

HOT-252: Chief Scientist Report

Chief Scientist: Brett Updyke

R/V *Kilo Moana*

16-20 May, 2013

Cruise ID: **KM 1308**

Departed: 16 May at 0900 (HST)

Returned: 20 May at 0818 (HST)

Vessel: **R/V *Kilo Moana***

Master of the Vessel: Captain Rick Meyer

OTG Marine Technicians: Trevor Goodman and Daniel Fitzgerald

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 16th 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 May 17th, 18th, and 19th.
- 3) Station 50, the site of WHOTS-9 Mooring (anchor position 22° 46.071'N 157° 53.956'W) was to be occupied on May 19th 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 May 19th for approximately 3 hours.

Upon arrival to Station Kahe a 1000 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 May 16th. 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 52 hours. This was to be followed by a 200 m CTD cast to collect water for incubation experiments, and 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 May 19th.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on May 18th. The Gas Array was to be recovered on May 19th.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on May 17th and May 18th at Station ALOHA.

The Hyperpro was to be deployed for approximately 45 minutes near noontime on May 16th, 17th, and 19th to collect three profiles during each deployment.

A package including a Wet Labs AC9, 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 around noon on May 19th.

A trace metal free sample was to be collected by the ATE sampler on May 18th 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 floating Gas Array and the Sediment Trap Array on the morning of May 19th.

After recovering the arrays, the ship was to transit to Station ALOHA to conduct ACS/AC9/FRRf/LISST casts, and Hyperpro casts, after which the ship was to transit to Station 50 to conduct a one-hour 200 m CTD yo-yo cast.

After the 200 m CTD yo-yo cast, an APEX profiling drifter was to be deployed.

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, *p*CO₂ system, underway fluorometer and the meteorological suite.

2. SCIENCE PERSONNEL

Participant	Title	Affiliation
Lance Fujieki	Research Associate	UH
Dan Sadler	Research Associate	UH
Adriana Harlan	Research Associate	UH
Brett Updyke	Research Associate	UH
Blake Watkins	Marine Engineer	UH
Christopher Schvarcz	Graduate Student	UH
Donn Viviani	Graduate Student	UH
Shimi Rii	Graduate Student	UH
Stuart Goldberg	Postdoctoral Researcher	UH
Benedetto Barone	Postdoctoral Researcher	UH
Sara Thomas	Graduate Student	UH
Jefrey Snyder	Marine Technician	UH
Fernando Santiago-Mandujano	Research Associate	UH
Cameron Fumar	Research Associate	UH
Daniel McCoy	Research Associate	UH
Michael Grissom	Graduate Student	UH
Eli Wong	Undergraduate Student	UH
Roberta Hamme	Scientist	Univ. of Victoria
Irina Shilova	Postdoctoral Researcher	UCSC
Brandon Carter	Research Specialist	UCSC
Zbigniew Kolber	Scientist	UCSC
Matt Mills	Research Specialist	Stanford
Trevor Goodman	Marine Technician	OTG
Dan Fitzgerald	Marine Technician	OTG

3. GENERAL SUMMARY

The vessel was diverted from Station Kahe (Station 1) due to undisclosed Navy operations in the area. The operations planned for Station 1 were relocated to 21° 20.6'N, 158° 16.4'W (Station 10), which is approximately 3 nautical miles WSW of Station 1.

Operations at Station ALOHA were conducted as planned.

One 1000 m CTD cast was completed at Station Kahe. Two near bottom CTD casts, one 1700 m CTD cast, twelve 1000 m CTD casts and one 200 m cast were conducted at Station ALOHA. One 200 m yo-yo CTD cast was completed near the WHOTS mooring (Station 50) with five cycles completed. One near bottom cast was completed at Station Kaena.

The trawl winch with the 0.681 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 three arrays drifted NNW of their respective deployment locations.

Six 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 May 16th, 17th and 19th.

The optical package ACS/AC9/FRRf/LISST was deployed four times on May 19th, two back-to-back deployments in the early morning, and two at around noon.

The ATE sampler was sent for repair and was not available in time for this cruise.

One APEX profiling drifter was deployed at 22° 44.14'N, 157° 55.57'W.

The underway thermosalinograph, fluorometer and *p*CO₂ system as well as 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 were from the east early in the cruise at about 15 kt, eventually decreasing in intensity to about 7 kt before shifting to 12 kt northerlies in the very early morning of May 19th.

