HOT-241 Chief Scientist's Report

Chief Scientist: Craig Nosse
R/V *Ka'Imikai-O-Kanaloa*
April 30 – May 4, 2012

Cruise ID: **KOK 12-02**
Departed: April 30, 2012 at 0810 (HST)
Returned: May 4, 2012 at 0740 (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. 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 (anchor position: 22°40.1572'N, 157°57.0225'W) was to be occupied on the 2nd day of the cruise for about one hour as part of the first Station ALOHA cast.

Upon arrival to Station Kahe a 500 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 April 30th. 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 50 hours. This was to be followed by one 200 m yo-yo CTD cast near the WHOTS mooring. Since the mooring was tending well within the confines of the Station ALOHA circle, this yo-yo cast was not only used to accomplish science objectives at Station 52, but to collect water for the Primary Productivity Array as well. The cast was to be followed by an optics cast utilizing a package that includes a Wet Labs AC9, a Chelsea Fast Repetition Rate Fluorometer (FRRf), a SeaBird Seacat and a LISST particle size and distribution analyzer to profile the upper 200 m at Station ALOHA. The optics cast was to be followed by the deployment of the free-drifting Primary Productivity Array to incubate in situ for 12 hours. A full depth (~4740 m) CTD cast was to be conducted after the deployment of the Primary Productivity Array. The full depth CTD cast was to be followed by 1000 m CTD casts at strict 3 hour intervals for at least 36 hours for continuous and discrete data collection.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on May 2nd. The Gas Array was to be recovered on May 3rd.

An Automated Trace Element (ATE) sampler is usually deployed on HOT cruises but it was not brought on the cruise as it is in the process of being repaired.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on May 1st and 2nd at Station ALOHA.

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

In addition to the optics (ACS/AC9/FRRf/LISST) cast before the deployment of the Primary Productivity Array, a second cast was to be made near noon on May 1st.

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 3rd.

Once the arrays were recovered, an APEX float from the University of Washington was to be recovered. Prior to sailing, the float was 45 miles due east of Station ALOHA.

After the APEX float recovery operation was complete, the ship was to transit back to Snug Harbor.

The following instruments were to collect data throughout the cruise: thermosalinograph, underway fluorometer and anemometer. The shipboard ADCP was not in service for the cruise.

2. SCIENCE PERSONNEL

Participant	**Title**	**Affiliation/HOT Group**
Adriana Harlan	Research Associate	UH/BEACH
Dan Sadler	Research Associate	UH/BEACH
Karin Bjorkman	Research Specialist	UH/BEACH
Blake Watkins	Marine Engineer	UH/BEACH
Donn Viviani	Graduate Student	UH/BEACH
Sean Jungbluth	Graduate Student	UH/BEACH
Jefrey Snyder	Marine Technician	UH/PO
Cameron Fumar	Research Associate	UH/PO
Craig Nosse	Research Associate	UH/PO
Branden Obra	Marine Programmer	UH/PO
Tara Clemente	Research Associate	UH/CMORE
Ken Doggett	Research Associate	UH/CMORE
Sandra Martinez-Garcia	Postdoctoral Researcher	UH/CMORE
Trevor Young	Marine Technician	OTG
Jeff Koch	Marine Technician	OTG

3. GENERAL SUMMARY

Operations at Station Kahe were conducted as planned. A 500 m weight-test cast, 1000 m CTD cast and a Hyperpro cast were all completed.

Operations at Station ALOHA were conducted as planned until approximately 1200 (HST) on May 2. An accident requiring medical transport of a science party participant suspended operations for about 18 hours. Full details of the accident were given to the University of Hawaii Marine Center as well as the National Science Foundation.

After providing medical transport for the injured party, there were approximately 10 hours available to complete our scientific objectives. The Gas and Sediment Trap Arrays were recovered and the remaining time was spent at Station ALOHA conducting CTD casts to provide profiles and collect samples for core and ancillary experiments. Given the limited time, the four remaining CTD casts were

optimized by consolidating samples when possible and by limiting the target depth for two of the four casts (two 1000 m casts were replaced with a 200 m and 500 m cast).

Operations not completed due to medical transport:
36 hours of 1000 m CTD casts at strict 3 hour intervals
3rd daytime net tow, 3rd nighttime net tow
APEX float recovery

One near-bottom CTD cast, eleven 1000 m CTD casts, one 500 m CTD cast and two 200 m CTD casts were conducted at Station ALOHA. One of the 200 m CTD casts was a yo-yo cast (with four cycles) near the WHOTS mooring (in effect, Station 52).

Four net tows for the HOT zooplankton collection were completed successfully; two during the day and two during the night.

