

# **HOT 295: Chief Scientist Report**

Chief Scientist: Tara M. Clemente

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

August 7-11, 2017

Cruise ID: **KOK17-12**

Departed: August 7, 2017 at 0734 (HST)

Returned: August 11, 2017 at 0730 (HST)

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

Master of the Vessel: Mike Hoshlyk

OTG Marine Technicians: Trevor Young and Julianna Diehl

## **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 7<sup>th</sup> 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 August 8<sup>th</sup>, 9<sup>th</sup>, and 10<sup>th</sup>.
- 3) Station 52, the site of WHOTS-14 Mooring (anchor position 22° 40.0154'N, 157° 57.0915' W) was to be occupied on August 10<sup>th</sup> 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 10<sup>th</sup> for approximately 3 hours.

Upon arrival to Station Kahe a ~370 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 August 7<sup>th</sup>. 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, one 200 m cast to collect water for the Primary Productivity array was to be conducted followed by the deployment of the free-drifting sediment trap array. The Sediment Trap array was to stay in the water for about 56 hours. This 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 Productivity 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 August 9<sup>th</sup>.

The free-drifting Gas array was to be deployed for 24 hours for incubation experiments on August 9<sup>th</sup>.

An Automated Trace Element (ATE) sampler was to be deployed to a depth of 10 m on August 9<sup>th</sup>.

A plankton net was to be towed three times between 1000-1400, and three times between 2200-0200 for 30 minute intervals on August 8<sup>th</sup> and 9<sup>th</sup> at Station ALOHA.

The Hyperpro was to be deployed for a half-hour period near ~1400 on August 7<sup>th</sup>, 8<sup>th</sup>, and 10<sup>th</sup>.

An optics package including a SeaBird Seacat with temperature, conductivity, fluorometer and pressure sensors, 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 on August 10<sup>th</sup>.

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After the optics package and 36 hour burst period of CTD work at Station ALOHA was accomplished, the ship was to transit to recover the Gas array and the Sediment Trap array on the morning of August 10<sup>th</sup>.

After recovering the arrays, , 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 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

<b>Participant</b>	<b>Title</b>	<b>Affiliation</b>	<b>Citizenship</b>
Karin Bjorkman	Research Scientist	UH	Sweden
Lance Fujieki	Research Associate	UH	USA
Eric Grabowski	Research Associate	UH	USA
Donn Viviani	Post- Doc	UH	USA
Brenner Wai	Research Associate	UH	USA
Blake Watkins	Marine Engineer	UH	USA
Tim Burrell	Research Associate	UH	New Zealand
Tara Clemente	Research Associate	UH	USA
Eric Shimabukuro	Research Associate	UH	USA
Ryan Tabata	Research Associate	UH	USA
Andrew King	Research Associate	UH	USA
Svetlana Naratov	Graduate Student	UH	USA
Kellen Rosburg	Research Associate	UH	USA
Jefrey Snyder	Marine Technician	UH	USA
Kelsey Maloney	Undergraduate Student	UH	USA
Ian Van Buskirk	Research Intern	UH	USA
Gerarda Terlouw	Post Graduate Trainee	UH	The Netherlands
Chris Follett	Research Scientist	MIT	USA
Julianna Diehl	Marine Technician	OTG	USA
Trevor Young	Marine Technician	OTG	USA

## 3. GENERAL SUMMARY

Operations during the cruise were conducted as planned with modifications to the schedule. Departure from Pier 35 was on time and operations at Station Kahe were completed successfully with the exception of the HyperPro.

We experienced connectivity issues with the Hyperpo at Station Kahe. The data connection appeared intermittent, due to a faulty connector and when the connectivity cable was lightly touched the power would turn on and off rapidly. We conducted the Hyperpro despite connectivity issues, however the data discard bytes were high and the PAR profile appeared step-like. We tried conducting a second Hyperpro on August 8<sup>th</sup> at

Station ALOHA and experienced the similar issues. The HyperPro was deemed unfixable at sea and will be sent in to Sat Altantic for repairs before the October HOT cruise.

Winds from the ENE at 10kts and 3-4 ft seas were present during transit to Station ALOHA after passing Kaena Point. We arrived at Station ALOHA 2 hours earlier than scheduled (2347 on August 7<sup>th</sup>).

Upon arriving at Station ALOHA, we successfully deployed the Sediment trap array after complications with ship operations and loss of power, conducted a CTD cast for the primary production in situ incubation array and successfully deployed the Primary Production Array. The deep cast was conducted successfully and the 36-hour CTD period began on schedule.

On August 10<sup>th</sup> following the 36hr burst period and optics cast, we headed to recover the Gas array and Sediment Trap arrays.

After the recovery was complete we then steam towards the WHOTS mooring, (Station 52) to conduct the final CTD cast of the cruise.

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 52) with five cycles completed. One 2500m cast was completed at Station Kaena.

The Primary Production, Sediment Trap, and Gas arrays 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 conducted successfully on August 9<sup>th</sup>.

The optical package (Sea Bird Seacat/ Fluorometer /LISST), was deployed once in the early morning on August 10<sup>th</sup>. Three 200m cast was conducted successfully.

The ADCP, underway fluorometer and the ship's meteorological suite ran without interruption during the cruise. The ships thermosalinograph had to be switched towards the end of the cruise.

Winds during the cruise were mostly from the ENE with speeds of 15-20 kts. The seas were NE at 3-6 ft.

We arrived at Pier 35 for off-loading on August 11th, at 0730 (HST).

