

HOT-232: Chief Scientist Report

Chief Scientist: Susan Curless

R/V Ka'Imikai-O-Kanaloa

May 8-12, 2011

Cruise ID: **KOK 11-07**

Departed: May 8, 2011 at 0800 (HST)

Returned: May 12, 2011 at 0742 (HST)

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

Master of the Vessel: Captain Clary Gutzeit

OTG Marine Technicians: Trevor Goodman and Kuhio Vellalos

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 50, the site of WHOTS-7 Mooring, approximate position 22° 46.0052'N 157° 53.9897'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 1000 m, one CTD cast to 1000 m, and a Hyperpro cast were to be conducted on the afternoon of May 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 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 200 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 May 10th.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on May 10th. The Gas Array was to be recovered on May 11th.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on May 9th and 10th at Station ALOHA.

The Hyperpro was to be deployed for a half-hour period near noon time on May 8th, May 10th and 11th.

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 around noon time on May 10th and 11th and in the early morning of May 11th.

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 May 11th.

After recovering the arrays, the ship was to transit to Station 50 to conduct a one-hour 200 m CTD yo-yo cast. Once operations at Station 50 were complete, the ship was to re-position within Station ALOHA to conduct an ACS/AC9/FRRf/LISST cast, a Hyperpro cast, and two shallow 200 m CTD casts.

During operations at Station ALOHA, Sea Glider #146 was to be deployed. Due to the need for good weather for this operation, three potential deployment times (of two hours each) were placed in the schedule in an attempt to accomplish this operation.

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
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
Sara Thomas	Technician	UH/CMORE
Donn Viviani	Graduate Student	UH/BEACH
Brett Updyke	Research Associate	UH/BEACH
Blake Watkins	Marine Engineer	UH/BEACH
Cameron Fumar	Research Associate	UH/PO
Steve Tottori	Marine Technician	UH/PO
Craig Nosse	Research Associate	UH/PO
James Stubbs	Marine Technician	UH/PO
Trevor Goodman	Marine Technician	OTG
Kuhio Vellalos	Marine Technician	OTG

3. GENERAL SUMMARY

Operations during the cruise were conducted as planned with only minor schedule delays due to a strong SSW current. The strong current not only increased the transit time to Station ALOHA, but increased the distance traveled by the free floating arrays off station. This in turn increased transit times to retrieve the arrays and to get back on station once they were on board.

To make up time in the schedule from the long transit out to ALOHA, S2C2, a planned 1000 m cast which collects water for the Primary Production Array was shortened to 200 m. To compensate for the

long transit time back to Station ALOHA from retrieving the arrays on the morning of May 11th and to keep the optics deployments in their designated time slot around noon, the AC9/FRRf and Hyperpro casts were conducted before Station 50.

One 1000 m CTD cast was completed at Station Kahe. Two near bottom CTD casts, twelve 1000 m and two 200 m CTD casts were conducted at Station AOHA. One 200 m yo-yo CTD cast was completed near the WHOTS mooring (Station 50) but only five of the six planned cycles were completed. One near bottom cast was conducted at Station Kaena.

The floating sediment trap array, primary production array, and gas array were all deployed and recovered successfully.

There was a slight complication in recovering the sediment trap array when after the line was hooked on initial approach, the surface buoy and line of floats became lodged under the ship. Pulling the hooked part of the line forward and further drifting of the ship allowed the line to come free and resulted in only minor chaffing to the line.

All three arrays drifted to the southwest of the center of Station ALOHA.

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 three times during the cruise, twice around noon and once in the early morning. The AC9 was sent out for recalibration and was not deployed with the rest of the optics package during this cruise.

The ATE was successfully deployed and a trace metal free sample was collected.

Sea Glider #146 was successfully deployed the morning of May 10th at 22° 43.9'N 157° 56.7'W.

The ADCP, fluorometer, thermosalinograph and the ship's anemometers ran without interruption during the cruise.

