HOT-242: Chief Scientist Report

Chief Scientist: Susan Curless

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

May 29 - June 2, 2012

Cruise ID: **KOK 12-05**
Departed: May 29, 2012 at 0800 (HST)
Returned: June 2, 2012 at 0751 (HST)
Vessel: **R/V *Ka'Imikai-O-Kanaloa***
Master of the Vessel: Captain Clary Gutzeit
OTG Marine Technicians: Trevor Young and Dan Fitzgerald

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. Three 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.

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 May 29th. 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 1000 m cast (to collect water for the Primary Productivity 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 31st.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on May 31st. The Gas Array was to be recovered on June 1st.

An Automated Trace Element (ATE) sampler was to be deployed to a depth of 10 m on May 30th, 31st, and June 1st.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on May 30th and 31st at Station ALOHA.

The Hyperpro was to be deployed for a half-hour period near noon time on May 29th, May 30th and June 1st.

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 May 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 June 1st.

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 a Hyperpro cast.

Once operations at Station ALOHA were complete, the ship was to transit to recover Sea Glider 148 to the south west of Station ALOHA. Once the recovery of the Sea Glider was 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
Shimi Rii	Graduate Student	UH/BEACH
Blake Watkins	Marine Engineer	UH/BEACH
Sean Jungbluth	Graduate Student	UH/BEACH
Sandra Martinez-Garcia	Postdoctoral Researcher	UH/CMORE
Benedetto Barone	Postdoctoral Researcher	UH/CMORE
Jefrey Snyder	Marine Technician	UH/PO
Cameron Fumar	Research Associate	UH/PO
Fernando Santiago-Mandujano	Research Associate	UH/PO
Joseph Gum	Research Technician	UH/PO
Kim Falinski	Graduate Student	UH/PO
Eric Tong	Graduate Student	UH/PO
Ken Doggett	Research Associate	UH/CMORE
Ger van den Engh	Visiting Scientist	BD Biosciences/CMORE
Trevor Young	Marine Technician	OTG
Dan Fitzgerald	Marine Technician	OTG

3. GENERAL SUMMARY

Operations at Station ALOHA were conducted as planned throughout the cruise with only minor delays experienced. To create more time in the schedule to recover Sea Glider 148 on June 1st, the 200 m yo-yo CTD cast at Station 52 was conducted before the recovery of the free drifting arrays.

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

The Sediment Traps, Primary Production Array, and Gas Array were all deployed and recovered successfully.

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 two times near noon. The third Hyperpro deployment originally scheduled for near noon on June 1st was cancelled to allow for the Sea Glider recovery.

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

The ATE was successfully deployed three times, but due to communication errors with the instrument only two trace metal free samples were collected.

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

The ship's ADCP system and the Knudsen sub-bottom profiler were not operational during the cruise.

A leak in the plumbing for the scientific sea water supply (forward of the thermosalinograph) created low water pressure for the entire science sea water system. OTG decreased the flow rate of sea water through the thermosalinograph to minimize the impact of low water pressure in the system, but this was not enough to allow for consistent temperature in the circulating on deck incubators. An extra supply line from the ship's sea water system was added to the incubators to increase the water circulation and maintain a constant temperature for incubating samples.

Winds during the first two days of the cruise were from the ENE sustained at ~20kts. On the afternoon of the third and throughout the last day of the cruise the winds increased to ~25kts. Seas were 4-6ft with ~6-8ft swell throughout the cruise.

We arrived at Snug Harbor for off-loading on June 2nd, at 0751 (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. A special thank you goes out to the Captain and Crew for their excellent work throughout the Sea Glider Recovery.

Technical support during this cruise was good. OTG personnel were available at any time to assist in our work. OTG's efforts to help provide proper water circulation to the incubators were very much appreciated.

