

# **HOT-285: Chief Scientist Report**

Chief Scientist: Tara M. Clemente

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

July 10-14, 2016

Cruise ID: **KOK16-08**

Departed: July 10, 2016 at 0829 (HST)

Returned: July 14, 2016 at 0759 (HST)

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

Master of the Vessel: Mike Hoshlyk

OTG Marine Technicians: Jeff Koch 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 July 10th 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 July 10th, 11th, 12th and 13th.
- 3) Station 50, the site of WHOTS-13 Mooring (anchor position 22° 47.24' N, 157° 54.45' W) was to be occupied on July 13th 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 July 13th for approximately 3 hours.

Upon arrival to Station Kahe a ~1300 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 July 10th. 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 a 200 m cast to collect water for the Primary Productivity Array. This cast was to be followed by the deployment of the free-drifting Net Trap to collect sinking particles for 24hrs and 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 July 12th.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on July 12th. The Gas Array was to be recovered on July 13th.

An Automated Trace Element (ATE) sampler was to be deployed to a depth of 10 m on July 12th.

A plankton net was to be towed three times between 1000-1400, and three times between 2200-0200 for 30 minute intervals on July 11th and 12th at Station ALOHA.

The Hyperpro was to be deployed for a half-hour period near ~1400 on July 10th, 11th, and 13th.

An optics package including a Wet Labs AC9, a SeaBird Seacat, Wet Labs Fluorometer, 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 July 13th.

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 July 13th.

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 Pier 35.

The following instruments were to collect data throughout the cruise: shipboard ADCP, thermosalinograph, the underway fluorometer, and the ship's anemometers.

## 2. SCIENCE PERSONNEL

Participant	Title	Affiliation	Citizenship
Susan Curless	Research Associate	UH	USA
Brie Maillot	Technician	UH	USA
Alexa Nelson	Research Associate	UH	USA
Dan Sadler	Research Associate	UH	USA
Brenner Wai	Research Associate	UH	USA
Blake Watkins	Marine Engineer	UH	USA
Greyson Adams	Research Associate	UH/SCOPE	USA
Jim Burkitt	Research Associate	UH/SCOPE	USA
Tara Clemente	Research Associate	UH/SCOPE	USA
Eric Shimabukuro	Research Associate	UH/SCOPE	USA
Robert (Walt) Deppe	Research Associate	UH	USA
Daniel McCoy	Research Associate	UH	USA
Kellen Rosburg	Research Associate	UH	USA
Jefrey Snyder	Marine Technician	UH	USA
Alyssa Agustin	Graduate Student Volunteer	UH	USA
Eint Kyi	Graduate Student	UH	Burma
Gerarda Terlouw	Graduate Student	UH	The Netherlands
Sara Ferron-Smith	Research Scientist	UH	USA
Jeff Koch	Marine Technician	OTG	USA
Steve Tottori	Marine Technician	OTG	USA

## 3. GENERAL SUMMARY

Operations during the cruise were conducted as planned with only minor delays to operations. We arrived at Station ALOHA three hours later than scheduled (0212 on July 11th) due to traffic in Honolulu harbor which delayed our departure by 30 minutes and an increase in transit time resulting from head seas.

The CTD squirt boom was moving slowly during CTD deployment and recoveries due to hydraulic system issues. It failed to extend and/or retract several times during the cruise until additional hydraulic fluid was added to the reservoir delaying recovery for ~15 minutes. These same issues were also reported on HOT 279. The ship reported that the boom is in need of a new hydraulic power unit which has arrived and needs to be installed.

One 1000 m CTD cast was completed at Station Kahe. One 200 m CTD, 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 50) with five cycles completed. One near bottom CTD cast was completed at Station Kaena.

The Sediment Trap, Net Trap, Primary Production, and Gas Array's were 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 ATE was not deployed due to instrument communication errors.

The Hyperpro casts (three cycles each) were successfully conducted three times around the scheduled 1330-1430 time slot on July 10th, 11th, and 13th.

The optical package (AC9/Sea Bird Seacat/ Fluorometer /LISST), was deployed two times during the cruise, once around noon and once in the early morning on July 13th. Both casts were conducted successfully.

The fluorometer, ADCP, thermosalinograph, and the ship's meteorological suite ran without interruption during the cruise.

Winds and seas during the cruise were mostly from the ENE. Wind speeds were ~10-20kts and seas were ~6-10ft. Surface currents were heading in the WSW direction at 0.1-.5kts.

We arrived at Pier 35 for off-loading on July 14th, at 0759 (HST).

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

The R/V *Ka'Imikai-O-Kanaloa* continues to provide good ship support for our work. Captain Mike Hoshlyk and the entire ship's crew showed enthusiasm, concern, and dedication to our scientific mission. A special thank you to John Carlin for fixing the boom hydraulics when needed during our cruise.

