

HOT-219: Chief Scientist Report

Chief Scientist: Susan Curless

R/V Ka'Imikai-O-Kanaloa

March 8-12, 2010

Cruise ID: **KOK10-05**

Departed: March 8, 2010 at 0800 (HST)

Returned: March 12, 2010 at 0726 (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: Kuhio Vellalos and Elly Speicher

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 Ka'ena, is located off Ka'ena 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 March 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 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 on March 11th.

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

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

The Hyperpro was to be deployed for half-hour periods near noon time on March 8th, 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 March 10th and 11th, and in the early morning and around noon on March 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 March 11th.

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 two 100 m CTD casts.

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

After Station Ka'ena 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/BEACH
Susan Curless	Chief Scientist – Res. Assoc.	UH/BEACH
Ken Doggett	Research Associate	UH/CMORE
Lance Fujieki	Computer Specialist	UH/BEACH
Adriana Harlan	Research Associate	UH/BEACH
Dan Sadler	Research Associate	UH/BEACH
Kathryn Stanaway	Research Associate	UH/BEACH
Donn Viviani	Graduate Student	UH/BEACH
Blake Watkins	Marine Engineer	UH/BEACH
Cameron Fumar	Research Associate	UH/PO
Rebecca Mabardy	Volunteer	PO
Rachel Mock	Undergraduate Student	UH/PO
Bo Keopaseut	Research Associate	UH/PO
Fernando Santiago-Mandujano	Research Associate	UH/PO
Jefrey Snyder	Marine Technician	UH/PO
Qian (Lydia) Li	Graduate Student	UH
Elisha Wood-Charlson	Post-doc	UH/CMORE
Elly Speicher	Marine Technician	OTG
Kuhio Vellalos	Marine Technician	OTG

3. GENERAL SUMMARY

Operations at Station Kahe were completed, but delayed due to the 1 knot current making maintaining station difficult. The Hyperpro was deployed three times in efforts of getting it to reach 100 m, but the current was too strong to allow it to be deployed correctly.

Winds and heavy seas delayed arrival to Station ALOHA and caused re-scheduling and in some cases cancelation of operations due to the sustained 30 knot winds, 10-15 foot swell, and 6 foot seas present on station.

All array deployments, net tows, and optical instrument profiles were cancelled upon arrival at Station ALOHA.

CTD work was done on a cast by cast basis throughout the morning of March 9th while the weather was evaluated between casts and observed to continue to deteriorate. Night time CTD operations for March 9th were cancelled due to unsafe conditions and the inability of seeing the calm spaces between swells for package deployment in the dark.

CTD operations resumed at daybreak on March 10th and continued on a three hour deployment interval throughout the remainder of the cruise.

Successful operations:

- One 1000 m CTD cast at Station Kahe.
- Eleven 1000 m, two near bottom deep casts, and two 100 m CTD casts at Station ALOHA.
- One 200 m yo-yo CTD cast at Station 52.
- One near bottom (~2500 m) CTD cast at Station Ka'ena.

Operations cancelled or complicated due to weather/sea conditions:

- Hyperpro profile at Station Kahe did not reach 100 m.

- The 36-hour CTD burst period at Station ALOHA was not completed.
- Two 1000 m CTD casts for primary production and gas array water collection were cancelled.
- Sediment Trap deployment/recovery.
- Primary Production Array deployment/recovery.
- Gas Array deployment/recovery.
- Six net tows.
- Two Hyperpro profiles.
- Three ACS/AC9/FRRf/LISST profiles.
- One ATE deployment for trace metal sample collection.

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 were very helpful and accommodating throughout the many schedule changes we experienced throughout the cruise.

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)

March 8, 2010

- 0800- Depart Snug Harbor
- 0837- Fire and Abandon Ship Drills
- 0857- Safety Meeting for Science Personnel
- 1100- Arrive at Station Kahe
- 1103- Weight Cast to 1000 m
- 1144- End of Weight Cast
- 1155- Hyperpro Cast - Strong current present- instrument did not reach 100 m.
- 1240- Third attempt to deploy Hyperpro- again did not reach 100 m. Ship re-positioned to Station Kahe, we had drifted approximately 2 miles due to heavy winds and current.
- 1319- S1C1 1000 m CTD cast
- 1435- End of cast
- 1440- Transit to Station ALOHA
- 1635- All stop off Ka'ena Point- fire hose on upper deck had broken loose of tie downs and was escaping over the side of the ship.
- 1641- Fire hose secure, underway for Station ALOHA

March 9, 2010

- 0330- Arrive at Station ALOHA, 0.5 miles inside the circle at 22°39.9'N 158°1.33'W to assess weather conditions and potentially conduct a 200 m cast for Primary production array.
- 0400- All deployments of arrays, nets, optics canceled. Ship to transit to center of circle for CTD work.
- 0515- S2C1 PO Shallow 1000 m CTD cast.
- 0635- Bridge reported wind gust over 40kts and rain.
- 0700- End of cast
- 0825- S2C2- PO Deep Cast (~4740 m)
- 1018- 5 m from bottom 22°45.36'N 157°59.83'W
- 1215- End of cast
- 0100- S2C3- PC/PN 1000 m CTD cast.

-CTD wire got caught under a bolt when a wave hit the package while entering the water causing the wire to get slack enough to get stuck on the bolt. The wire was slipped off the bolt while that package sat at 10 m, the wire was inspected and then the cast was allowed to continue.

1700- S2C4 PPO4 1000 m CTD cast.

1914- End of cast

1935- Night time CTD operations canceled.

March 10, 2010

0710- S2C5 BEACH 1000 m CTD cast.

0835- End of cast

1001- S2C6 1000 m CTD cast.

1125- End of cast

1243- Organic orange matter noticed on CTD lanyards.

1300- S2C7 1000 m CTD cast.

1424- End of cast

1600- S2C8 1000 m CTD cast.

1900- S2C9 1000 m CTD cast.

2011- End of cast

2158- S2C10 1000m CTD cast.

2304- End of cast

March 11, 2010

0103- S2C11 1000 m CTD cast.

0207- End of cast

0214- Transit to pump ship's tanks

0430- S2C12 PO 2nd Deep Cast (~4740 m)

0620- 8m off the bottom 22°45.03'N 158°0.27'W

0800- End of cast

0930- S52C1 200 m yo-yo cast.

1045- End of cast, 5 cycles complete.

1130- S2C13 100 m CTD cast.

1155- End of cast

1230- S2C14 100 m CTD cast.

1250- End of cast

1400- S2C15 1000 m CTD cast.

1500- End of cast

1502- Transit to Station Ka'ena

2211- S6C1 ~2400 m CTD cast at Station Ka'ena

2307- 10 m off the bottom 21°51.6'N 158°21.94'W

March 12, 2010

0003- End of Cast

0008- Transit Snug Harbor

0726- 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
Elisha Wood-Charlson	Virus collection and concentration from Station ALOHA waters.	UH/CMORE
Qian Li/Guangyi Wang	Marine thraustochytrid abundance and diversity.	UH
Brandon Carter	Isolation of UCYN-A unicellular diazotrophic cyanobacteria.	UCSC
Matt Church (via Donn Viviani, Daniela Böttjer, and Dan Sadler)	Carbon dioxide ocean perturbation experiment.	UH