HOT-274: Chief Scientist Report

Chief Scientist: Dan Sadler
R/V *Kilo Moana*
July 18 - 22, 2015

Cruise ID: **KM15-12**
Departed: July 18, 2015 at 0950 (HST)
Returned: July 22, 2015 at 0748 (HST)
Vessel: **R/V *Kilo Moana,*** University of Hawaii
Master of the Vessel: Captain Jay Chavez
Chief Scientist: Dan Sadler, University of Hawaii
OTG Marine Technicians: Jeff Koch 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 July 18th 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 July 18th, 19th, 20th and 21st.
3) Station 52, the site of WHOTS-12 Mooring (anchor position 22° 40.061'N 157° 56.9654'W) was to be occupied on July 21st 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 July 21st for approximately 3 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 18th. 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, two seagliders were to be launched followed by deployment of the free-drifting sediment trap. The sediment trap array was to stay in the water for about 52 hours. This was to be followed by a 200 m CTD cast for incubation experiments and a 1000m CTD cast for preparation of the Primary Productivity Array. This cast was to be followed by the deployment of the free-drifting Primary Productivity Array to incubate insitu for 12 hours. A full-depth (~4740 m) CTD cast was to be conducted after the deployment of the Primary Production Array, 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 20th.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on July 20th. The Gas Array was to be recovered on July 21st.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on July 19th and 20th at Station ALOHA.

The Hyperpro was to be deployed around the 1400-1430 time slot on July 18th, 19th and 21st. This time slot allows for a better matchup with both the AQUA and S-NPP satellites.

A package including a Wet Labs ACS, a SeaBird Seacat, 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 and around noon on July 21st.

A trace metal free sample was to be collected by the ATE sampler on July 20th.

After the 36 hour burst period of CTD work at Station ALOHA was accomplished, the ship was to transit to recover the floating Sediment Trap Array and the Gas Array on the morning of July 21st.

After recovering both arrays, the ship was to transit back to Station ALOHA to conduct an ACS/LISST cast. Once the ACS/LISST profile was complete, the ship was to transit to Station 52 to conduct a one-hour 200 m CTD yo-yo cast. Once operations at Station 52 were complete, the ship was to transit back into the ALOHA circle for a Hyperpro cast. Just before departing ALOHA, an ARGO float and a SVP Drifter were to be deployed.

Once operations 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 Snug Harbor.

The following instruments were to collect data throughout the cruise: shipboard ADCP, thermosalinograph, underway fluorometer, pCO_2 system, and the meteorological package.

2. SCIENCE PERSONNEL

Participant	**Title**	**Affiliation**
Susan Curless	Research Associate	UH
Dan Sadler	Research Associate	UH
Lance Fujieki	Research Associate	UH
Alexa Nelson	Research Associate	UH
Brenner Wai	Research Associate	UH
Eric Shimabukuro	Research Associate	UH/SCOPE
Tara Clemente	Research Associate	UH/SCOPE
Ken Doggett	Research Associate	UH
Blake Watkins	Marine Engineer	UH
Natalie Dornan	Student	UH
Chris Schvarcz	Graduate Student	UH
Jefrey Snyder	Marine Technician	UH
Daniel McCoy	Research Associate	UH
Robert (Walt) Deppe	Research Associate	UH
Emma Nuss	Graduate Student	UH
Sara Coffey	Graduate Student	UH
Adela Dumitrascu	Student Assistant	UH
Jim Burkitt	Research Associate	UH/SCOPE
Paige Connell	Graduate Student	USC/SCOPE
Alyssa Gellene	Research Specialist	USC/SCOPE
Eleni Callos	Volunteer	Marine Center
Jeff Koch	Marine Technician	OTG

Trevor Young Marine Technician OTG

3. GENERAL SUMMARY

Operations during the cruise ran as scheduled. The .680 wire, trawl winch and A-frame were used for CTD operations

One 1000 m CTD cast was completed at Station Kahe. Two near bottom CTD casts, two 200 m CTD cast, and twelve 1000 m CTD casts were conducted at Station ALOHA. One yo-yo cast was conducted at Station 52 (WHOTS-12 mooring); 5 cycles were conducted to 200 dbar. One near bottom cast was completed at Station Kaena.

