HOT 262: Chief Scientist Report

Chief Scientist: Brett Updyke
R/V *Kilo Moana*
April 9 – April 13, 2014

Cruise ID: **KM1410**
Departed: 9 April at 0930 (HST)
Returned: 13 April at 0748 (HST)
Vessel: **R/V *Kilo Moana***
Master of the Vessel: Captain Gray Drewry
OTG Marine Technicians: Jeff Koch, Trevor Goodman, Robert Spina

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 April 9th 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 was to be occupied during April 10th- 12th.
3) Station 52, the site of WHOTS-10 Mooring (anchor position 22° 40.12'N 157° 57.01'W) was to be occupied on April 12th 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 April 12th for approximately 2 hours.

Upon arrival to Station Kahe a 1300 lb. weight-test cast to 1000 m, one CTD cast to 1000 m, and a Hyperpro cast were to be conducted on the afternoon of April 9th. 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 free-drifting sediment trap array was to be deployed. The sediment trap array was to stay in the water for about 56 hours. This was to be followed by a 1000 m 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 *in situ* for 12 hours. A full-depth (~4740 m) CTD cast was to be conducted after the deployment of the Primary Productivity 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 April 11th.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on April 11th. The Gas Array was to be recovered on April 12th.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on April 10th and 11th at Station ALOHA.

The Hyperpro was to be deployed for approximately 45 minutes at 1400 hours on April 9th, 10th, and 12th to collect three profiles during each deployment.

A package including a Wet Labs AC9 and ACS, a Chelsea Fast Repetition Rate Fluorometer (FRRf), 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 at 1000 hours on April 12th.

A trace metal free sample was to be collected by the ATE sampler on April 11th at Station ALOHA.

A 30 minute test of the ALOHA Cabled Observatory (ACO) hydrophone was to be conducted once during the cruise using the ship's Benthos DS700 acoustic release deck unit.

After the 36 hour burst period of CTD work at Station ALOHA was accomplished, the ship was to transit to recover the free-floating Gas Array and the Sediment Trap Array on the morning of April 12th.

After recovering the arrays, the ship was to transit to Station ALOHA to conduct an AC9/FRRf cast. After these operations were complete, the ship was to transit to Station 52 to conduct a one-hour 200 m CTD yo-yo cast and surface instrument intercomparisons. After the yo-yo cast was complete, the ship was to transit to Station ALOHA for a Hyperpro cast at 1400 hours.

Once operations at Station ALOHA 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, pCO_2 system, underway fluorometer and the meteorological suite.

2. SCIENCE PERSONNEL

Participant	**Title**	**Affiliation**
Dan Sadler	Research Associate	UH
Lance Fujieki	Research Associate	UH
Karin Björkman	Research Specialist	UH
Adriana Harlan	Research Associate	UH
Brett Updyke	Research Associate	UH
Blake Watkins	Marine Engineer	UH
Jefrey Snyder	Marine Technician	UH
Fernando Santiago-Mandujano	Research Associate	UH
Joseph Gum	Research Associate	UH
Daniel McCoy	Research Associate	UH
Kelly Lance	Undergraduate Student	UH
Margot Cramwinckel	Graduate Student	Utrecht University
Cheree Smith	Volunteer	NOAA
Brenner Wai	Technician	UH
Donn Viviani	Graduate Student	UH
William McQuiston	Intern	UH
Elizabeth Butcher	Undergraduate Student	UH
Crystal Coughlin	Graduate Student	HPU
Charles Roman Battisti	Graduate Student	HPU
Monica Mocaer	Volunteer	NOAA
Jeffrey Koch	Marine Technician	OTG
Trevor Goodman	Marine Technician	OTG
Robert Spina	Marine Technician	OTG

3. GENERAL SUMMARY

Operations at Station ALOHA were conducted as planned. 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 52) with five cycles completed. One near bottom cast was completed at Station Kaena.

The Caley winch with the 0.322" wire and the A-frame were used for CTD operations.

The Sediment Traps, Primary Productivity Array and Gas Array were all deployed and recovered successfully.

All six of the planned net tows for the core HOT zooplankton collection were completed successfully; three during the day, and three during the night.

Hyperpro casts (3 cycles each) were conducted on April 9th, 10th, and 12th.

The optical package ACS/AC9/FRRf/LISST was deployed twice (2 cycles each) on April 12th in the early morning and at 1000 hours.

The ATE sampler was deployed and one trace metal free seawater sample was collected.

The 30 minute test of the ACO hydrophone was successfully completed.

The underway thermosalinograph, fluorometer, pCO_2 system, and the ship's meteorological suite ran without interruption during the cruise. The broad band/narrow band Ocean Surveyor ADCP and the Workhorse ADCP were working correctly during the cruise.

