HOT 293: Chief Scientist Report

Chief Scientist: Dan Sadler
R/V *Ka'Imikai-O-Kanaloa*
May 22-26, 2017

Cruise ID: **KOK17-10**
Departed: May 22, 2017 at 0750 (HST)
Returned: May 26, 2017 at 0943 (HST)
Vessel: **R/V *Ka'Imikai-O-Kanaloa***
Master of the Vessel: Mike Hoshlyk
OTG Marine Technicians: Sonia Brugger and Rob Palomares

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 May 22nd 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 May 23rd, 24th , and 25th.
3) Station 50, the site of WHOTS-13 Mooring (anchor position 22° 47.24' N, 157° 54.45' W) was to be occupied on May 25th for about one hour.
4) Deep Trap Deployment Site (22° 51'N, 157° 54'W) was to be occupied for approximately 3 hours on May 25th.

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 May 22nd. 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 May 24th.

There were issues with rosette bottle 13 closing on casts S2C2, S2C3 and S2C12. Post cruise salt analysis indicate mistrips on these casts. The pylon latch was replaced after S2C12 and no further problems were encountered.

The free-drifting gas array was to be deployed for 24 hours for incubation experiments on May 24th.

An Automated Trace Element (ATE) sampler was to be deployed to a depth of 10 m on May 24th.

A plankton net was to be towed three times between 1000-1400, and three times between 2200-0200 for 30 minute intervals on May 23rd and 24th at Station ALOHA.

The Hyperpro was to be deployed for a half-hour period near ~1400 on May 22nd, 23rd, and 24th.

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 May 25th.

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 May 25th.

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 proceed to the Deep Trap Deployment site to deploy the deep moored sediment traps

After the deep trap deployment was 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
Dan Sadler	Research Associate	UH	USA
Brenner Wai	Research Associate	UH	USA
Karin Björkman	Research Specialist	UH	Sweden
Blake Watkins	Marine Engineer	UH	USA
Tara Clemente	Research Associate	UH	USA
Morgan Linney	Graduate Student	UH	USA
Eric Shimabukuro	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
Sonia Brugger	Marine Technician	OTG	USA
Rob Palomares	Marine Technician	OTG	USA
Kyle Aukai	Student	UH	USA
Antonio Miranda	Student	UH	USA
Casey Ching	Graduate Student	UH	USA

3. GENERAL SUMMARY

Operations during the cruise were conducted as planned with slight delays on the last day picking up the floating arrays. The gas array recovery was delayed when it got caught in the rudder post and time was spent looking for the missing sediment trap gear. As the floating arrays had drifted over 30 miles from the WHOTS site, the extended transit time required shortening the WHOTS cast to 3 cycles to insure enough time for the deep trap deployment.

The cruise departed Pier 35 at 0750, a slight delay as we waited for a volunteer to show up. They were not able to attend so the cruise proceeded without them. Operations at Station Kahe were completed successfully. The transit to Station ALOHA was slowed due to wind and seas. Arrival was later than scheduled (0145 on May 23rd). 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.

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

The Primary Production array was successfully deployed and recovered on May 23rd.

The Gas Array was successfully deployed and recovered, though the upper floats and line caught on the rudder post during recovery resulting in a 2 hour delay while it was all sorted out.

The Sediment Trap array was lost along with the SeapHOx. We were able to track and recover the communications buoy which had been detached from the rest of the array.

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 May 22nd ,23rd, and 24th.

The ATE successfully collected a sample on May 24th.

The optical package (Sea Bird Seacat/ Fluorometer /LISST), was deployed once in the early morning on May 25th. Two of the 200m yoyo cast were completed. A third yoyo was aborted due to concern over grinding noises emanating from the capstan.

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

Winds during the cruise were mostly from the E and NE with speeds of 18-25 kts. The seas were 6-8 ft with a westerly current.

We arrived at Pier 35 for off-loading on May 26th, at 0943 (HST).

