

HOT-237: Chief Scientist Report

Chief Scientist: Susan Curless

R/V Ka'Imikai-O-Kanaloa

November 27- December 1, 2011

Cruise ID: **KOK 11-14**

Departed: November 27, 2011 at 0800 (HST)

Returned: December 1, 2011 at 0730 (HST)

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

Master of the Vessel: Captain Clary Gutzeit

OTG Marine Technicians: Trevor Goodman 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 November 27th. 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 November 29th.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on November 29th. The Gas Array was to be recovered on November 30th.

An Automated Trace Element (ATE) sampler was to be deployed the afternoon of November 28th to a depth of 10 m.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on November 28th and 29th at Station ALOHA.

The Hyperpro was to be deployed for a half-hour period near noon time on November 27th, November 29th and 30th.

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 November 30th.

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 November 30th.

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 1000 m CTD 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	Chief Scientist – Res. Assoc.	UH/BEACH
Ken Doggett	Research Associate	UH/CMORE
Benjamin Rubin	Intern	CMORE
Dan Sadler	Research Associate	UH/BEACH
Brett Updyke	Research Associate	UH/BEACH
Donn Viviani	Graduate Student	UH/BEACH
Blake Watkins	Marine Engineer	UH/BEACH
Cameron Fumar	Research Associate	UH/PO
Joseph Gum	Research Associate	UH/PO
Dave Hashisaka	Research Associate	UH/PO
Jefrey Snyder	Marine Technician	UH/PO
Trevor Goodman	Marine Technician	OTG
Jeffrey Koch	Marine Technician	OTG

3. GENERAL SUMMARY

Planned science operations at Station ALOHA were compromised due to heavy weather conditions. The transit from Station Kahe to Station ALOHA was slow due to heavy winds and large swells. Upon arrival at Station ALOHA, science operations were suspended due to unsafe working conditions. Once the wind and swell frequency decreased (~14 hour delay), operations at Station ALOHA resumed under a modified cruise plan.

Operations not completed due to weather delays:

Sediment Trap Array

Gas Array

Second deep cast at Station ALOHA

Four Zooplankton Net Tows

One 1000 m CTD cast was completed at Station Kahe. One near bottom CTD cast and fourteen 1000 m CTD casts were conducted at Station AOHA. One 200 m yo-yo CTD cast was completed near the WHOTS mooring (Station 52) but only five of the six planned cycles were completed. One near bottom cast was conducted at Station Kaena.

The primary production array was deployed and recovered successfully. The array drifted to the NW of the center of Station ALOHA.

Due to time constraints on the revised operations schedule, only two net tows for the core HOT zooplankton collection were completed successfully; one during the day, and one 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 ATE was successfully deployed and a trace metal free sample was collected.

The fluorometer, thermosalinograph and the ship's anemometers ran without interruption during the cruise. The ship's ADCP collected data during the trip, but the velocity measurements are not useable due to errors with the serial gyro feed.

Winds were from the East throughout the cruise holding at 30-35 knots with gusts up to 40 knots during the first two days of the cruise. The swell was 8-10 feet with a sea state of 6 with scattered squalls. For the remainder of the cruise the wind decreased to 10-15kts, the swell frequency also decreased and the sea state came down to 2-3.

We arrived at Snug Harbor for off-loading on December 1st, at 0730 (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)

November 27, 2011

0800- Depart Snug Harbor

0835- Fire and Abandon Ship Drills

0859- Safety briefing with Chief Mate

1107- Arrive Kahe Station 500 m Weight Cast

1130- End of weight cast

1145- Hyperpro to 105 m

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1218- S1C1 1000 m CTD cast
1336- End of cast
1340- Transit to Station ALOHA

November 28, 2011

0200- Arrive Station ALOHA
0205- Weather conditions unsuitable for safe operations. Stand down till breakfast.
0800- Meeting with Captain, weather conditions still not safe for operations. Re-evaluate at noon.
1205- Weather has come down enough for easing into operations.
1245- S2C1 1000 m CTD cast -slow winch speeds on down cast, wind came down to 10-15 kts during cast, wire angle okay with bridge making 1.5 kts ahead
1400- End of Cast
1537- S2C2 1000 m CTD cast
1711- End of cast
1840- S2C3 1000 m CTD cast
2002- End of cast
2130- Re-seat primary O2 sensor due to spikes in downcast profile
2136- S2C4 1000 m CTD cast
2252- End of cast
2345- Net Tow

November 29, 2011

0015- End of net tow
0035- S2C5 1000 m CTD cast
0205- End of cast
0300- Replaced primary oxygen sensor
0340- S2C6 1000 m CTD cast
0456- End of cast
0620- Begin Primary Production Array Deployment 22 44.96'N 158 07.09'W
0655- PP Array released
0714- S2C7 1000 m CTD cast
0826- End of cast
0927- S2C8 1000 m CTD cast
1028- End of cast
1040- Net Tow
1110- End of net tow
1200- Hyperpro
1223- End Hyperpro
1223- S2C9 1000 m CTD cast
1329- End of Cast
1415- ATE
1445- ATE on deck
1541- S2C10 1000 m CTD cast
1701- End of cast
1705- Transit to PP array
1823- PP Array Recovery 22 45.423'N 158 01.397'W
1839- PP Array on board
1859- S2C11 1000 m CTD cast
2015- End of cast
2125- S2C12 1000 M CTD
2236- End of cast
2354- CTD cast delayed for ship re-positioning to center

November 30, 2011

0017- S2C13 1000 m CTD
0145- End of cast
0200- AC9/FRRf in for first cast
0250- End of first cast
0300- AC9/FRRf in for second cast

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0350- End of second cast
0453- S2C14 PO deep cast
0648- Near bottom 22 45.233'N 158 01.397'W
0836- End of cast
1028- S252C1
1133- End of casts 5 cycles complete
1145- Hyperpro
1210- End of Hyperpro
1220- AC9/FRRf in for first cast
1311- End of first cast
1320- AC9/FRRf in for second cast
1406- End of second cast
1417- S2C15 1000 m CTD cast
1515- End of cast
1520- Transit to Station Kaena
2128- Arrive Station Kaena
2133- S6C1 near bottom CTD cast
2326- End of cast
2330- Transit to Snug Harbor

December 1, 2011

0645- Passing Honolulu Sea Buoy
0730- 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
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 Donn Viviani)	Bacterial production and EOC at Station ALOHA	UH
Matt Church/Dave Karl (via Daniela Böttjer and Sam Wilson)	Nitrogen Fixation methodology comparison	UH
Dave Karl (via Daniela del Valle)	Sample collection for methylphosphonate production methodology experiments	UH
Dave Karl (via Ken Doggett)	Light/dark adaptation and leucine uptake of prochlorococcus via flow cytometry	UH
Dave Karl (via Sandra Martinez-Garcia)	Water collection for prochlorococcus culturing	UH
Dave Karl (via Karin Björkman and Daniela Böttjer)	Water collection for CMORE BAGS cruise nutrient mixing experiment	UH/CMORE