The Sediment Traps, Primary Production Array, and Gas Array were all 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 hand net tows were completed by the Caron Lab on July 19th and 20th; two during the day and one at night.

The ATE operated successfully and one trace metal free sample was collected.

The Hyperpro casts (three cycles each) were successfully conducted three times around the scheduled 1400-1430 time slot on July 18th, 19th and 21st.

The optical package ACS/LISST was deployed two times during the cruise, once around noon and once in the early morning on July 21st.

The fluorometer, ADCP, thermosalinograph, underway pCO2 and the ship's meteorological suite ran without interruption during the cruise.

Sea Gliders sg146 and sg152 were deployed upon arrival to St. ALOHA on July 18th.

An ARGO float was deployed at St. ALOHA on July 21st.

A SVP drifter was deployed at St. ALOHA on July 21st.

The winds throughout most of the cruise were from northeast at 10-15 kts. Seas of 2-4 ft were present throughout the cruise.

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

The R/V *Kilo Moana* provided good ship support for our work. Captain Jay Chavez and the ship's crew showed enthusiasm, concern, and dedication to our scientific mission.

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

5. DAILY REPORT OF ACTIVITIES (HST)

Saturday, July18, 2015

0900 Delayed for ship traffic
0950 Depart Snug Harbor
0952 ISUS mounted on rosette
1035 Orientation meeting with Captain
1052 Safety drill
1235 Arrive St Kahe
1250 Start weight cast to 500m
1320 Weight back on deck
1330 Hyperpro at 21° 20.578'N 158° 16.443'W
1406 Recovered Hyperpro
1411 S1C1 CTD to 1000m
1535 End of cast
1540 Transit to St. ALOHA
2358 Deployed Seaglider sg512 at 22° 45.983'N 158° 3.302'W

Sunday, July 19, 2015

0016 Deployed Seaglider sg146 at 22° 46.032'N 158° 3.312'W
0103 Deployed Sediment Traps at 22° 44.983'N 158° 3.205'W
0150 Begin S1C1 CTD to 200m
0220 End of Cast
0255 Begin S2C2 CTD to 200 m
0332 End of Cast
1430 Deployed Primary Production array at 22° 44.933'N 158° 1.100'W
0452 Begin S2C3 near bottom CTD cast
1653 7m off bottom at 22° 44.992'N 158° 0.022'W
0853 End of cast
0859 start hand net tow
0910 End net tow
1912 transit to pump tanks
1032 Begin S2C3 CTD to 1000m - start of 36 hour burst sampling
1202 End cast
1221 Begin net tow at 22° 45.004'N, 157° 59.970'W
1255 End net tow
1335 Begin Hyperpro at 22° 45.224'N 157° 59.618'W
1400 End Hyperpro
1420 Begin S2C5 CTD to 1000m
1527 End of Cast
1530 Transit to pump tanks
1700 Begin S2C6 CTD to 1000m
1813 End of Cast
1815 Transit to PP array
1919 Recovering PP array at 22° 41.916'N 158° 6.993'W
1956 Begin s2C7 CTD cast to 1000m
2107 End of Cast
2200 Net tow at 22° 43.23'N 158° 3.92'W
2231 Net recovered
2234 Net tow at 22° 43.27'N 158° 3.30'W
2301 Net recovered
2314 Begin S2C8 CTD cast to 1000m

