

HOT-275: Chief Scientist Report

Chief Scientist: Fernando Santiago-Mandujano

R/V Ka'Imikai-O-Kanaloa

11-15 August, 2015

Cruise ID: **KOK 15-08**

Departed: 11 August at 0800 (HST)

Returned: 15 August at 0840

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

Master of the Vessel: Captain Don Jack

OTG Marine Technicians: Trevor Young and Patrick A'Hearn

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 August 11th 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 August 12th to 14th.
- 3) Station 52, the site of WHOTS-12 Mooring (anchor position 22° 40.061' N, 157° 56.9654' W) was to be occupied on August 14th 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 was to be occupied on August 14th for approximately 2 hours.

Upon arrival to Station Kahe a 400 lb. weight-test cast to 1000 m, one CTD cast to 1000 m, and a Hyperpro cast were to be conducted on the afternoon of August 11th. The single CTD cast was to be conducted to collect a continuous profile 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 a 1000 m CTD cast for preparation of the Primary Productivity Array. This 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 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 August 13th.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on August 13th. The Gas Array was to be recovered on August 14th.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on August 12th and 13th at Station ALOHA.

The Hyperpro (a profiling unit with one up-looking and one down-looking hyperspectral radiometer, a WET Labs ECO-BB2F triplet, temperature and conductivity sensors), was to be deployed on August 11th, 12th, and 14th.

An optics package including a Wet Labs AC-S, 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 morning on August 14th.

A trace metal free sample was to be collected by the ATE sampler on August 13th at Station ALOHA.

After the 36 hour burst period of CTD work at Station ALOHA was accomplished, the ship was to transit to recover the floating Gas Array and the Sediment Trap Array on the morning of August 14th.

After recovering the arrays, the ship was to transit to Station ALOHA to conduct optics profiles, and to Station 52 to conduct a one-hour 200 m CTD yo-yo 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, fluorometer, and the ship's anemometer.

2. SCIENCE PERSONNEL

Participant	Title	Affiliation
Susan Curless	Research Associate	UH
Lance Fujieki	Research Associate	UH
William McQuiston	Volunteer	UH
Brenner Wai	Research Associate	UH
Alexa Nelson	Research Associate	UH
Blake Watkins	Marine Engineer	UH
Roman Battisti	Technician	UH
Brie Maillot	Technician	UH
Eric Shimabukuro	Research Associate	UH/SCOPE
Tara Clemente	Research Associate	UH/SCOPE
Greyson Adams	Research Associate	UH/SCOPE
Jim Burkitt	Research Associate	UH/SCOPE
Jefrey Snyder	Marine Technician	UH
Fernando Santiago-Mandujano	Research Associate	UH
Daniel McCoy	Research Associate	UH
Robert (Walt) Deppe	Research Associate	UH
Emma Nuss	Graduate Student	UH
Matthew Dwyer	Undergrad Student	HPU
Patrick A'Hearn	Marine Technician	OTG
Trevor Young	Marine Technician	OTG

3. GENERAL SUMMARY

Operations during the cruise were conducted as planned. The cruise was delayed three days because of ship's engine repairs. There were three issues with the provided equipment that should be addressed before our next cruise on this ship: 1) There was no bottom depth information during the cruise since the Knudsen system was not available, and the Sea-Beam was not operational. 2) The CTD winch tension-meter was not working correctly, and it seemed to have an offset problem; the system did not register a correct tension during the weight cast, and the displayed tension and wire-out speed were fluctuating erratically during some of the casts. 3) The CTD squirt boom was moving slowly during CTD deployment and recoveries, indicating a possible problem with the hydraulic system.

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 four cycles completed. One near bottom cast was completed at Station Kaena. The first deep cast was about 30 to 40 m off the bottom (4772 dbar) because the altimeter failed and there was no backup system to estimate the distance of the package from the bottom (the Knudsen system was not available to receive the pinger's signal). The altimeter was replaced with the backup before the second deep cast.

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

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

The optical package ACS/LISST was deployed two times in the morning of August 14th.

The ATE was successfully deployed on August 13th.

The underway thermosalinograph system was working fine during the cruise, but it stopped logging data on August 15th at 00:00:30 HST, during the return transit between Kaena Station and Snug Harbor. The underway fluorometer and the ADCP worked correctly during the cruise.

The ship's anemometer ran without interruption during the cruise.

Winds were easterlies between 15 and 25 kts, with moderate seas.

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

The R/V *Ka'imikai-O-Kanaloa* continues to maintain very good ship support for our work. Captain Don Jack and the ship's crew showed flexibility, enthusiasm, concern, and dedication to our scientific mission.

Technical support during this cruise was very good. OTG personnel were available to assist in our work during the cruise.