Winds were from the southeast throughout the cruise holding at 20-25 knots the first day and then decreasing to 15-20 knots for the remaining days of the cruise. Seas were 10-12 feet on the first day and also decreased to about 4-8 feet for the remainder of the cruise.

We arrived at Snug Harbor for off-loading on May 12, at 0742 (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.

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)

May 8, 2011

0755- Depart Snug Harbor

0835- Fire and abandon ship drills, safety briefing with Chief Mate.

0910- Secure from all drills.
1130- Weight cast
1150- End of weight cast
1200- Hyperpro
1215- End Hyperpro attempt #1, not deep enough
1220- Hyperpro second attempt
1235- Hyperpro third attempt, successful.
1300- S1C1 Station Kahe 1000 m CTD
1420- End of cast
1425- Transit to Station ALOHA

May 9, 2011

0130- Arrive at Station ALOHA
0226- Sediment Traps deployed 22° 42.710'N 158° 00.734'W
0250- S2C1 200 m CTD
0320- End S2C1
0350- S2C2 200 m CTD
0415- End S2C2
0530- Primary Production Array Deployed 22° 43.201'N 157° 58.834'W
0605- S2C3 PO Deep Cast; 6 m off the bottom 22° 43.973'N 157° 59.954'W
0945- End S2C3
1007- Net Tow
1040- End of net tow
1050- Transit to center of station
1130- S2C4 1000 m CTD
1235- End of S2C4
1252- Net Tow
1320- End of Net Tow
1325- ATE deployed
1345- ATE retrieved, sample successfully collected.
1408- S2C5 1000 m CTD
1509- End of Cast
1655- S2C6 1000 m CTD
1755- End of Cast
1851- Begin Recovery of PP Array
1923- Recovered Primary Production Array 22° 34.682'N 158° 02.232'W
2029- S2C7 1000 m CTD cast
2135- End of Cast
2206- Net tow (2 tows back to back)
2304- Both Net tows complete
2305- S2C8

May 10, 2011

0006- End of Cast
0158- S2C9 1000 m CTD
0250- End of Cast
0400- Gas Array Deployment 22° 47.87'N 157° 58.88'W
0500- S2C10 1000 m CTD
0550- End of Cast
0715- Deployment of Sea Glider 22° 43.9'N 157° 56.7'W
0800- S2C11
0835- End of Cast

1000- Net Tow
1035- End of tow
1055- S2C12 1000 m CTD
1145- End of Cast
1205- Hyperpro
1220- End of Hyperpro cast
1251- AC9/FRRf
1330- End of AC9/FRRf
1400- S2C13 1000 m CTD
1500- End of Cast
1651- S2C14 1000 m CTD
1803- End of Cast
1954- S2C15 1000 m CTD
2054- End of Cast
2200- Net Tow
2257- S2C16 PO Second deep cast

May 11, 2011

0030- At bottom 22° 45.202'N 158° 09.940'W
0203- End of Cast
0710- Sediment Trap Recovered 22° 19.660'N 158° 09.052'W
0850- Gas Array Recovered 22° 27.625'N 158° 05.144'W
1130- Hyperpro
1205- AC9/FRRf
1250- End of AC9
1305- WHOTS S50C1
1410- End of cast, 5 cycles complete
1450- Transit Station Kaena
2100- Arrive Station Kaena
2105- S6C1 near bottom CTD
2245- End of Cast, transit to Snug Harbor

May 12, 2011

0742- Arrive 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	SIO
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/Moore
Matt Church (via Shimi Rii)	Investigation of temporal changes in picoeukaryote diversity at Station ALOHA	UH
Matt Church (via Donn Viviani)	Bacterial production and EOC at Station ALOHA	UH
Henrieta Dulaiova and Ken Buesseler	Japanese radionuclide release sampling	UH
Sara Riseman	Seawater for nutrient analysis testing	CMOP
Ed Laws (via Scott Grant)	³³ P Uptake Experiment	UH
Matt Church (via Sara Thomas)	Particle settling experiment	UH
Mike Rappé (via Sean Jungbluth)	Preservation protocol testing for deep ocean microbes	UH/CMORE