5. DAILY REPORT OF ACTIVITIES (HST)

May 29, 2012
0759- Depart Snug Harbor
0840- Safety drills
0900- Science party briefing by Chief Mate, included safety at sea talk.
1115- Arrive Station Kahe
1120- Weight Cast to 500 m
1150- End of weight cast
1200- Hyperpro
1215- End of Hyperpro
1231- S2C1 1000 m CTD
1345- End of cast
1350- Transit to Station ALOHA

May 30, 2012
0000- Arrive Station ALOHA, deployment of sediment traps delayed due to communication problems when programming the TSRB
0112- Deployed Sediment Traps 22° 42.43'N 157° 59.99'W
0138- S2C1 1000 m CTD
0241- End of cast
0251- AC9/FRRf
0450- End AC9/FRRf
0500- Re-position ship to 1 mile south of the center
0530- PP array deployment begins
0552- PP array deployed 22° 44.38'N 157° 59.81'W
0605- S2C2 PO deep cast
0950- End of cast
1005- Net tow
1035- End of net tow
1050- ATE
1115- End ATE, sample not collected due to communication error
1126- S2C3 1000 m CTD
1240- End of cast
1300- Hyperpro
1330- AC9/FRRf
1505- End of AC9/FRRf
1512- S2C4 1000 m CTD
1618- End of cast
1703- S2C5 1000 m CTD
1825- End of cast
1830- Transit to PP array
1910- PP array recovered 22° 45.32'N 157° 59.80'W
1956- S2C6 1000 m CTD
2114- End of cast
2210- Net Tow
2235- End of Net Tow
2240- Net Tow
2259- End of Net Tow
2304- S2C7 1000 m CTD

May 31, 2012
0009- End of cast
0030- Raining on station
0156- S2C8 1000 m CTD
0301- End of cast

0305- Transit 1 mile west of center
0400- Gas Array Deployment
0425- Gas Array released 22° 45.35'N 158° 00.71'W
0430- Transit to center of ALOHA
0455- S2C9 1000 m CTD
0606- End of cast
0620- Transit to pump ship's tanks
0755- S2C10 1000 m CTD
0905- End of cast
1000- Net tow
1035- End of net tow
1041- ATE
1104- End of ATE
1105- S2C11 1000 m CTD
1209- End of cast
1215- Net tow
1247- End of net tow
1400- S2C12 1000 m CTD
1500- End of S2C12
1657- S2C13 1000 m CTD
1747- Winch all stop to check level wind
1749- Continue with cast
1818- End of cast
1956- S2C14 1000 m CTD
2101- End of cast
2205- Net Tow
2240- End of net tow
2301- S2C15 Second deep cast

June 1, 2012
0039- 8 m off the bottom 22° 44.573'N 158° 00.274'W
0212- End of cast
0230- Transit to 0.5 mile west of WHOTS mooring
0340- ATE
0400- End of ATE
0410- S52C1 200 m yo-yo
0550- End of cast, 5 cycles complete
0555- Transit to Gas Array
0700- Gas Array Recovery begins 22° 46.77'N 158° 00.92'W
0715- Gas Array recovery complete, transit to Sediment Traps
0800- Sediment trap recovery begins 22° 41.383'N 158° 03.884'W
0840- Traps on board, transit to Sea Glider 148
1500- Sea Glider spotted, ship maneuvered alongside for recovery via lasso
1518- Lasso attempt on glider recovery failed, launch small boat for glider recovery
1525- Sea Glider in small boat
1532- Sea Glider on deck of KOK
1541- Small boat on board, transit to Snug Harbor

June 2, 2012
0700- H Buoy
0751- Arrive Snug Harbor

HOT program sub-components:

Investigator	Project	Institution
Matt Church Dave Karl Bob Bidigare	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

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 Sandra Martinez-Garcia)	Microbial Respiration in the NPSG, and water collection for prochlorococcus culturing	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
Bob Bidigare	Method development for bacteriochlorophyll-a	UH
Rebecca Briggs	LNSW collection for SOEST Lab for Analytical Biogeochemistry	UH
Dave Karl (via Ken Doggett and Ger van den Engh)	Fluorescence responses by deep populations of prochlorococcus to upper euphotic zone light levels	UH
Adina Paytan	O^{18} natural abundance	UCSC
Dave Karl (via Mariona Segura-Noguera)	Sample collection for dissolved inorganic and organic nitrogen determination	UH
Matt Church/Dave Karl (via Sam Wilson and Daniela Böttjer)	Nitrogen fixation methodology comparison	UH