5. DAILY REPORT OF ACTIVITIES (HST)

August 11, 2015

0800 - All aboard. Depart from Snug harbor

0900 - Fire and Abandon ship drills

0945 - Safety briefing by the captain. Science meeting

1100 - Arrived at Kahe Station

1116 - Weight cast to 1000 m with 400 lb weight. Problems with tension-meter, tension readout stuck at 260 lb. during cast

HOT-275 Chief Scientist Report

1158 - End of weight cast
1210 - Hyperpro cast start
1255 - End of hyperpro cast
1321 - Start S1C1 CTD cast to 1000 m.
1436 - End of cast
1445 - Transit to ALOHA Station

August 12, 2015

0045 - Arrived to ALOHA Station
0118 - Deployed sediment traps: 22 44.853'N, 158 2.826'W
0150 - Start S2C1 CTD cast to 1000 m. Problems with tension-meter, erratic tension and wire-out speed being displayed.
0259 - End of cast
0405 - Deployed primary productivity array: 22 45.01'N, 158 1.0'W
0437 - Start S2C2 CTD deep cast
0635 - Near the bottom (4772 dbar), altimeter not responding. Ship drifted about 1.5 nm NW from the center of ALOHA
0850 - End of cast
0855 - Transit to pump ship's tanks
1056 - Start S2C3 CTD cast to 1000 m
1218 - End of cast
1230 - Start net tow
1300 - End net tow
1313 - Hyperpro cast
1415 - End hyperpro cast
1417 - Start S2C4 CTD cast to 1000 m
1525 - End of cast
1655 - Start S2C5 CTD cast to 1000 m
1805 - End of cast
1917 - Recovered primary productivity array 22 46.081' N, 158 4.782'W
1956 - Start S2C6 CTD cast to 1000 m
2111 - End of cast
2202 - Start net tow
2231 - End net tow
2233 - Start net tow
2302 - End net tow
2314 - Start S2C7 CTD cast to 1000 m

August 13, 2015

0017 - End cast
0156 - Start S2C8 CTD cast to 1000 m
0255 - End of cast
0420 - Gas array deployment 22 44.95'N, 158 1.11'W
0453 - Start S2C9 CTD cast to 1000 m
0558 - End of cast
0753 - Start S2C10 CTD cast to 1000 m
0858 - End of cast
1000 - Start net tow
1030 - End net tow
1045 - ATE sampling
1110 - End ATE sampling
1128 - Start S2C11 CTD cast to 1000 m
1230 - End cast
1235 - Start net tow

1303 - End net tow
 1349 - Start S2C12 CTD cast to 1000 m.
 1504 - End of cast
 1655 - Start S2C13 CTD cast to 1000 m
 1803 - End of cast
 2001 - Start S2C14 CTD cast to 1000 m
 2114 - End of cast
 2205 - Start net tow
 2237 - End of net tow
 2257 - Start S2C15 CTD cast to near-bottom

August 14, 2015

0044 - CTD at 7 m off the bottom 22 44.97'N, 158 0.024'W
 0220 - End of cast
 0301 - Start optics package profile
 0355 - Optics package recovered
 0400 - Optics package re-deployed
 0453 - End of optics package profile
 0500 - Transit to recover gas array
 0619 - Start gas array recovery 22 47.774'N 158 9.947'W
 0630 - End of recovery
 0803 - Start sediment traps recovery 22 43.691'N 158 13.725'W
 0810 - End of recovery
 1045 - Start optics package profile
 1135 - Optics package recovered
 1137 - Optics package re-deployed
 1223 - Optics package recovered
 1235 - Start S52C1 CTD yo-yo cast to 200 m
 1329 - End of cast
 1335 - Hyperpro cast
 1424 - End hyperpro cast
 1430 - Transit to Kaena Station
 2108 - Start S6C1, CTD cast to near-bottom
 2311 - End of cast
 2320 - Transit to Snug harbor

August 15, 2015

0840 - Arrive Snug Harbor, full offload.

6. HOT program sub-components:

Investigator	Project	Institution
Matt Church Dave Karl Bob Bidigare	Core Biogeochemistry	UH
John Dore	Biogeochemistry QA/QC	MSU
Roger Lukas	Hydrography	UH
Mike Landry	Zooplankton dynamics	SIO

Ricardo Letelier	Optical measurements	OSU
Ancillary programs:		
Andrew Dickson	CO ₂ dynamics and inter-calibration	SIO
Paul Quay	DI ¹³ C	SIO
Matt Church & Ricardo Letelier	Diversity and activities of nitrogen-fixing microorganisms	UH
Sam Wilson	Reduced gases in the upper ocean: The cycling of methane, sulfide and nitrous oxide	UH
Christopher Schvarcz	Viral Dynamics in the Oligotrophic Open Ocean, Station ALOHA	C-MORE
Erica Goetze	Temporal stability of copepod populations at Station ALOHA	UH
Sara Ferron-Smith	Determination of net community production from the Diurnal variability of O ₂ /Argon ratios	UH
Ed DeLong Dave Karl Matt Church	SCOPE DNA collection	UH
Katie Watkins-Brandt	Diazotroph microscopy sampling	SCOPE
Jennifer McKay	HOT oxygen isotopic standard	CEOAS, OSU
Chris Winn	Surface water collection for carbon chemistry standard	HPU