# HOT 292: Chief Scientist Report

Chief Scientist: Dan Sadler
Chief Scientist At-Sea: Tara Clemente
R/V *Ka'Imikai-O-Kanaloa*
April 24-28, 2017

Cruise ID: **KOK17-07**
Departed: April 24, 2017 at 0724 (HST)
Returned: April 28, 2017 at 0901 (HST)
Vessel: **R/V *Ka'Imikai-O-Kanaloa***
Master of the Vessel: Mike Hoshlyk
OTG Marine Technicians: Sonia Brugger and Trevor Young

## 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 April 24th 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 April 25$^{th}$, 26$^{th}$ , and 27$^{th}$.
3) Station 50, the site of WHOTS-13 Mooring (anchor position 22° 47.24' N, 157° 54.45' W) was to be occupied on April 27$^{th}$ 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 April 27$^{th}$ for approximately 3 hours.

Upon arrival to Station Kahe a 350 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 April 24$^{th}$. 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 sediment trap array was to be deployed and remain in the water for about 56 hours followed by a CTD cast to 1000 m cast to collect water for the Primary Productivity array. 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 April 26$^{th}$.

Two additional free-drifting arrays (Net Trap array and Gas array) were to be deployed for 24 hours for incubation experiments on April 29$^{th}$.

An Automated Trace Element (ATE) sampler was to be deployed to a depth of 10 m on April 26$^{th}$.

A plankton net was to be towed three times between 1000-1400, and three times between 2200-0200 for 30 minute intervals on April 26$^{th}$ and 27$^{th}$ at Station ALOHA.

The Hyperpro was to be deployed for a half-hour period near ~1400 on April 24$^{th}$, 25$^{th}$, and 27$^{th}$.

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 April 27th.

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 floating Net Trap array, Gas array, and the Sediment Trap array on the morning of April 27th.

After recovering the arrays, 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.

Seaglider (sg626) was to be recovered near Station ALOHA as conditions and schedule permit.

## 2. SCIENCE PERSONNEL

| Participant | Title | Affiliation | Citizenship |
|---|---|---|---|
| Alexa Nelson | Research Associate | UH | USA |
| Karin Björkman | Research Specialist | UH | Sweden |
| Blake Watkins | Marine Engineer | UH | USA |
| Tim Burrell | Research Associate | UH | New Zealand |
| Tara Clemente | Research Associate | UH | USA |
| Morgan Linney | Graduate Student | UH | USA |
| Paul Den Uyl | Research Associate | UH | USA |
| Eint Kyi | Graduate Student | UH | Myanmar |
| 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 |
| Gerarda Terlouw | Post Graduate Trainee | UH | The Netherlands |
| Emily Townsend | Research Associate | UH | USA |
| Alyssa Augustin | Graduate Student | UH | USA |
| Sonia Brugger | Marine Technician | OTG | USA |
| Trevor Young | Marine Technician | OTG | USA |

## 3. GENERAL SUMMARY

Operations during the cruise were conducted as planned with slight modifications at the end of the cruise to recover the sea glider, repair an anemometer on the WHOTS buoy and accommodate decreased cruising speed due to the loss of the port generator.

Departure from Pier 35 was delayed a half hour due to science party arrivals and operations at Station Kahe were completed successfully. Arrival at Station ALOHA was a half hour earlier than scheduled (2351 on April 24th). Upon arrival at Station ALOHA the sediment traps were deployed 2 nm south of station center. They drifted westward during the cruise. One 1000 m cast to collect water for the Primary Productivity array was completed and the PP array was deployed. The ship moved to station center where the deep cast was conducted successfully and the 36-hour CTD period began on schedule.

The rest of the cruise proceeded as scheduled with the exception of cancelling Station Kaena due to the diminished cruising speed from loss of the port generator.

One 1000 m CTD cast was completed at Station Kahe, two near bottom CTD casts and eleven 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 four cycles completed.

The Primary Production, Sediment Trap, and Net Trap 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.

Three Hyperpro casts (three cycles each) were successfully conducted two times around the scheduled 1330-1430 time slot on April 24th ,25th, and 26th.

The ATE was cancelled prior to sailing due to poor instrument communication.

The optical package (Sea Bird Seacat/ Fluorometer /LISST), was deployed once in the early morning on April 27th. The cast was conducted successfully.

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

Sea Glider sg626 was successfully recovered using the ship's small boat.

Fair weather and seas at Station 50 allowed small boat operations to repair an anemometer on the WHOTS buoy.

Winds during the cruise were mostly from the E and NE with speeds of 12-18 kts. The seas were 3-5ft with a westerly current.

We arrived at Pier 35 for off-loading on April 28th, at 0901 (HST).

Tara Clemente acted as chief scientist during the cruise as Dan Sadler was not able to sail due to illness.