The following operations were cancelled or delayed due problems with equipment:

1. HyperPro casts were cancelled after experiencing connectivity issues with the instrument.

The following operations were cancelled or delayed due problems with ship and/or maneuvering:

1. Sediment trap deployment took approximately 2 hours due to propulsion failure.

The following were problems experienced with ships equipment:

1. Thermosalinograph malfunctioned and was switched out towards the end of the cruise.

#### 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. Ship handling was good; however there still seems to be some difficulty holding station when a CTD cast is in the water.

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

## 5. DAILY REPORT OF ACTIVITIES (HST)

### **August 7, 2017**

0734 Depart Pier 35

0801 Fire and Abandon Ship Drills

0815 Safety Briefing

0830 Secured from Drills

1025 Arrive Station Kahe

1030 Weight cast to 500m

1110 End of weight cast

1115 Start HyperPro; connectivity issues conducted 2 casts and 1 yoyo cast, but data was intermittent.

1210 End of HyperPro

1217 S1C1 1000m CTD cast

1345 S1C1 End

1350 Transit to Station ALOHA

2347 Arrive at Station ALOHA

### **August 8, 2017**

0020 Start Sediment Trap array deployment, 4nm southwest of center

0106 Experience engine issues during deployment

0127 Engine issues resolved, deployment resumed.

0208 Sediment Trap array released: 22°42.040 N, 158°02.713 W

0210 Transit, 2nm southwest of center

0241 S2C1 200m CTD cast

0305 S2C1 End

0438 Start Primary Production array deployment

0500 Primary Production array released: 22°44.34 N, 158°01.83 W

0501 Transit to Station ALOHA, Center

0520 Arrive at Station ALOHA, Center

0545 S2C2 near bottom CTD

0751 S2C2 bottom depth 4799db, 5m off bottom

0955 S2C2 End

1125 S2C3 1000m CTD

1230 S2C3 End

1240 Net tow

1330 Net tow end

1335 Start HyperPro

1355 End HyperPro Cast #1, had to recover and relocate away from PP array

1407 Start HyperPro Cast #2, ended cast early due to connectivity issues

1415 End of HyperPro

1442 S2C4 1000m CTD

1551 S2C4 End

1656 S2C5 1000m CTD

1808 End S2C5  
1810 Transit to recover PP array  
1858 Begin PP array recovery: 22°47.38 N, 157°59.44 W  
1943 PP array recovered  
1955 S2C6 1000m CTD  
2107 End S2C6  
2205 Net tow  
2230 Net tow end  
2235 Net tow  
2305 Net tow end  
2307 S2C7 1000m CTD

**August 9, 2017**

0013 End S2C7  
0015 Transit to pump tanks  
0157 S2C8 1000m CTD  
0303 End S2C8  
0315 Transit to deploy Gas Array, 2 miles east of center  
0400 Start Gas Array deployment  
0430 Gas Array released: 22°44.95 N, 157°57.62 W  
0500 S2C9 1000m CTD  
0610 End S2C9  
0755 S2C10 1000m CTD  
0910 End S2C10  
1005 Deploy ATE  
1035 Recover ATE  
1100 S2C11 1000m CTD  
1155 End S2C11  
1210 Net tow  
1250 Net tow end  
1300 Net tow  
1335 Net tow end  
1407 S2C12 1000m CTD  
1506 End S2C12  
1659 S2C13 1000m CTD  
1810 End S2C13  
2002 S2C14 1000m CTD  
2100 End S2C14  
2200 Start Net tow  
2237 End Net tow  
2300 S2C15 near bottom CTD

**August 10, 2017**

0054 S2C15 3m off bottom; 22°45.291 N, 158°0.035 W  
0225 End S2C15  
0310 Deploy Optics package, three casts  
0500 Optics package recovered  
0505 Transit to recover Gas Array  
00615 Begin Gas Array Recover: 22°52.58 N, 157°52.14 W  
0645 Gas Array Recovered  
0648 Transit to the Sediment Trap Array

0744 Begin Sediment Trap Recovery: 22°35.15 N, 158°23.16 W  
0840 Sediment Trap Array Recovered  
0842 Transit to Station 52, WHOTS-14 buoy  
1030 Arrive WHOTS-14 buoy, due W of mooring  
1035 S50C1 200m Yo-Yo, 400m CTD  
1155 End S52C1, 5 cycles complete  
1205 Transit to Kaena  
1845 Arrive Station Kaena  
1902 S6C1 near bottom CTD  
2001 S6C1 8m off bottom; 21°50.857 N, 158°20.929 W  
2057 End S6C1  
2100 Transit to Honolulu

**August 11, 2017**

0730 Arrive Honolulu Harbor, Pier 35

**HOT program sub-components:**

<b>Investigator</b>	<b>Project</b>	<b>Institution</b>
Dave Karl	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
Matthew McCarthy Tom Guilderson	Sediment trap samples to look at amino acid-based paleo proxies to examine propagation of exported production into coral polyps and skeletons.	UCSC
Matt Church	Diversity and activities of nitrogen-fixing microorganisms	UM/FLBS
Sam Wilson	Reduced gases in the upper ocean: The cycling of methane, sulfide and nitrous oxide.	UH
Sara Ferrón-Smith	Determination of gross primary production from the euphotic zone in situ, using the drifting primary production array	UH
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
Chris Follett	SCOPE: Measuring Nitrogen Fixation from Diel Fluctuations in Stoichiometry	MIT