HOT-269: Chief Scientist Report

Chief Scientist: Susan Curless
R/V *Ka'Imikai-O-Kanaloa*
February 23-27, 2015

Cruise ID: **KOK 15-02**
Departed: February 23, 2015 at 0745 (HST)
Returned: February 27, 2015 at 0830 (HST)
Vessel: **R/V *Ka'Imikai-O-Kanaloa***
Master of the Vessel: Captain Don Jack
OTG Marine Technicians: Trevor Young and Steve Tottori

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 February 23rd for about 3 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 February 24th, 25th, and 26th.
3) Station 50, the site of WHOTS-11 Mooring (anchor position 22° 45.981'N 157° 53.964'W) was to be occupied on February 26th 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 February 26th 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 on the afternoon of February 23rd. 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 200 m CTD cast (to collect water for an incubation experiment) and 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, and 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 February 25th.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on February 25th. The Gas Array was to be recovered on February 26th.

An Automated Trace Element (ATE) sampler was to be deployed to a depth of 10 m on February 25th.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on February 24th and 25th at Station ALOHA.

The Hyperpro was to be deployed for a half-hour period near noon time on February 23rd, 24th, and 26th.

An optics package including a Wet Labs AC9, 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 on February 26th.

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 February 26th.

After recovering the arrays, the ship was to transit to Station ALOHA to conduct an optics cast. Once that operation was complete, the ship was to transit to Station 50 to conduct a one-hour 200 m CTD yo-yo cast. Once operations at Station 50 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 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, ship's two anemometers, and the underway fluorometer.

2. SCIENCE PERSONNEL

Participant	**Title**	**Affiliation**
Susan Curless	Research Associate	UH
Dan Sadler	Research Associate	UH
Lance Fujieki	Research Associate	UH
Christopher Schvarcz	Graduate Student	UH
Brenner Wai	Research Associate	UH
Alexa Nelson	Research Associate	UH
Blake Watkins	Marine Engineer	UH
Jefrey Snyder	Marine Technician	UH
Fernando Santiago-Mandujano	Research Associate	UH
Daniel McCoy	Research Associate	UH
Robert (Walt) Deppe	Research Associate	UH
Eric Shimabukuro	Research Associate	UH/SCOPE
Tara Clemente	Field Operations Coordinator	UH/SCOPE
Charles Roman Battisti	Graduate Student	HPU
Yuki Yamamoto	Undergraduate Student	UH
Ken Doggett	Research Associate	UH/CMORE
Kendra Turk-Kubo	Research Associate	UCSC/SCOPE
Hanna Farnelid	Postdoctoral Researcher	UCSC/SCOPE
Steve Tottori	Marine Technician	OTG
Trevor Young	Marine Technician	OTG

3. GENERAL SUMMARY

Operations during the cruise were compromised due to slow transit speeds and modifications were made to the cruise schedule.
To compensate for slow transit speeds to reach Station ALOHA, the planned 200 m CTD cast for an incubation experiment was cancelled and the 1000 m CTD cast for water for the Primary Production Array was conducted to only 200 m. Water needed for the incubation experiment was collected on a CTD cast within the 36 hour CTD burst period instead of collecting samples for PUR.
Slow transit speeds back to Station ALOHA from the sediment trap array recovery site cancelled, delayed and re-ordered operations on February 26th.

The Hyperpro was conducted before the CTD operations at WHOTS because the 1400 optimum deployment time slot arrived prior to the ship arriving at Station 50. After completing operations at Station ALOHA and WHOTS, there was not enough time to complete planned operations at Station Kaena and still arrive at Snug Harbor on time. Therefore, operations at Station Kaena were cancelled.

A ~2.5 hour delay in science operations was experienced when the CTD squirt boom failed when power to the boom hydraulics was left on for too long during a near bottom CTD cast which resulted in overheated hydraulic fluid. The boom failure occurred during recovery of the near bottom CTD cast, S2C2 on February 24th. The CTD package was suspended above the water outboard of the ship during the ~2.5 hour delay. Repairs were made and CTD operations continued normally until the early morning of February 25th when the retraction motion of the boom became noticeably slower than the extension motion. After inspection by the Chief Engineer it was recommended that CTD operations continue with the slow retraction motion of the boom since repairs to the retraction hydraulics would be too involved to complete at sea.

One 1000 m CTD cast was completed at Station Kahe. Two near bottom CTD casts, twelve 1000 m CTD casts, and one 200 m CTD cast were conducted at Station ALOHA. One 200 m yo-yo CTD cast was completed near the WHOTS mooring (Station 50) 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 casts (three cycles each) were successfully conducted three times around the scheduled 1400-1430 time slot on February 23rd, 24th, and 26th.

