# HOT 304: Chief Scientist Report

Chief Scientist: Dan Sadler
R/V *Ka'Imikai-O-Kanaloa*

Cruise ID: **KOK18-07**
Departed: July 23, 2018 at 0700 (HST)
Returned: July 27, 2018 at 0755 (HST)
Vessel: **R/V *Ka'Imikai-O-Kanaloa***
Master of the Vessel: Ross Barnes
OTG Marine Technicians: Jeff Koch and Steve Tottori

## 1. SCIENTIFIC OBJECTIVES

The objective of the cruise is to maintain a collection of hydrographic and biogeochemical data at the Hawaii Ocean Time-series (HOT) stations. Three stations will be occupied and during the cruise along with the recovery of the deep moored traps, events will occur in the following order:

1) Station 1, referred to as Station Kahe, is located at 21° 20.6'N, 158° 16.4'W and will be occupied on July 23rd for about 2 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 will be occupied July 26$^{4h}$ – 26th.
3) Station 52, the site of WHOTS-14 Mooring (anchor position 22° 40.01'N 157° 57.09'W) will be occupied on for about one hour on July 26th.
4) Station 6, referred to as Station Kaena, is located off Kaena Point at 21° 50.8'N, 158° 21.8'W and will be occupied on July 26th for about 2 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 23th. 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, a 1000 m CTD cast for preparation of the Primary Productivity Array was to be conducted followed by deployment of the WireWalker and the free-drifting sediment trap array. These two arrays were to stay in the water for about 54 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 Production Array centered over Station ALOHA, 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 25th.

The lowered-ADCP was to collect current measurements on down- and up-cast. The LADCP, operating in single ping at 4 Hz, was to record measurements internally and data was to be downloaded after each cast via RS422 connection.

The free-drifting Gas array was to be deployed for 24 hours for incubation experiments on July 25$^{h}$.

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

The Hyperpro was to be deployed for a half-hour period near ~1400 on July 23th, 24th, and 26th.

An optics package including a package consisting of 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 July 26th.

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, the WireWalker and the Sediment Trap array on the morning of July 26th.

After recovering the arrays, , the ship was to transit to Station 52 to conduct a one-hour 200 m CTD yo-yo cast. The ship was to remain 0.25 nm, downwind and down current from Station 52, after completion of the CTD yo-yo to gather one hour of shipboard ADCP for comparison to WHOTS-14 ADCP data. Once operations at Station 52 were complete, the ship was to re-position within Station ALOHA to conduct a Hyperpro cast.

The ship was to proceed to Station 6 (Kaena) and perform a near bottom CTD cast then transit back to Honolulu Harbor, Pier 35.

The following instruments were to collect data throughout the cruise: shipboard ADCP, thermosalinograph, underway fluorometer, transmissometer, the meteorological package.

## 2. SCIENCE PERSONNEL

| **Participant** | **Title** | **Affiliation** | **Citizenship** |
|---|---|---|---|
| Karin Björkman | Scientist | UH | Sweden |
| Kendra Brooks | Research Associate | UH | USA |
| Macarena Burgos | Scientist | UCádiz | Spain |
| Robert Cacace | Student –Volunteer | Stockton University | USA |
| Carolina Funkey | Research Associate | UH | USA |
| Svetlana Naratov | Graduate Student | UH | USA |
| Dan Sadler– Chief Scientist | Research Associate | UH | USA |
| Fernando Santiago-Mandujano | Research Associate | UH | USA |
| Eric Shimabukuro | Research Associate | UH | USA |
| Michelle Smith | Biology Lecturer –Volunteer | WCC | USA |
| Jefrey Snyder | Marine Technician | UH | USA |
| Ryan Tabata | Research Associate | UH | USA |
| Kellie Teague | Graduate Student –Volunteer | HPU | USA |
| Ksenia Trifonova | Research Assistant | UH | Germany |
| Blake Watkins | Marine Engineer | UH | USA |
| Fernanda Henderikx Freitas | Scientist | UH | Brazil |
| Jeff Koch | Marine Technician | OTG | USA |
| Steve Tottori | Marine Technician | OTG | USA |

## 3. GENERAL SUMMARY

All operations were completed at Station Kahe. Upon arrival at Station ALOHA, the WireWalker, sediment traps and primary production array were deployed and drifted slowly southwestward.

One 1000 m CTD cast was completed at Station Kahe. Two near bottom CTD casts, twelve 1000 m CTD casts, and one 200m CTD cast were conducted at Station ALOHA. One 5 cycle yoyo CTD cast to 200 m was completed near the WHOTS mooring (Station 52). A near bottom CTD cast was completed at Station Kaena.

