

HOT-220: Chief Scientist Report

Chief Scientist: Fernando Santiago-Mandujano

R/V Ka'Imakai-O-Kanaloa

April 5th – 9th, 2010

Cruise ID: **KOK1007**

Departed: April 05, 2010 at 0800 (HST)

Returned: April 09, 2010 at 0800 (HST)

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

Operator: University of Hawaii

Master of the Vessel: Captain Ross Barnes

Chief Scientist: Fernando Santiago-Mandujano

OTG Electronics/Deck Operations Technicians: Justin Smith, Jenny White, Ben Colello

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 3 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° 39.99'N, 157° 56.96'W will be occupied on the 4th day of the cruise for about two hours.
- 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 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 the first day. 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 and one 1000 m cast (to collect water for the Primary Production Array). These 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 April 7th.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on April 7th. The Gas Array was to be recovered on April 8th.

A plankton net was to be towed between 1000 – 1400 and 2200 – 0200 for 30 min intervals on April 6th and April 7th at Station ALOHA.

A Hyperpro profiling instrument was to be deployed for half-hour periods near noon time on April 5th, 7th, and 8th.

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 April 7th and in the early morning and around noon on April 8th.

An automated trace element sampler (ATE) was to be deployed to a depth of 10 m for 30 minutes in the afternoon of April 6th.

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 April 8th.

After recovering the arrays, the ship was to transit to Station 52 to conduct one one-hour 200 m CTD yo-yo cast. Once the cast was completed, the ship was to re-position within Station ALOHA to conduct an AC9/FRRf/LISST cast, followed by a Hyperpro cast, and a 200-m CTD cast.

After operations at ALOHA Station were completed, 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, underway fluorometer, and two anemometers.

2. SCIENCE PERSONNEL

Participant	Title	Affiliation
Susan Curless	Research Associate	UH/BEACH
Lance Fujieki	Computer Specialist	UH/BEACH
Adriana Harlan	Research Associate	UH/BEACH
Dan Sadler	Research Associate	UH/BEACH
Kathryn Stanaway	Research Associate	UH/BEACH
Blake Watkins	Marine Engineer	UH/BEACH
Scott Grant	Research Associate	UH/CMORE
Cameron Fumar	Research Associate	UH/PO
Jessica Hill	Undergraduate Student	UH/PO
Bo Keopaseut	Research Associate	UH/PO
Fernando Santiago-Mandujano	Chief Scientist – Research Associate	UH/PO
Robin Minton	Volunteer	PO
Jefrey Snyder	Marine Technician	UH/PO
Don Viviani	Graduate Student	UH/CMORE
Justin Smith	Marine Technician	OTG
Jenny White	Marine Technician	OTG
Ben Colello	Marine Technician	OTG

3. GENERAL SUMMARY

Operations during the cruise were conducted as planned without any major delays. All objectives for HOT-220 were successfully completed, except for the ATE sampler, which did not function properly.

One 1000 m CTD cast was conducted at Station Kahe. Twelve 1000 m CTD casts, three 200 m, and two deep casts were conducted at Station ALOHA. One one-hour CTD yo-yo cast was conducted near the WHOTS mooring (Station 52). One near-bottom CTD cast was conducted at Station Kaena. During all the casts the ISUS was not giving signal in the upper 100 dbar downcast, and it stopped giving signal in the upper 50 dbar upcast.

A reddish/brown thick, waxy and slightly iridescent film was seen on various types of filters from water taken at various depths. Some filtrations took over 24 hours to complete due to the presence of this matter in the water column. Extra samples were taken for HPLC, and slides were made in efforts of trying to identify the organic matter.

The array of floating sediment traps, the gas array, and the primary production array were deployed and recovered without any incidents. All arrays drifted to the north-west, with the sediment trap and gas array being recovered 8 miles and 5 miles, respectively from the center of ALOHA.

Six net tows were successfully completed; three were conducted during the day, and three at night.

The Hyperpro was deployed three times around noon.

The optical package ACS/AC9/FRRf/LISST was deployed three times during the cruise.

The ATE sampler was deployed but did not function properly and thus no sample was collected .

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

Winds were from the east about 20 knots for the first three days of the cruise, decreasing to 18 knots during the last day. A large swell and rough seas were present during transit to ALOHA Station, but decreased after arriving to the Station.

