niskin #17 did not fire
1000- Net tow
1035- End of net tow
1046- S2C12 1000 m CTD
1145- End of cast
1200- Net tow
1245- End of net tow
1400- S2C13 1000 m CTD
1501- End of cast
1700- S2C14 1000 m CTD
1756- End of cast
1956- S2C15 1000 m CTD
2056- End of cast
2202- Net Tow
2240- End of net tow
2355- S2C16 near bottom CTD cast

January 20, 2012

0032- At 4808 dbar, 8 m off the bottom 22° 45. 148'N 158° 00.271'W
0209- End of cast
0315- AC9/FRRf
0515- Both AC9/FRRf casts complete, package on deck
0520- Transit to Sediment Traps
0655- Begin Sediment Trap Recovery 22° 43.129'N 158° 03.172'W
0722- Sediment Traps on board 22° 43.272'N 158° 03.763'W
0730- Transit to Gas Array
0830- Gas Array on board 22° 43.579'N 157° 57.604'W
1000- Start S52C1, computer problems delayed deployment
1026- S52C1
1140- End of cast, 5 cycles complete
1157- Hyperpro
1215- End of Hyperpro
1242- AC9/FRRf
1352- AC9/FRRf second cast completed
1400- Transit to Station Kaena
2055- Arrive at Station Kaena
2101- S6C1 near bottom CTD cast
2243- End of cast
2245- Transit to Snug Harbor

January 21, 2012

0745- Arrive at Snug Harbor

HOT program sub-components:

Investigator	Project	Institution
Matt Church	Core Biogeochemistry	UH
Dave Karl		
Bob Bidigare		
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	SIO
Matt Church	Diversity and activities of nitrogen-fixing microorganisms	UH

Additional programs:

Dave Karl (via Sam Wilson)	Reduced gases in the upper ocean: The cycling of methane, sulfide and nitrous oxide	UH/Moore
Matt Church (via Donn Viviani)	Bacterial production and EOC at Station ALOHA	UH
Dave Karl (via Daniela del Valle)	Sample collection for methylphosphonate production methodology experiments	UH
Dave Karl (via Sandra Martinez-Garcia)	Water collection for prochlorococcus culturing	UH
John Zehr (via Anne Thompson and Brandon Carter)	Diazotroph Ecology at Station ALOHA	UCSC
Dave Karl (via Sandra Martinez-Garcia)	Microbial Respiration in the NPSG	UH
Matt Church (via Shimi Rii)	Investigation of temporal changes in picoeukaryote diversity at Station ALOHA	UH
Henrieta Dulaiova and Ken Buesseler	Japanese radionuclide release sampling	UH