Six net tows for the core HOT zooplankton collection were completed successfully; Three during the day and two during the night. The gas array was deployed and recovered.

All work was completed at Station 52 (WHOTS) and Station 6 (Kaena).

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

Winds during the cruise were mostly from the NE with speeds of 10-18 kts. The seas were 2-5 ft.

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

This was her last HOT cruise aboard the R/V *Ka'Imikai-O-Kanaloa*. We thank her for her many years supporting the HOT program. We also appreciate the support from Captain Barnes and the ship's crew as they provided us with a picture perfect cruise.

Technical support during this cruise was very good. OTG personnel were available to assist in our work during the cruise.

## 5. DAILY REPORT OF ACTIVITIES (HST)

23 July 2018

0712 Depart Pier 35
0730 Safety and Abandon Ship Drills
0800 Safety and Science Meeting
1020 Arrive St. Kahe
1023 Weight cast to 500 m
1113 Hyperpro
1224 Begin S1C1 CTD to 1000m
1329 End cast
1340 Transit to ALOHA

24 July 2018

0005 Apex float deployed at 22° 35.49'N, 158° 02.95'W
0130 Begin S2C1 CTD to 200m
0205 End cast
0320 Deployed Wirewalker at 22° 6.23'N, 158° 01.79'W
0430 Deployed sediment traps at 22° 47.04'N, 158° 03.01'W
0530 Deploy PP array at 22° 45.12'N, 158° 01.83'W
0555 Begin S2C2 near bottom CTD cast
0926 End cast
1106 Begin S2C3 1000m CTD
1227 End cast

1235 Net Tow
1310 Hyperpro
1412 Begin S2C4 1000m CTD
1516 End cast
1708 Begin S2C5 1000m CTD
1816 End cast
1817 Transit to PP array
1927 PP array recovered at 22° 44.02'N, 158° 04.09'W
2004 Begin S2C6 1000m CTD
2112 End cast
2200 Net Tow
2233 Net Tow
2313 Begin S2C7 CTD 1000m CTD

25 July 2018

0009 End cast
0156 Begin S2C8 CTD 1000m CTD
0303 End cast
0427 Gas array deployed at 22° 45.24'N, 157° 59.74'W
0447 Begin S2C9 CTD 1000m CTD
0610 End cast
0755 Begin S2C10 CTD 1000m CTD
0855 End cast
0908 Transit to pump tanks
1106 Begin S2C11 CTD 1000m CTD
1159 End cast
1203 Net tow
1240 Net tow
1354 Begin S2C12 CTD 1000m CTD
1503 End cast
1700 Begin S2C13 CTD 1000m CTD
1808 End cast
2000 Begin S2C14 CTD 1000m CTD
2058 End cast
2200 Net Tow
2258 Begin S2C15 CTD near bottom CTD

26 July 2018

0222 End cast – kink in wire
0306 Optics Cast package 1
0438 Optics Cast package 2
0518 Transit to Gas Array
0634 Begin Gas Array recovery
0640 Gas Array on board at 22° 41.93'N, 158° 04.64'W
0745 Begin Sediment Trap recovery
0804 Sediment trap array on board at 22° 41.66'N, 158° 11.40'W
0935 WireWalker recovered and on board at 22° 40.29'N, 158° 12.77'W
1207 Begin S52C1 CTD 200m 5 cycle yo-yo

1323 End cast
1336 Hyperpro
1414 Transit to Kaena
2140 Begin S6C1 CTD to near bottom
2335 End cast
2340 Transit to Honolulu

27 July 2018

0755 Arrive Pier 35
0815 Post-cruise meeting

**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: Protistan biodiversity, tropic activities, culturing | USC |
| Ed DeLong | SCOPE: DNA and Viral DNA collection,<br>Single cell genomic flow cytometry sample collection | UH |
| Dan Repeta | SCOPE: DOM collection | WHOI |
| Angelique White | SCOPE: C-STAR,<br>IFCB and LISST to record nano-plankton special diversity | OSU |
| Grieg Steward | Three dimensional model system of mixotrophic Phytoplankton, its prey and a giant virus infecting them | UH |
| Dave Karl | Mixing Experiment | UH |
| Karin Bjorkman &<br>Sara Ferrón-Smith | Comparison of 14C-assimilation and gross O2 production, and effects on respiration at different light intensities. | UH |