

HOT-263: Chief Scientist Report

Chief Scientist: Susan Curless

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

May 30 - June 3, 2014

Cruise ID: **KOK 14-04**

Departed: May 30, 2014 at 0758 (HST)

Returned: June 3, 2014 at 0745 (HST)

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

Master of the Vessel: Captain Don Jack

OTG Marine Technicians: Dave Hashisaka and Justin Smith

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 May 30th 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 May 31st, June 1st, and 2nd.
- 3) Station 52, the site of WHOTS-10 Mooring (anchor position 22° 40.12'N 157° 57.01'W) was to be occupied on June 2nd 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 June 2nd for approximately 3 hours.

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 May 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 52 hours. This was to be followed by one 200 m CTD cast 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 June 1st.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on June 1st. The Gas Array was to be recovered on June 2nd.

An Automated Trace Element (ATE) sampler was to be deployed to a depth of 10 m on June 1st.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on May 31st and June 1st at Station ALOHA.

The Hyperpro was to be deployed for a half-hour period near noon time on May 30th, 31st, and June 2nd.

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 June 2nd.

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 2nd.

After recovering the arrays, the ship was to transit to Station ALOHA to conduct an AC9/FRRf cast. Once that operation was complete, 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 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
Adriana Harlan	Research Associate	UH
Dan Sadler	Research Associate	UH
Lance Fujieki	Research Associate	UH
Christopher Schvarcz	Graduate Student	UH
Stuart Goldberg	Postdoctoral Researcher	UH
Jamie Becker	Postdoctoral Researcher	MIT
Charles Roman Battisti	Graduate Student	HPU
Brenner Wai	Technician	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
Kristine Tofte	Graduate Student	UH
Seth Travis	Graduate Student	UH
Kayla Svelling	Undergraduate Student	UH
Justin Smith	Marine Technician	OTG
Dave Hashisaka	Marine Technician	OTG

3. GENERAL SUMMARY

During the Hyperpro deployment at Station Kahe, the Hyperpro communications cable became caught under the aft shaft of the ship. Extra time was taken to free it and then successfully conduct a full Hyperpro cast. This delayed our departure from Kahe and further time was lost heading into the weather during the transit to Station ALOHA. Arrival to the chosen sediment trap deployment site at ALOHA was not until 0200 on May 31st. The planned 200 m CTD cast for ancillary science experiments was cancelled to make up for time lost at Kahe and during the transit.

As CTD operations at Station ALOHA were commencing, CTD winch operator error caused damage to

the rosette when it was accidentally lifted into the ceiling of the air castle. Damage to the niskin bottles and the wire termination required ~3 hours for repairs. To compensate for the time needed for repairs, deployment of the Gas Array was cancelled and the Primary Production Array was deployed in the originally scheduled Gas Array time slot.

One 1000 m CTD cast was completed at Station Kahe. Two near bottom CTD casts and twelve 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 Sediment Traps and Primary Production Array were deployed and recovered successfully. Both arrays drifted to the south of their deployment sites.

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 May 30th, June 1st and 2nd.

The optical package ACS/AC9/FRRf/LISST was deployed two times during the cruise, once around noon and once in the early morning on June 2nd.

The ATE was successfully deployed on May 31st.

The ship's fluorometer and anemometers ran without interruption during the cruise. The ADCP data collection was interrupted for a couple of hours on June 2nd when the MAHRS Gyro stopped communicating with the ADCP. The thermosalinograph had multiple interruptions of operation during the cruise.

Winds during the cruise were from the east at 10-20kts. Seas were 4-6ft for the first two days of the cruise, diminishing to 2-3 feet on the third day. The swell was ~4-6 ft throughout the cruise.

We arrived at Snug Harbor for off-loading on June 3rd, at 0745 (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.

Technical support during this cruise was good. OTG personnel were available at any time to assist in our work. OTG's efforts to help troubleshoot the thermosalinograph problems were very much appreciated.

5. DAILY REPORT OF ACTIVITIES (HST)

May 30, 2014

0758- Depart Snug with two tug boat escorts.

