HOT 294: Chief Scientist Report

Chief Scientist: Dan Sadler
R/V *Kilo Moana*
June 19-23, 2017

Cruise ID: **KM 17-08**
Departed: June 19, 2017 at 1000 (HST)
Returned: June 23, 2017 at 0815 (HST)
Vessel: **R/V *Kilo Moana***
Master of the Vessel: Gregory Steele
OTG Marine Technicians: Trevor Young, 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 June 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 June 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 June 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 June 25th.

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 19th. 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 June 21st.

The free-drifting gas array was to be deployed for 24 hours for incubation experiments on June 21st.

An Automated Trace Element (ATE) sampler was to be deployed to a depth of 10 m on June 21st.

A plankton net was to be towed three times between 1000-1400, and three times between 2200-0200 for 30 minute intervals on June 20th and 21st at Station ALOHA.

The Hyperpro was to be deployed for a half-hour period near ~1400 on June 19th, 20th, and 21st.

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 June 22nd.

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 June 22nd.

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 NE to to deploy the OSU optical profiling float.

After deployment of the optical profiling float the argos, 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
Alexa Nelson	Research Associate	UH	USA
Blake Watkins	Marine Engineer	UH	USA
Tara Clemente	Research Associate	UH	USA
Morgan Linney	Graduate Student	UH	USA
Gerarda Terlouw	Post Graduate Trainee	UH	The Netherlands
Eric Shimabukuro	Research Associate	UH	USA
Andrew King	Research Associate	UH	USA
Svetlana Natarov	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
Trevor Young	Marine Technician	OTG	USA
Kyle Aukai	Student	UH	USA
Stephanie Peart	Student	Stockton University	USA
Alyssa Augustin	Graduate Student	UH	USA
Carla Esquivel	Student	UH	USA
Angelicque White	Scientist	OSU	USA
Katie Watkins-Brandt	Scientist	OSU	USA
Mark Haught	Scientist	UW	USA
Michael Gray	Volunteer	UH	USA
Ksenia Trifonova	Volunteer	UH	Germany

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 1000 after flipping the ship starboard side to the pier in order to load a science van. All operations at Station Kahe were completed successfully. Upon arrival at Station ALOHA the sediment traps were deployed 2 nm west 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 five cycles completed.

The Primary Production array was successfully deployed and recovered on June 20th.

The Gas Array was successfully deployed and recovered.

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 June 19th , 20th, and 21st.

The ATE was not communicative and was not deployed.

The optical package (Sea Bird Seacat/ Fluorometer /LISST), was deployed once in the early morning on June 23rd. Two 200m yoyo cast were completed with the package oriented vertically and two yoyo cast were completed with the package oriented horizontally. This variation was employed to determine any effect on the LISST data due to sensor orientation.

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

An optical profiling float was deployed NE of Station ALOHA at 22° 59.997'N, 157° 29.977 W in support of the MESO-SCOPE cruise.

Winds during the cruise were mostly from the East with speeds of 10-20 kts. The seas were 2-6 ft with a westerly current.

We arrived at Pier 35 for off-loading on June 23rd, at 0815 (HST).

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. None

The following were problems experienced with ships equipment:

1. None

4. R/V *Kilo Moana* OFFICERS AND CREW, TECHNICAL SUPPORT

The R/V *Kilo Moana* continues to provide good ship support for our work. Captain Gregory Steele and the entire ship's crew showed enthusiasm, concern, and dedication to our scientific mission. Ship handling during back deck operations and array recoveries was excellent. With smooth ship operations we were able to stay ahead of schedule and allow time to deploy the optical profiling float nearly 28 miles NE of Station ALOHA.

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

5. DAILY REPORT OF ACTIVITIES (HST)

June 19, 2017

1000 Depart Pier 35 after flipping ship to load OTG lab van with -80 freezer.
1015 Safety Meeting with Captain
1030 Science Mtg
1045 Fire Drill
1227 Arrive St. Kahe
1245 Weight Cast
1348 Hyperpro cast at 21° 20.67'N, 158° 16.31'W
1430 S1C1 CTD cast to 1000 m
1623 Transit to St. ALOHA
2305 Arrive St. ALOHA

June 20, 2017

0029 Sediment Trap array released at 22° 45.007'N, 158° 3.232'W
0155 S2C1 CTD cast to 1000 m.
0245 NO water flowing thru underway system. Engineering repaired.
0315 Under system back up
0430 PP array deployment at 22° 45.02'N, 158° 02.18'W
0540 S2C2 CTD cast to near bottom
0725 Inspect wire at 4730 m for damage from ROV cruise. None found, wire looked good.
1015 Pump sewage
1150 S2C3 CTD cast to 1000 m
1350 Net tow at 22° 45.043'N, 158° 00.02'W. Rescheduled 2nd net tow to fit in Hyperpro
1430 Hyperpro cast at 22° 45.95 157° 59.71'W
1501 S2C4 CTD cast to 1000 m
1656 S2C5 CTD cast to 1000 m
1815 Transit to PP array
1953 PP array recovered at 22° 48.713'N, 158° 7.944'W
1955 Pumped tanks during transit back to St. ALOHA
2026 S2C6 CTD cast to 1000 m
2219 Net tow at 22° 47.483'N, 158° 4.591'W
2250 Net tow at 22° 47.069'N, 158° 04.139'W
2325 S2C7 CTD cast to 1000 m

June 21, 2017

0146 S2C8 CTD cast to 1000 m. Problems with carousel. 11 Bottles closed. Carousel serviced.
0419 S2C9 CTD cast to 275 m to collect water for gas array.
0500 Deployed ST9 experimental array @ 22° 46.81'N, 158° 03.60'W
0540 Deployed GAs Array at 22° 45.84'N, 158° 03.59'W
0625 S2C10 CTD cast to 1000 m.
0836 S2C11 CTD cast to 1000 m.
1038 S2C12 CTD cast to 1000 m.
1215 Two net tows at 22° 45.48'N, 158° 01.81'W
1310 Hyperpro casts at 22° 45.48'N, 158° 01.81'W
1357 S2C13 CTD cast to 1000 m
1530 Transit to pump tanks
1615 Recovered ST9 array at 22° 49.042'N, 158° 8.042 W
1650 Transit back to St ALOHA
1715 S2C14 CTD cast to 1000 m
1952 S2C15 CTD cast to 1000 m
2006 2 net tows at 22° 44.844'N, 157° 59.94'W
2252 S2C16 CTD cast to near bottom

June 22, 2017

0046 8 m off bottom at 22° 45.012'N, 158° 0.041'W
0255 Optics cast 1 at 22° 45.01'N, 157° 59.97'W. Cage in vertical orientation.
0410 Optics cast2. Cage in horizontal orientation.
0520 Transit to Gas Array.
0700 Recovered Gas Array at 22° 51.46'N, 158° 14.28'W
0720 Transit to Sediment Traps.
0830 Recovered Sediment Traps at 22° 53.34'N, 158° 24.34'W
0900 Transit to WHOTS Mooring
1141 S50C1 CTD yoyo cast to 200 m, 4 cycles.
1302 Transit to APEx float Deployment Site.
1538 APEX float for SCOPE cruise deployed at 22° 59.997'N, 157° 29.977 W.
1542 Transit to Station Kaena
2242 S6C1 near bottom CTD cast – lost DP and had to restart cast at 2307

June 23, 2017

0121 Transit to Honolulu
0815 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 and Oxygen Isotopes	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 Optical Profiling Float	OSU