The Hyperpro was deployed and recovered successfully two times near noon. The Hyperpro cast at Station ALOHA could not descend to the target depth (despite two attempts) due to sea conditions and ship movement.

The optical package ACS/AC9/FRRf/LISST was deployed two times during the cruise, once in the early morning and once around noon. Due to a suspected battery power issue, the ACS did not collect data during the early morning cast.

The fluorometer, thermosalinograph and the ship's anemometer had one slight interruption during the cruise (outbound from Honolulu Harbor) when a UPS had to be changed out for some ship systems.

Winds were from the east throughout the cruise, in the 20-25 knot range. Swell ranged from 6 to 8 feet.

We arrived at Snug for off-loading on May 4th at 0740 (HST).

4. R/V *Ka'Imikai-O-Kanaloa* OFFICERS and CREW, TECHNICAL SUPPORT

The officers and crew of R/V *Ka'Imikai-O-Kanaloa* provided dedicated support during our cruise. We are most appreciative of their response and actions during the time of the aforementioned accident and injury to a science party participant. OTG personnel were always available to assist in our work and were very accommodating.

5. DAILY REPORT OF ACTIVITES (HST)

30 April 2012

0810 Depart Snug Harbor
0845 Fire and Abandon Ship drills
1115 Arrive Station Kahe
1130 Weight-test cast to 500 m
1215 Hyperpro cast
1242 S1C1 - 1000 m CTD cast
1410 Transit to Station ALOHA
2337 Arrive Station ALOHA

01 May 2012

0022 Sediment trap deployed at 22 41.235 N, 158 01.838 W
0114 S2C1 - 200 m yo-yo cast at WHOTS mooring to collect PP water
0234 ACS/AC-9/FRRf
0543 PP Array deployed at 22 43.529 N, 158 0.780 W
0604 S2C2 - 4725 m CTD cast
0753 Reached bottom (4803 dbar) at 22 43.045 N, 158 0.127 W
1005 Net tow
1118 S2C3 - 1000 m CTD cast
1241 Hyperpro cast (unable to reach target depth despite 2 attempts)
1320 ACS/AC9/FRRf
1453 S2C4 - 1000 m CTD cast
1702 S2C5 - 1000 m CTD cast
1859 PP array recovered at 22 48.436 N, 158 01.153 W
2001 S2C6 - 1000 m CTD cast
2158 Net tow
2255 S2C7 - 1000 m CTD cast, small bend in the wire found upon recovery

02 May 2012

0031 Net tow
0154 S2C8 - 1000 m CTD cast
0451 Gas array deployed at 22 45.552 N, 157 54.147 W
0516 S2C9 - 1000 m CTD cast
0625 Transit to pump tanks
0758 S2C10 - 1000 m CTD cast
1007 Net tow
1053 S2C11 - 1000 m CTD cast
1230 Transit to Haleiwa Small Boat Harbor
2040 Arrive Haleiwa
2123 Transit to Gas Array

03 May 2012

0623 Arrive Gas Array
0639 Recover Gas Array at 22 50.110 N, 157 51.951 W
0700 Transit to Sediment Trap
0852 Recover Sediment Trap at 22 59.470, 157 54.701 W
0900 Transit to Station ALOHA
1045 S2C12 - 1000 m CTD cast
1316 S2C13 - 1000 m CTD cast
1540 S2C14 - 500 m CTD cast
1712 S2C15 - 200 m CTD cast
1730 Transit to Snug Harbor
2130 Formalin spill in Wet Lab

04 May 2012

0740 Arrive 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 Sandra Martinez-Garcia)	Microbial respiration in the NPSG	UH
Henrieta Dulaiova and Ken Buesseler	Japanese radionuclide release sampling	UH
Jonathan Zehr (via Anne Thompson and Brandon Carter)	UCYN-A Ecology	UCSC
*Steve Riser and Ken Johnson	Integration of pH sensor into Apex profiling floats	UW/MBARI
Dave Karl (via Marona Segura-Noguera)	Developing a methodology for sampling microphytoplankton and synechococcus for XMRA	UH
Matt Church (via Shimi Rii)	Investigation of temporal changes in picoeukaryote diversity at Station ALOHA	UH
Matt Church/Dave Karl (via Sam Wilson and Daniela Bottjer)	Nitrogen fixation methodology comparison	UH
Adina Paytan	O^{18} natural abundance	UCSC
Grieg Steward (via Chris Schvarcz)	Ecology of protistan viruses at Station ALOHA	UH
Dave Karl (via Ken Doggett)	Troubleshooting stability of flow cytometer	UH

* Denotes HOT program sub-components, ancillary programs and additional programs that were compromised due to decreased amount of science time at Station ALOHA.