0847- Safety Drills

0920- Safety/ship briefing with the Captain

1115- Arrive Station Kahe

1125- Weight Cast to 500m

1135- Problem with locked and rusty sheaves on drum, engineers inspecting

1206- End of weight cast

1225- Start of Hyperpro cast (over starboard rail)

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-Hyperpro got pushed under the ship by currents, and was then stuck under the aft shaft.

1256- Hyperpro recovered

1300- Ship Reposition

1327- Hyperpro re-deployed through A-frame

1422- Hyperpro recovered

1428- S1C1 1000 m CTD

1557- End of cast

1600- Transit Station ALOHA

May 31, 2014

0207- Arrive Station ALOHA, 3nm southwest of the center

0227- Begin Sediment trap deployment

0249- Sediment trap array deployed 22° 43.095'N 158° 2.134'W

0250- Transit 0.5 nm toward center to begin CTD operations

1315- While deploying the CTD it was accidentally brought up into the ceiling causing damage to the bottles and wire termination. Bottle #24 was replaced, both bottom and top caps were replaced on #22, and various bottles were repositioned.

0618- S2C1 PO deep cast

0815- 5m off the bottom 22° 45.06'N 157° 59.832'W

1002- End S2C1

1010- Net Tow

1124- S2C2 1000 m CTD cast, start of the 36 hour burst period

1242- End of cast

1330- ATE

1401- ATE recovered

1405- S2C3 1000 m CTD

1520- End of cast

1512- End of cast S2C3

1659- S2C4 1000 m CTD

1814- End of cast

1825- Transit to pump tanks

2001- S2C5 1000 m CTD

2103- End of cast

2200- Net Tow

2230- End of net tow

2233- Start of second net tow

2307- End of net tow

2315- S2C6 1000 m CTD

June 1, 2014

0015- End of cast

0158- S2C7 1000 m CTD

0303- End of cast

0401- Deploy PP Array 22° 44.864'N 158° 0.934'W

0456- S2C8 1000 m CTD

0559- End of cast

0602- Bilge pump run

0756- S2C9 1000 m CTD

0855- End of cast

1000- Net tow

1056- S2C10 1000 m CTD

1156- End of cast

1200- Net tow

1321- Hyperpro

1411- End of Hyperpro

1414- S2C11 1000 m CTD

1519- End of cast
1657- S2C12 1000 m CTD
1801- End of cast
1810- Transit to PP Array
1920- Recovery of PP Array 22° 41.396'N 158° 1.334'W
1959- S2C13 1000 m CTD
2101- End of cast
2201- Net tow
2240- End of net tow
2258- S2C14 Near bottom CTD cast

June 2, 2014

0036- At 8 m off the bottom 22° 44.821'N 157° 59.586'W
0210- End of cast
0305- AC9/FRRf
0415- End of AC9
0418- AC9/FRRf re-deployed
0520- End of AC9
0530- Transit to Sediment traps
0645- Start Recovery 22° 34.65'N 157° 59.86'W
0730- End of recovery, transit to ALOHA
1000- AC9/FRRf
1103- End of AC9
1104- AC9/FRRf
1154- End of AC9, transit to WHOTS
1210- S52C1 200 m yo-yo
1221- Ship drifting towards buoy, need to re-position. Cast recovered.
1227- S52C1 Re-deployed
1335- End of cast, 4 cycles complete
1340- Transit to ALOHA
1400- Hyperpro
1500- End Hyperpro, transit Kaena
2130- Arrive Station Kaena
2132- S6C1 near bottom CTD
2238- Near bottom, 10 m off 21° 51.351'N 158° 21.64'W
2321- End of cast
2325- Transit to Snug Harbor

June 3, 2014

0715- Entering Honolulu Harbor with two tug escorts.
0745- 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
Stu Goldberg	Nutrient and DOC cycling experiment	UH
Sara Ferrón-Smith	Determination of net community production from the diurnal variability of O ₂ /Argon ratios and water collection for CH ₄ production experiments	UH
Jamie Becker	Prochlorococcus and bacterial vesicle isolations	MIT
Kendra Turk-Kubo	Genomics of prymnesiophyte/cyanobacterial symbiosis	UCSC