The optical package was deployed two times during the cruise, once around noon and once in the early morning on February 26th.

The ATE was successfully deployed on February 25th.

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

Winds during the cruise were from the east at ~15-20kts. Seas were 2-3ft from the east and the swell was from the northwest at ~3-4 ft throughout the cruise.

We arrived at Snug Harbor for off-loading on February 27th, at 0830 (HST).

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

The R/V *Ka'Imikai-O-Kanaloa* continues to maintain good ship support for our work. Captain Jack and the ship’s crew showed enthusiasm, concern, and dedication to our scientific mission. The extra effort from the Chief Engineer and his team to help with the CTD squirt boom malfunctions was very much appreciated.

Technical support during this cruise was good. OTG personnel were available at any time to assist in our work.

5. DAILY REPORT OF ACTIVITIES (HST)

February 23, 2015
0745- Depart
0830- Safety drills and meeting with the Captain
1135- Arrive Kahe
1147- Weight cast to 1000 m

1225- End of weight cast
1239- Hyperpro
1320- End of cast
1352- S1C1 1000 m CTD
1516- End of cast
1525- Transit to Station ALOHA

February 24, 2015
0149- Arrive ALOHA
0155- Sediment Trap deployment 3nm SSW of center
0216- Traps deployed 22° 42.136'N 158° 1.000'W
0240- S2C1 200 m CTD
0304- End of cast
0345- PP deployment 22° 44.0'N 158° 0.35'W
0423- S2C2 near bottom CTD cast
0614- 5m off the bottom 22° 46.268'N 158° 59.944'W
0824- CTD out of water, squirt boom hydraulics not working due to overheated hydraulic fluid
1110- Hydraulics fixed, CTD on deck
1150- Net tow
1224- End net tow
1228- S2C3 1000 m CTD
1340- End of cast
1400- Hyperpro
1445- End
1505- S2C4 1000 m CTD
1614- End
1703- S2C5 1000 m CTD
1819- End of cast
1935- PP Array Recovery 22° 45.948'N 158° 06.503'W
1955- End of recovery
2018- S2C6 1000 m CTD
2138- End of cast
2200- Net Tow
2227- End of tow
2232- Net Tow
2259- End of tow
2304- S2C7 1000 m CTD

February 25, 2015
0007- End of cast
0159- S2C8 1000 m CTD
0304- End of cast - Boom retraction movement noticeably slower than normal.
0436- Gas Array Deployment 22° 45.462'N 158° 1.092'W
0512- S2C9 1000 m CTD
0632- End of cast
0700- Hand net tow
0753- S2C10 1000 m CTD
0901- End of cast
1000- Net Tow
1035- End of tow
1045- ATE
1109- End of ATE
1113- S2C11 1000 m CTD
1211- End of cast
1338- Net Tow
1400- End of tow

1413- S2C14 1000 m CTD
1450- Hand Net tow
1525- End of cast
1530- Transit to pump ship's tanks
1712- S2C13 1000 m CTD
1820- End of cast
1956- S2C14 1000 m CTD
2128- End of cast
2200- Net Tow
2225- End of tow
2259- S2C15 near bottom CTD

February 26, 2015
0045- 8 m off the bottom 22° 45.643'N 158° 00.470'W
0227- End of cast
0303- Optics cast
0450- Recovery of optics
0455- Transit to Gas Array
0645- Gas Array Recovery 22° 53.86'N 158° 09.26'W
0700- Array on board, transit to Sediment Traps
0837- Sediment Trap Recovery 22° 47.77'N 158° 21.33'W
0848- Array on board, transit to ALOHA
1100- Optics cast
1157- End of optics cast
1201- Optics cast
1230- Raining on station
1246- End of optics
1250- Transit WHOTS
1401- Hyperpro
1444- End of Hyperpro
1510- S50C1 200 m yo-yo cast
1615- End of cast, 5 cycles complete
1620- End of cast, transit to Snug Harbor

Februay 27, 2015
0740- Sea Buoy
0830- Arrive Snug Harbor

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 intercalibration	SIO
Paul Quay	$DI^{13}C$	UW
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 at Station ALOHA	UH
Erica Goetze	Temporal stability of copepod populations at Station ALOHA	UH
Sara Ferrón-Smith	Determination of net community production from the diurnal variability of O2/Argon ratios	UH
SCOPE	Sample collection for DNA analysis	UH
Kendra Turk and Hanna Farnelid (SCOPE)	Functional aspects of microbial communities at Station ALOHA: Nitrogen fixation and other ecological functions	UCSC
Anne Thompson	Water for cultures	Institute for Systems Biology, WA
Ken Doggett	High resolution sample collection for Flow Cytometry	UH