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

1. None

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

1. Station Kaena was cancelled due to loss of port generator slowing cruising speed to 6 kts.

*The following were problems experienced with ships equipment:*

1. Squirt boom sheave was making unusual noises below 4000 m. Engineering stated is was due to be repaired/replaced.

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. The ship demonstrated marked improvement over the previous 2 cruises in maintaining appropriate wire angles during CTD and back deck operations.

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)

April 24, 2017

0724 Depart Pier 35
0736 Safety Briefing
0750 Fire and Abandon Ship Drills
0815 Secured from Drills
1043 Arrive Station Kahe
1049 Weight cast to 500m
1114 End of weight cast
1136 Start HyperPro
1124 End of HyperPro
1246 S1C1 1000m CTD cast
1346 S1C1 End
1350 Transit to Station ALOHA
2351 Arrive at Station ALOHA

April 25, 2017

0002 Start Sediment Trap array deployment, 2 nm south of center
0032 Sediment Trap array released: 22°43.23 N, 158°0.48 W
0158 S2C1 1000m CTD cast
0259 S2C1 End
0410 Start Primary Production array deployment
0432 Primary Production array released: 22°44.19 N, 157°57.75 W
0450 Arrive at Station ALOHA, Center
0503 S2C2 near bottom CTD
0701 S2C2 bottom depth 4799db, 5m off bottom
0854 S2C2 End
1105 S2C3 1000m CTD
1223 S2C3 End
1230 Net tow
1308 Net tow end
1315 Start HyperPro
1350 End of HyperPro
1410 S2C4 1000m CTD
1508 S2C4 End

1657 S2C5 1000m CTD
1807 End S2C5
1810 Transit to recover PP array
1919 Begin PP array recovery: 22°44.69 N, 158°09.32 W
1933 PP array recovered
2012 S2C6 1000m CTD
2123 End S2C6
2204 Net tow
2230 Net tow end
2234 Net tow
2304 Net tow end
2310 S2C7 1000m CTD

April 26, 2017

0011 End S2C7
0155 S2C8 1000m CTD
0256 End S2C8
0304 Start Net Trap deployment
0330 Net Trap released: 22°45.383 N, 158°01.931 W
0400 Start Gas Array deployment
0420 Gas Array released:  22°43.40 N, 158°01.99 W
0500 S2C9 1000m CTD
0558 End S2C9
0802 S2C10 1000m CTD
0855 End S2C10
1105 S2C11 1000m CTD
1202 End S2C11
1207 Net tow
1235 Net tow end
1241 Net tow
1308 Net tow end
1315 Start HyperPro
1400 End of HyperPro
1409 S2C12 1000m CTD
1508 End S2C12
1653 S2C13 1000m CTD
1810 End S2C13
1952 S2C14 1000m CTD
2056 End S2C14
2207 Start Net tow
2234 End Net tow
2256 S2C15 near bottom CTD

April 27, 2017

0057 S2C15 8m off bottom; 22°45.5622 N, 158°0.5312 W
0241 End S2C15

0300 Deploy Optics package, three casts
0442 Optics package recovered
0445 Transit to recover Gas Array
0640 Begin Gas Array Recover: 22°45.713 N, 158°17.794 W
0700 Gas Array Recovered
0701 Transit to recover Net Trap Array
0720 Net Trap Closed
0740 Net Trap Recovered: 22°45.76 N, 158°18.82 W
0745 Transit to the Sediment Trap Array
0904 Begin Sediment Trap Recovery: 22°35.15 N, 158°23.16 W
0930 Sediment Trap Array Recovered
0932 Transit to recover Sea Glider sg626
1210 Sea Glider sg626 recovered: 22°47.347 N, 158°06.906 W
1230 Transit to Station 50, WHOTS-13 buoy
1345 Port generator secured due to cracked piston liner – Inoperable
for the remainder of cruise.
1430 Arrive WHOTS-13 buoy
1432 S50C1 200m Yo-Yo, 500m CTD
1530 End S50C1, 4 cycles complete
1630 Replaced wind vane #703 on WHOTS mooring via small boat operation
1731 Transit to HNL at approx. 6 kts due to secured port generator

April 28, 2017

0830 Post Cruise Meeting held aboard KOK
0901 Arrive Pier 35

**HOT program sub-components:**

| Investigator | Project | Institution |
|---|---|---|
| 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 |
| **Ancillary programs:** | | |
| Andrew Dickson | $CO_2$ dynamics and intercalibration | SIO |
| Paul Quay | $DI^{13}C$ | UW |
| Matthew McCarthy<br>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, Underway C-STAR | OSU |
| Eint Kyi | Investigating the microbial activity and diversity involved with sinking particles at Station ALOHA, Net Trap array deployment | UH |
| Danielle Hull | S-LAB Nutrient Reference Water Collection | UH |