HOT 261: Chief Scientist Report

Chief Scientist: Brett Updyke
R/V *Kilo Moana*
March 4 – March 8, 2014

Cruise ID: **KM1408**
Departed: 4 March at 0900 (HST)
Returned: 8 March at 0841 (HST)
Vessel: **R/V *Kilo Moana***
Master of the Vessel: Captain Jay Chavez
OTG Marine Technicians: Jeff Koch, 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 March 4th 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 March 5th- 7th.
3) Station 52, the site of WHOTS-10 Mooring (anchor position 22° 40.12'N 157° 57.01'W) was to be occupied on March 7th 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 March 7th 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 March 4th. 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 March 6th.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on March 6th. The Gas Array was to be recovered on March 7th.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on March 5th and 6th at Station ALOHA.

The Hyperpro was to be deployed for approximately 45 minutes at 1400 hours on March 4th, 5th, and 7th 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 March 7th.

A trace metal free sample was to be collected by the ATE sampler on March 6th at Station ALOHA.

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 March 7th.

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
Susan Curless	Research Associate	UH
Adriana Harlan	Research Associate	UH
Brett Updyke	Research Associate	UH
Blake Watkins	Marine Engineer	UH
Stuart Goldberg	Postdoctoral Researcher	UH
Jefrey Snyder	Marine Technician	UH
Fernando Santiago-Mandujano	Research Associate	UH
Cameron Fumar	Research Associate	UH
Daniel McCoy	Research Associate	UH
Damion Rosbrough	Undergraduate Student	UH
Ryan Tabata	Volunteer	UH
Sheuli Molla	Volunteer	UH
Brenner Wai	Technician	UH
William McQuiston	Intern	UH
Trevor Young	Marine Technician	OTG
Jeff Koch	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 four 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.

Five of the six planned net tows for the core HOT zooplankton collection were completed successfully; three during the day, and two during the night. One nighttime net tow was unsuccessful due to a small tear in the backup zooplankton net on the night of March 5th. The primary net was badly damaged two weeks prior on HOT 260 and was therefore unavailable for this cruise. The secondary net was repaired, allowing net tows to continue, however the schedule did not allow for a third net tow in the 2200-0200 time slot on March 6th.

Hyperpro casts (3 cycles each) were conducted on March 4th, 5th, and 7th.

The optical package ACS/AC9/FRRf/LISST was deployed twice (2 cycles each) on March 7th in the early morning and at 1000 hours.

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

The underway thermosalinograph, fluorometer, pCO_2 system, and the ship's meteorological suite ran without interruption during the cruise, however the ULTRA anemometer was not in service. The broad band/narrow band Ocean Surveyor ADCP and the Workhorse ADCP were working correctly during the cruise.

A northwest swell persisted at Station ALOHA, starting at 10-12 ft. on the night of March 4th and gradually decreasing to 4 ft. on the afternoon of March 7th. Winds at Station ALOHA started from the northeast at 5 knots on March 4th, shifting to ~10 knot westerlies on March 6th.

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 Jay Chavez 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 available to assist in our work during the cruise.

5. DAILY REPORT OF ACTIVITIES (HST)

March 4, 2014
0900 - Depart Snug harbor
0945 - Safety briefing
1000 - Fire and abandon ship drills
1200 - Start weight cast to 1000 m
1255 - End weight cast
1305 - Start Hyperpro cast
1400 - End Hyperpro
1409 - Start S1C1 CTD cast to 1000 m
1530 - End S1C1
1540 - Transit to Station ALOHA
2355 - Arrive Station ALOHA

March 5, 2014
0033 - Sediment Traps deployed (22º 45.237' N, 158º 02.156' W)
0151 - Start S2C1 CTD cast to 1000 m
0330 - End S2C1
0430 - Start Primary Production array deployment
0447 - PP array deployed (22º 45.012' N, 158º 01.073' W)
0508 - Start S2C2
0656 - 6 m off the bottom (22º 44.996' N, 157º 59.934' W)
0837 - Stop at 2070 db to adjust wire gap
0943 - End S2C2
1000 - Transit to pump ship's tanks
1030 - Start net tow
1145 - End net tow
1151 - Start S2C3 CTD cast to 1000 m
1325 - End S2C3
1335 - Start Hyperpro
1430 - End Hyperpro
1434 - Start S2C4 CTD cast to 1000 m
1546 - End S2C4
1555 - Transit to pump ship's tanks
1725 - Start S2C5 CTD cast to 1000 m
1843 - End S2C5
1910 - Start Primary Production array recovery
1937 - PP array recovered (22º 48.3112' N, 158º 04.923' W)
1953 - Start S2C6 CTD cast to 1000 m
2118 - End S2C6
2200 - Start net tow
2229 - End net tow
2230 - Cancel second net tow due to small tear in net
2258 - Start S2C7 CTD cast to 1000 m

March 6, 2014
0014 - End S2C7
0156 - Start S2C8 CTD cast to 1000 m
0310 - End S2C8
0400 - Start Gas array deployment
0417 - Gas array deployed (22º 44.881' N, 158º 01.149' W)
0456 - Start S2C9 CTD cast to 1000 m
0556 - End S2C9
0600 - Transit to pump ship's tanks
0758 - Start S2C10 CTD cast to 1000 m
0912 - End S2C10
1000 - Start net tow
1028 - End net tow
1030 - Start ATE
1110 - End ATE
1112 - Start S2C11 CTD cast to 1000 m
1217 - End S2C11
1230 - Start net tow
1300 - End net tow
1356 - Start S2C12 CTD cast to 1000 m
1518 - End S2C12

1521 - Transit to pump ship's tanks
1651 - Start S2C13 CTD cast to 1000 m
1813 - End S2C13
1957 - Start S2C14 CTD cast to 1000 m
2108 - End S2C14
2116 - Transit to pump ship's tanks
2205 - Start net tow
2231 - End net tow
2310 - Start S2C15 near bottom CTD cast

March 7, 2014
0113 - 8 m off the bottom (22º 44.976' N, 157º 59.970' W)
0255 - End S2C15
0315 - Start AC9/FRRf cast
0501 - End AC9/FRRf; transit to Gas array
0610 - Start Gas array recovery
0628 - Gas array recovered (22º 50.076' N, 158º 09.625' W)
0726 - Start Sediment Trap recovery
0745 - Sediment Traps recovered (22º 52.342' N, 158º 14.494' W)
0750 - Transit to Station 52
1020 - Start AC9/FRRf cast
1200 - End AC9/FRRf
1210 - Start S52C1 CTD yo-yo cast
1314 - End S52C1
1322 - Start Hyperpro
1405 - End Hyperpro
1445 - Transit to Station Kaena
2000 - Arrive Kaena
2001 - Start S6C1 near bottom CTD cast
2113 - 10 m off the bottom (21º 50.833’ N, 158º 21.742’ W)
2213 - End S6C1
2225 - Transit to Snug harbor

March 8, 2014
0658 - Passing H buoy
0747 - First line starboard side to
0750 - Load flow cytometry van
0801 - Last line; commence shift operations
0831 - First line port side to
0841 - All fast; partial 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
Stuart Goldberg	Tracking composition and removal of TOC and DON in surface waters by various bacterial communities	UH
William McQuiston	Flow rate versus volume for Anotop filters	UH
Rosie Gradoville	Searching for aphotic nitrogen fixation a Station ALOHA	OSU
Oscar Sosa	Seawater collection for culturing media	MIT/WHOI