Monday July 20, 2015

0016 End of cast
0022 Transit to pump tanks
0150 Begin S2C9 CTD cast to 1000m
0301 End of cast
0359 Begin Gas Array deployment
0441 Gas Array deployed at 22° 44.959'N, 158° 1.032'W
0448 Begin S2C10 CTD to 1000m
0557 End of cast
0754 Begin S2C11 CTD cast to 1000m
0854 End of Cast
0857 Start Hand Net Tow
0905 End Hand Net Tow
0906 Transit to pump tanks
1001 Net tow at 22° 47.502'N, 158° 5.018'W
1031 End net tow
1040 Deploy ATE at 22° 47.706'N, 158° 4.440'W
1108 Recover ATE
1112 Begin S2C12 CTD cast to 1000m
1121 End of cast
1232 Begin net tow at 22° 47.753'N, 158° 4.468'W
1302 End of net tow
1356 Begin S2C13 CTD to 1000m
1506 End S2C13 CTD cast
1510 Transit to pump tanks
1658 Begin S2C14 CTD cast to 1000m
1804 End of cast
1948 Begin S2C15 CTD cast to 1000m
2105 End of cast
2109 Hand net tow at 22° 47.451'N, 158° 3.460'W
2122 Net tow recovered. Transit to pump tanks
2207 Net tow at 22° 46.05N, 158° 3.31W
2237 Net tow recovered - Removed ISUS from rosette
2301 Begin S2C16 CTD cast to bottom

Tuesday July 21, 2015

0051 5m off bottom at 22° 45.036'N, 158° 0.006'W
0232 End of cast
0255 Start AC9 at 22° 44.99'N, 158° 0.002'W
0348 Recover AC9
0350 Deploy AC9 at 22° 44.977'N, 158° 0.002'W
0430 Recover AC9
0442 Transit to Gas Array
0610 Recover Gas Array at 22° 41.113'N, 158° 8.440'W
0624 Transit to Sediment Traps
0717 Recover Sediment Traps at 22° 38.882'N, 158° 14.355'W
0725 Transit to ALOHA
0955 Start AC9 22° 44.01'N, 157° 58.99'W
1042 Recover AC9
1045 Start AC9 22° 39.942'N, 157° 58.994'W

1135 Recover AC9
1140 Reposition near WHOTS-12 mooring
1156 Begin S52C1 yoyo CTD cast to 200m
1316 End of cast
1326 Deploy Hyperpro at 22° 39.737N, 157° 58.735W
1415 Hyperpro recovered
1539 ARGO float released at 22° 49.23'N, 157° 55.303'W
1540 SVPD released at 22° 49.212'N, 157° 55.050'W
1545 Transit to St. Kaena
2057 Begin S6C1 CTD cast to 2500m – pinger wasn't turned on, CTD was at near-surface and recovered to turn on instrument, then re-deployed
2201 8m off at 21° 50.784'N, 158° 21.792'W
2057 End of cast
2300 Transit to Snug Harbor
0748 Arrival Snug Harbor

HOT program sub-components:

Investigator	**Project**	**Institution**
Matt Church Dave Karl Bob Bidigare	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 inter-calibration	SIO
Paul Quay	$DI^{13}C$	UW
Matt Church & Ricardo Letelier	Diversity and activities of nitrogen-fixing microorganisms	UH
Sam Wilson	Reduced gases in the upper ocean: The cycling of methane, sulfide and nitrous oxide	UH
Christopher Schvarcz	Viral Dynamics at Station ALOHA	UH
Erica Goetze	Temporal stability of copepod populations at Station ALOHA	UH
Sara Ferrón-Smith	Determination of net community production from the	UH

	diurnal variability of O2/Argon ratios	
Ed DeLong Dave Karl Matt Church	SCOPE DNA collection	UH
Angelique White	SCOPE Diazatroph Microscopy	OSU
Virginia Armbrust	Seaflow Underway Flow Cytometer	UW
David Caron Paige Connell Alyssa Gellene	Protistan biodiversity, trophic activities and biogeochemistry at Station ALOHA	USC
Sara Ferrón-Smith	Carboy of water collected for O^{18} MIMS	
Kyle Edwards	Surface Seawater for Media	UH
Dave Karl Ed DeLong	SCOPE: Sea Glider Deployment	UH
Dana Swift	ARGOS Float Deployment	UW
Sam Wilson	SVP Drifter Deployment for CMORE/SCOPE	UH
Debbie Lindell	Isolation of cyanophages	IIT/SCOPE