We arrived at Snug Harbor for off-loading on April 9th, at 0730 (HST).

Changes in scheduled operations due to time constraints:

Station ALOHA: S2C2 was conducted to 200 m instead of the planned 1000 m to make up time in the schedule.

4. R/V KA'IMAKAI-O-KANALOA, OFFICERS AND CREW, TECHNICAL SUPPORT

The R/V Ka'Imikai-O-Kanaloa continues to maintain excellent ship support for our work. The Captain and ship's crew were most helpful and accommodating throughout the cruise. Throughout our cruise, the entire crew showed enthusiasm, concern, and dedication to our scientific mission.

Technical support during this cruise was excellent. OTG personnel were available at any time to assist in our work and helped keep operations running smoothly.

5. DAILY REPORT OF ACTIVITIES (HST)

01 April, 2010: Loading Day

The lab vans, winches, and scientific equipment were loaded this day.

05 April, 2010

0800 Departed from Snug harbor
0845 Abandon ship and fire drills, followed by safety briefing and science meeting
1100 Arrive at Kahe Station
1120 300 lb weight cast to 500 m
1155 Hyperpro cast
1226 Station 1 CTD cast 1 (1000 m)
1335 Transit to Station ALOHA

06 April, 2010

0045 Arrive ALOHA Station
0157 Sediment trap array deployed 22° 43.85'N 157° 59.63'W
0214 Station 2 CTD cast 1 (200 m)
0315 Station 2 CTD cast 2 (200 m)
0515 Primary production array deployed 22° 45.54'N 158° 0.04'W
0530 Station 2 CTD cast 3 (~4740 m)
1000 Net tow
1100 Station 2 CTD cast 4 (1000 m) – Start 36 hour burst sample period.
1235 Net tow
1315 ATE sampler deployed – Instrument communicated with computer and accepted commands for sample collection and was successfully deployed. Upon retrieval, a bubble was present in the sample bottle and the sample bottle cap was loose indicating that the sampler failed to collect a sample. Further communication attempts with the sampler were tried but communication could not be established.
1400 Station 2 CTD cast 5 (1000 m)
1659 Station 2 CTD cast 6 (1000 m)
1845 Primary production array recovered 22° 47.86'N 158° 03.54'W
2005 Station 2 CTD cast 7 (1000 m)
2204 Net tow
2303 Station 2 CTD cast 8 (1000 m)

07 April, 2010

0115 Net tow
0204 Station 2 CTD cast 9 (1000 m)
0400 Gas array deployed 22° 46.0'N 158° 00.29'W
0500 Station 2 CTD Cast 10 (1000 m)
0800 Station 2 CTD Cast 11 (1000 m)
1000 Net Tow
1100 Station 2 CTD Cast 12 (1000 m)
1210 Hyperpro cast
1300 ACS/AC9/FRRf/LISST cast
1415 Station 2 CTD Cast 13 (1000 m)
1656 Station 2 CTD Cast 14 (1000 m)
2004 Station 2 CTD Cast 15 (1000 m)
2115 Organic orange matter noticed on CTD lanyards.
2200 Net Tow
2307 Station 2 CTD Cast 16 (~4740 m) - End of 36 hour burst sample period.

08 April, 2010

0300 AC9/FRRf/LISST cast
0700 Recovered Sediment trap array 22° 50.94'N 158° 05.56'W
0815 Recovered Gas array 22° 50.13'N 158° 01.76'W
1030 Station 52 Cast 1 (200 m CTD yo-yo cast)
1150 Hyperpro cast.
1215 ACS/AC9/Frrf/LISST cast
1330 Station 2 CTD Cast 17 (200 m cast)

2123 Station 6 CTD Cast 1 (2400 m)
2324 Transit to Snug Harbor

09 April, 2010

0730 Arrive at Snug Harbor for full offload.

6. 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/CMORE
Elisha Wood-Charlson (via Scott Grant)	Comparison of virus concentrating methods in oligotrophic waters from station ALOHA.	UH/CMORE
Dave Karl (via Scott Grant)	RNA/DNA sample collection.	UH/CMORE
Matt Church (via Donn Viviani, Daniela Böttjer, and Dan Sadler)	Carbon dioxide ocean perturbation experiment.	UH
Malfatti/Azam (via Scott Grant)	Atomic Force Microscopy of bacterial assemblages	UCSD