Winds at Station ALOHA started from the northeast at 8-10 knots on April 10th, increasing on the morning of April 12th to 25 knots by the afternoon. Seas remained slight throughout the beginning of the cruise, building to moderate with the increased wind.

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

The R/V *Kilo Moana* continues to maintain very good ship support for our work. Captain Gray Drewry and the ship's crew showed enthusiasm, concern, and dedication to our scientific mission.

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

5. DAILY REPORT OF ACTIVITIES (HST)

April 9, 2014
0930 - Depart Snug Harbor
0950 - Safety briefing
1030 - Fire and life boat drills
1200 - Arrive Station Kahe
1213 - Start weight cast to 1000 m
1305 - End weight cast
1325 - Start Hyperpro
1358 - End Hyperpro
1407 - Start S1C1 CTD cast to 1000 m

1547 - End S1C1
1550 - Transit to Station ALOHA
2345 - Arrive ALOHA

April 10, 2014
0025 - Sediment trap deployed (22 45.108'N, 158 02.249'W)
0151 - Start S2C1 CTD cast to 1000 m
0425 - Start primary productivity array deployment
0440 - PP array deployed (22 45.05'N, 158 0.92'W)
0447 - Transit to center of ALOHA
0504 - Start S2C2 near bottom CTD cast
0702 - 6 m off the bottom (22 45.0'N, 158 0.011'W)
0905 - End S2C2
0913 - transit to pump tanks
1057 - Start S2C3 CTD cast to 1000 m
1221 - End S2C3
1237 - Start net tow
1308 - End net tow
1324 - Start Hyperpro
1359 - End Hyperpro
1407 - Start S2C4 CTD cast to 1000 m
1518 - End S2C4
1530 - Transit to PP array
1650 - Start S2C5 CTD cast to 1000 m
1804 - End S2C5
1845 - Start PP array recovery
1900 - PP array recovered (22 45.918'N, 158 07.020'W)
1905 - Transit to pump tanks
1955 - Start S2C6 CTD cast to 1000 m
2115 - End S2C6
2200 - Start net tow
2220 - End net tow
2230 - Start net tow
2256 - End net tow
2258 - Start S2C7 CTD cast to 1000 m

April 11, 2014
0011 - End S2C7
0147 - Start S2C8 CTD cast to 1000 m
0254 - End S2C8
0414 - Gas array deployed (22 44.99'N, 158 01.04'W)
0445 - Start S2C9 CTD cast to 1000 m
0551 - End S2C9
0614 - Start ACO ping (22 45.14'N, 158 01.86'W)
0640 - End ACO ping
0645 - Transit to pump tanks
0756 - Start S2C10 CTD cast to 1000 m
0901 - End S2C10
1001 - Start net tow
1028 - End net tow
1034 - Start ATE
1106 - End ATE

1108 - Start S2C11 CTD cast to 1000 m
1218 - End S2C11
1230 - Start net tow
1304 - End net tow
1347 - Start S2C12 CTD cast to 1000 m
1503 - End S2C12
1515 - Transit to pump tanks
1649 - Start S2C13 CTD cast to 1000 m
1755 - End S2C13
1948 - Start S2C14 CTD cast to 1000 m
2054 - End S2C14
2122 - Transit to pump tanks
2202 - Start net tow
2230 - End net tow
2306 - Start S2C15 near bottom CTD cast

April 12, 2014
0100 - 8 m off bottom (22 44.926'N 157 59.988'W)
0244 - End S2C15
0310 - Start AC9/FRRf
0400 - End
0403 - Start AC9/FRRf
0455 - End
0458 - Transit to gas array
0603 - Start gas array recovery
0623 - Gas array recovered (22 43.312' N, 158 11.570' W)
0625 - Transit to sediment traps
0712 - Start sed traps recovery
0740 - Sed traps recovered (22 49.377' N, 158 18.143' W)
0741 - Transit to Station 52
1009 - Arrive at Station 52
1022 - Start AC9/FRRf
1111 - End
1115 - Start AC9/FRRf
1207 - End
1225 - Start S52C1 yo-yo cast to 200 m
1329 - End S52C1
1330 - Transit to Station ALOHA
1345 - Start Hyperpro
1427 - End Hyperpro
1500 - Transit to Station Kaena
2000 - Arrive at Station Kaena
2001 - Start S6C1 near bottom CTD cast
2223 - End S6C1
2240 - Transit to Snug Harbor

April 13, 2014
0700 - Passing H buoy
0739 - First line port side to
0748 - All fast; full offload

6. 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 intercalibration	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
Sara Ferrón-Smith	O_2/Argon measurements	UH
Christopher Schvarcz	Viral dynamics in the oligotrophic open ocean, Station ALOHA	UH
Erica Goetze	Temporal stability of copepod populations at Station ALOHA	UH
Donn Viviani	The effects of ocean acidification, nutrient limitation and light on microbial physiology	UH