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

#### **5. DAILY REPORT OF ACTIVITIES (HST)**

##### **July 10, 2016**

0830- Depart Snug Harbor

0920- Fire and Abandon Ship Drills

0942- Secured from Drills

0945- Safety briefing with the ship's captain

1150- Arrive Station Kahe

1200- Weight cast to 500m

1207- Winch stopped at 89.5 m payout due to problem with winch, engineers called to assess situation

1211- Winch sending down at 15m/min, winch working properly

1214- Winch increasing speed to 60m/min and resuming as normal  
1234- End of weight cast  
1248- Start HyperPro: 21°20.336 N, 158°15.451 W  
1338- End of HyperPro  
1342- Transit back to Kahe  
1401- S1C1 1000m CTD cast  
1514- S1C1 End  
1520- Transit to Station ALOHA

### **July 11, 2016**

0210- Arrive at Station ALOHA, 1nm northwest of center, Start Sediment Trap Deployment  
0300- Sediment Traps released 22°45.810 N, 158°0.551 W  
0320- S2C1 200m CTD  
0350- S2C1 End  
0418- Start Net trap deployment 1nm west of center  
0431- Net trap released 22°45.175 N, 158°1.158 W  
0500- Start PP array deployment, 1nm south of center  
0520- PP array released 22°44.093 N, 158°0.059 W  
0522- Transit to center of Station ALOHA  
0538- S2C2 near bottom CTD  
0729- 9m off the bottom  
0925- S2C2 out of water, squirt boom not working, engineers called to assess the situation  
0934- End S2C2, sent package down to 10m until squirt boom was fixed  
0939- Squirt boom functioning, needed oil  
0942- S2C2 recovered  
1105- S2C3 1000m CTD  
1227- End S2C3  
1244- Net Tow  
1314- Net Tow End  
1335- Start Hyperpro  
1413- End of Hyperpro  
1422- S2C4 1000m CTD  
1528- End S2C4  
1654- S2C5 1000m CTD  
1803- End S2C5  
1815- Transit to PP array  
1940- Recover PP array: 22°42.367 N, 158°3.590 W  
2000- S2C6 1000m CTD, squirt boom would not extend, 15min delay  
2130- End S2C6  
2217- Net tow  
2243- Net tow end  
2246- Net tow  
2315- Net tow end  
2325- S2C7 1000m CTD

### **July 12, 2016**

0033- End S2C7  
0040- Transit to pump tanks  
0159- S2C8 1000m CTD  
0302- End S2C8  
0406- Start Gas Array Deployment  
0426- Gas array released: 22°45.171 N, 158°1.203 W

0455- S2C9 1000m CTD  
0606- End S2C9  
0609- Transit to Net Trap  
0740- Recover Net Trap: 22°41.439 N, 158°8.400 W  
0745- Transit to Station ALOHA  
0825- S2C10 1000m CTD  
0934- End S2C10  
1000- Net tow  
1032- Net tow end  
1050- ATE not deployed, unable to establish communication.  
1059- S2C11 1000m CTD  
1209- End S2C11  
1225- Net tow  
1258- Net tow end  
1400- S2C12 1000 CTD  
1505- End S2C12  
1654- S2C13 1000m CTD;  
1805- Squirt boom wouldn't retract. Rosette sent down to 5m while engineers assess. Squirt boom was low on oil. Problem fixed.  
1813- End S2C13  
1957- S2C14 1000m CTD  
2057- End S2C14  
2155- Net tow  
2231- End Net tow  
2259- S2C15 near bottom CTD: 22°44.78 N, 157°59.926 W

### **July 13, 2016**

0040- 8m off bottom  
0222- End S2C15  
0259- Deploy Optics package, Cast #1  
0403- Optics Cast #2  
0500- Optics package recovered  
0510- Transit to Gas array, 8.6 nm southwest from the center of ALOHA.  
0641- Begin Gas array recovery: 22°39.992 N, 158°7.520 W  
0657- Gas array recovered, transit to sediment traps, 3.1 nm west of gas array.  
0738- Begin sediment trap recovery: 22°39.505 N, 157°10.987 W  
0835- Sediment traps recovered, transit to Station ALOHA  
1000- Deploy Optics package, Cast # 1  
1105- Optics Cast #2  
1157- Optics package recovered  
1200- Transit to WHOTS-13 Buoy  
1206- S50C1 200m Yo-Yo  
1310- End S50C1, 5 cycles complete  
1329- Start Hyperpro  
1402- End of Hyperpro  
1441- Transit Station Kaena  
2104- S6C1 near bottom CTD  
2253- End of cast  
2300- Transit Pier 35

### **July 14, 2016**

0759- Arrive Pier 35

**HOT program sub-components:**

<b>Investigator</b>	<b>Project</b>	<b>Institution</b>
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
<b>Ancillary programs:</b>		
Andrew Dickson	CO <sub>2</sub> dynamics and intercalibration	SIO
Paul Quay	DI <sup>13</sup> C	UW
Matt Church	Diversity and activities of nitrogen-fixing microorganisms	UH
Sam Wilson	Reduced gases in the upper ocean: The cycling of methane, sulfide and nitrous oxide. Surface Seawater collection to be used for a set of nitrogen fixation methods testing experiments back at UH.	UH
Sara Ferrón-Smith	Determination of gross primary production from the euphotic zone in situ, using the drifting primary production array	UH
Virginia Armbrust	SCOPE: Seaflow Underway Flow Cytometer	UW
Dave Caron	SCOPE: DNA collection	USC
Ed DeLong	SCOPE: DNA and Viral DNA collection	UH
Dan Repeta	SCOPE: DOM collection	WHOI
Angelique White	SCOPE: Diazotroph Microscopy	OSU
Tim Burrell	Water Collected for Experiments	UH
Eint Kyi	Net Trap Experiments: to study the remineralization of sinking particles by various bacteria.	UH
Oscar Sosa	Dissolved organic matter sample collection	UH