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

1. A third Optics cast yoyo was cancelled due to noise in the capstan.

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

1. Recovery of the floating gas array was slowed due to entanglement with the ships rudder post.

The following were problems experienced with ships equipment:

1. None

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 maintained appropriate wire angles during CTD and back deck operations.

Technical support during this cruise was very good. The OTG personnel were available at any time to assist in our work during the cruise. They were especially helpful in communicating wire angle during back deck operations.

5. DAILY REPORT OF ACTIVITIES (HST)

May 22, 2016

0750 Depart Pier 35
0815 Safety/OTG/Science Meeting
0840 Fire Drill
1100 Weight Cast to 500 m
1145 Hyperpro cast at 21° 20.61' N 158° 16.42' W
1235 S1C1 ctd cast to 1000 m
1405 Transit to ALOHA

May 23, 2015

0145 Arrive ALOHA, Begin Sediment Trap Deployment
0231 Sediment Traps released at 22° 45.34' N, 158° 02.67' W
0250 S2C1 ctd cast to 1000 m
0510 Primary Production Array deployed at 22° 45.41' N, 158° 01.89' W
0600 S2C2 ctd cast to near bottom
1130 S2C3 ctd cast to 1000 m
1300 Net tow
1340 Hyperpro cast at 22° 45.22' N, 157° 59.73' W
1430 S2C4 ctd cast to 1000 m
1600 Transit to PP cast recovery site
1657 S2C5 ctd cast to 1000 m
1924 Recover PP array @ 22° 42.693' N, 158° 8.849' W
2034 S2C6 ctd cast to 1000 m
2207 Net Tow
2241 Net Tow
2312 S2C7 ctd cast to 1000 m

MaY 24, 2017

0030 Transit to pump tanks
0155 S2C8 ctd cast to 1000 m
0430 Deploy Gas Array @ 22° 45.05' N, 158° 01.10' W
0525 S2C9 ctd cast to 1000 m
0635 OTG reported T-Sal stopped logging. They are troubleshooting
0750 T-Sal logging.
0800 S2C10 ctd cast to 1000 m
1020 ATE cast @ 22° 45.20' N, 157° 58.57' W.
1100 S2C11 ctd cast to 1000 m

1215 Net Tow
1245 Net Tow
1330 Hyperpro cast
1410 S2C12 ctd cast to 1000 m
1658 S2C13 ctd cast to 1000 m
1950 S2C14 ctd cast to 1000 m
2159 Net tow
1059 S2C15 ctd cast to near bottom

May 25, 2015

0310 Optics cast at 22° 45.37' N, 157° 59.35' W. Completed 2 yoyo cycles. Cancelled 3rd due to capstan grinding noise.
0425 Transit to Gas Array
0645 Recover Gas Array at 22° 41.31' N, 158° 12.20' W. Array caught on rudder during approach. Assessed with GoPro camera and were able to recover.
0800 Transit to sediment traps
1100 Arrive at sediment traps. 22° 39.33' N, 158° 39.41' W.

Sediment trap buoy recovered but no gear was attached. The 2 shackles attaching the bridle to the buoy had been removed. Both shackles had been moused with seizing wire so only explanation was they were purposefully removed. Lost sediment trap line, weight, 1 PIT cross, 12 traps and SeapHOx. Suspect a fishing boat encountered the gear and removed the buoy. L. Fujieki and S. Poulos provided iridium positions for the entire deployment. Kellen and Andrew analyzed the data and provided a probable location for the incident. The ship followed a line along the expected drift track but did not find anything

1110 Transit to WHOTS
1420 Arrive WHOTS
1624 S50C1 yoyo ctd cast to 300 m, 3 cycles
1722 Transit to deep moored sediment trap deployment site. Began trap deployment
1957 Deep trap anchor deployed at 22° 51.971' N, 157° 53.167' W
2000 Transit to Pier 35

May 26, 2017

0901 Arrive Pier 35
1000 Post Cruise Meeting held in Marine Center conference room

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
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
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