HOT 303: Chief Scientist Report

Chief Scientist: Dan Sadler
R/V *Ka'Imikai-O-Kanaloa*
June 25-29, 2018

Cruise ID: **KOK18-04**
Departed: June 25, 2018 at 0712 (HST)
Returned: June 29, 2018 at 1020 (HST)
Vessel: **R/V *Ka'Imikai-O-Kanaloa***
Master of the Vessel: Mike Hoshlyk
OTG Marine Technicians: Rob Palomares, Rory O'Connell

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 June 25th 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 June 26th – 28th.
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 June 28th.
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 June 28th 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 June 25th. 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 June 27th.

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 June 27h.

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

The Hyperpro was to be deployed for a half-hour period near ~1400 on June 25th, 26th, and 28th.

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 June 28th.

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 June 28th.

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**
Eric Grabowski	Research Associate	UH	USA
Dan Sadler– Chief Scientist	Research Associate	UH	USA
Karin Björkman	Scientist	UH	Sweden
Blake Watkins	Marine Engineer	UH	USA
Kendra Brooks	Research Associate	UH	USA
Kellen Rosburg	Research Associate	UH	USA
Ryan Tabata	Research Associate	UH	USA
Svetlana Natarov	Research Assistant	UH	USA
Ksenia Trifonova	Research Assistant	UH	Germany
Jefrey Snyder	Marine Technician	UH	USA
Macarena Burgos	Scientist	UCádiz	Spain
Tim Burrell	Research Assistant	UH	New Zealand
Frank Pavia	Graduate Student	LDEO	USA
Alan Seltzer	Graduate Student	UCSD	USA
Kate Feloy	Graduate Student	UH	USA
Kun Ma	Graduate Student	UGA	China
Eric Klingberg	Undergraduate Student	UH	USA
Rob Palomeres	Marine Technician	OTG	USA
Rory O'Connell	Marine Technician	OTG	USA

3. GENERAL SUMMARY

All operations were completed at Station Kahe, though issues with the level wind on the CTD winch required additional time on station to remove overwraps of the wire on the drum. Upon arrival at Station ALOHA, the WireWalker, sediment traps and primary production array were deployed and drifted slowly southwestward.

Due to the late arrival, one cast was dropped to remain on the 3 hour CTD schedule. 2 net tows, the Hyperpro and Optics cast were cancelled due to high winds and rough seas.

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

One 1000 m CTD cast was completed at Station Kahe. Two near bottom CTD casts, nine 1000 m CTD casts, and one 200m CTD cast were conducted at Station ALOHA. One 4 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.

Seagliders 626 and 148 were recovered in difficult conditions.

Five 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. The sediment trap samples were compromised during recovery in rough conditions when they spilled solution due to the extreme wire angle and getting dunked by a large wave. PUR samples were not collected due to dropping one cast to stay on schedule.

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 18-28 kts. The seas were 6-8 ft.

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

The R/V *Ka'Imikai-O-Kanaloa* continues to maintain very good ship support for our work. Captain Hoshlyk and the ship's crew showed flexibility, enthusiasm, concern, and dedication to our scientific mission.

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)

25 June 2018

0712 Depart Pier 35
0800 Safety and Abandon Ship Drills
0830 Safety and Science Meeting
1020 Arrive St. Kahe
1037 Weight cast to 1000 m – overwraps had to be cleared and level wind adjusted
1225 Hyperpro
1343 Begin S1C1 CTD to 1000m
1515 End cast
1520 Transit to ALOHA

26 June 2018

0324 Begin S2C1 CTD to 200m
0358 End cast
0412 Deployed Wirewalker at 22° 45.56'N, 158° 02.02'W
0512 Deployed sediment traps at 22° 46.92'N, 158° 02.87'W

0541 Deploy PP array at 22° 48.09'N, 158° 02.72'W
0649 Begin S2C2 near bottom CTD cast
1024 End cast
1159 Net tow 1
1300 Begin S2C3 1000m CTD
1454 End cast
1652 Begin S2C4 1000m CTD
1812 End cast
1815 Transit to PP array
1914 PP array recovered at 22° 46.99'N, 158° 03.20'W
1956 Begin S2C5 1000m CTD
2130 End cast
2209 Net tow 2
2229 Net tow 3
2329 Begin S2C6 1000m CTD

27 June 2018

0031 End cast
0153 Begin S2C7 CTD 1000m CTD
0256 End cast
0407 Begin gas array deployment at 22° 45.16'N, 158° 02.10'W
0430 End deployment at 22° 45.44'N, 158° 02.20'W
0506 Begin S2C8 CTD 1000m CTD
0620 End cast
0813 Begin S2C9 CTD 1000m CTD
0921 End cast
0922 Transit to pump tanks
1115 Begin S2C10 CTD 1000m CTD
1210 End cast
1231 Net tow 4
1305 Net tow 5
1403 Begin S2C11 CTD 1000m CTD
1517 End cast
1654 Begin S2C12 CTD 1000m CTD
1819 End cast
2001 Begin S2C13 CTD 1000m CTD
2116 End cast
2256 Begin S2C14 CTD near bottom CTD

28 June 2018

0236 End cast – kink in wire – new termination required to proceed with CTD casts
0550 Begin Gas Array recovery
0628 Gas Array on board at 22° 42.60'N, 158° 05.03'W
0741 Begin Sediment Trap recovery
0804 Sediment trap array on board at 22° 43.38'N, 158° 10.22'W – traps comprised during recovery due to heavy seas and drastic wire angle.
0848 WireWalker recovered and on board at 22° 40.14'N, 158° 10.44'W

1130 Recovered Seaglider 626 at 22° 45.90'N, 157° 57.97'W
1130 Recovered Seaglider 148 at 22° 46.16'N, 157° 57.75'W
1327 Begin S52C1 CTD 200m 4 cycle yo-yo
1428 End cast
2206 Begin S6C1 CTD to near bottom

29 June 2018

0009 End cast
1020 Arrive Pier 35
1050 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 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, Single cell genomic flow cytometry sample collection	UH
Dan Repeta	SCOPE: DOM collection	WHOI
Angelique White	SCOPE: C-STAR, 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 & Sara Ferrón-Smith	Comparison of 14C-assimilation and gross O2 production, and effects on respiration at different light intensities.	UH

Kun Ma & Jay Brandes	DIC Photoproduction in Oceanic Waters	UGA
Frank Pavia & Alan Seltzer	First Oceanic Profiles of Dissolved Xe and Kr Isotopes	LDEO SIO