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 Rick 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)

May 16, 2013

0900 All aboard. Depart Snug Harbor

0945 Safety briefing with the Captain and Chief Scientist

1015 Fire and abandon ship drills

1200 Vessel diverted from Station Kahe due to Navy operations in the area

1220 Arrive at Station 10 (21° 19.5'N, 158° 19.5'W)
1230 Start Hyperpro cast (3 cycles)
1315 End of Hyperpro
1320 Weight cast to 500 m
1350 End of cast
1428 Start S10C1 CTD cast to 1000 m
1551 End S10C1
1600 Transit to Station ALOHA
2342 Arrive at Station ALOHA

May 17, 2013

0000 Start Sediment Traps deployment
0020 Sediment Traps deployed (22° 44.990'N, 158° 02.140'W)
0025 Transit 1 nm east
0041 Start S2C1 CTD cast to 200 m
0120 End S2C1
0250 Start S2C2 CTD cast to 1000 m
0415 End S2C2
0510 Start PP Array deployment
0530 PP Array deployed (22° 44.97'N, 158° 01.07'W)
0543 Start S2C3 CTD cast to 4800 m
0740 4 m off bottom (22° 45.019'N, 157° 59.981'W)
0940 End S2C3
0945 Transit to pump ship's tanks
1035 Start net tow
1110 End net tow
1145 Start S2C4 CTD cast to 1000 m
1331 End S2C4
1338 Start Hyperpro cast (3 cycles)
1426 End Hyperpro
1433 Start S2C5 CTD cast to 1000 m
1557 End S2C5
1657 Start S2C6 CTD cast to 1000 m
1805 End S2C6
1815 Transit to pump ship's tanks
1935 Start PP Array recovery (22° 45.818'N, 158° 01.392'W)
1950 PP Array recovered
1955 Start S2C7 CTD cast to 1000 m
2120 End S2C7
2159 Start net tow
2226 End net tow
2230 Start net tow
2300 End net tow
2313 Start S2C8 CTD cast to 1000 m

May 18, 2013

0028 End S2C8
0153 Start S2C9 CTD cast to 1000 m
0315 End S2C9
0400 Start Gas Array deployment
0435 Gas Array deployed (22° 45.002'N 158° 01.069'W)
0452 Start S2C10 CTD cast to 1700 m
0630 End S2C10
0635 Transit to pump ship's tanks
0751 Start S2C11 CTD cast to 1000 m
0900 End S2C11

1000 Start net tow
 1030 End net tow
 1053 Start S2C12 CTD cast to 1000 m
 1210 End S2C12
 1220 Start net tow
 1250 End net tow
 1353 Start S2C13 CTD cast to 1000 m
 1513 End S2C13
 1520 Transit to pump ship's tanks
 1650 Start S2C14 CTD cast to 1000 m
 1757 End S2C14
 1953 Start S2C15 CTD cast to 1000 m
 2100 End S2C15
 2206 Start net tow
 2235 End net tow
 2258 Start S2C16 CTD cast to 4800 m
 2355 Pinger battery appears to have died, switched to altimeter

May 19, 2013

0051 At 9 m off the bottom (22° 45.060'N 158° 59.988'W)
 0240 End S2C16
 0300 AC9/FRRf (2 cycles)
 0450 End AC9/FRRf
 0540 Start Gas Array recovery (22° 48.233'N 158° 00.076'W)
 0601 Gas Array recovered
 0605 Transit to pump ship's tanks
 0615 Transit to Sediment Traps
 0645 Start Sediment Traps recovery (22° 48.94'N 158° 03.21'W)
 0720 Sediment Traps recovered
 0725 Transit to WHOTS mooring
 1000 Start AC9/FRRf (2 cycles)
 1140 End AC9/FRRf
 1200 Start Hyperpro cast (3 cycles)
 1235 End Hyperpro
 1245 start S50C1 yo-yo cast to 200 m
 1425 End S50C1, 5 cycles completed
 1540 Deployed APEX profiling drifter (22° 44.14'N 157° 55.57'W)
 1542 Transit to Station Kaena
 2046 Arrive at Station Kaena, S6C1 CTD cast to 2500 m
 2144 10 m off the bottom (21° 50.808'N 158° 21.80'W)
 2244 End S6C1
 2258 Transit to Snug Harbor

May 20, 2013

0654 Arrive H buoy
 0736 Arrive Snug Harbor starboard side to, load OTG van
 0818 All fast port side to, partial offload.

6. HOT program sub-components:

Investigator	Project	Institution
Matt Church	Core biogeochemistry	UH
Dave Karl		
Bob Bidigare		
John Dore	Biogeochemistry QA/QC	MSU
Roger Lukas	Hydrography	UH

Mike Landry Ricardo Letelier	Zooplankton dynamics Optical measurements	SIO 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
Adina Paytan	O ¹⁸ natural abundance	UCSC
Shimi Rii	Investigation of temporal changes in picoeukaryote diversity at Station ALOHA	UH
Christopher Schvarcz	Viral dynamics in the oligotrophic open ocean, Station ALOHA	UH
Erica Goetze	Temporal stability of copepod populations at Station ALOHA	UH
Sara Thomas	Chemolithoautotroph experiment	UH
Roberta Hamme	The marine dissolved N ₂ /Ar ratio, a tracer for deep ocean denitrification?	University of Victoria
Irina Shilova, Matthew Mills, Zbigniew Kolber, Brandon Carter	Phytoplankton responses to different nitrogen sources in the North Pacific Subtropical Gyre	UCSC, Stanford
Barbara Balestra, Adina Paytan	Quantification of trace element concentrations in extant coccolithophore cells	UCSC
Ken Johnson, Steve Riser	Development of an integrated IFET pH sensor for high pressure applications in the deep sea	MBARI, UW
Jeffrey Drazen	Diet analysis of top predatory pelagic fishes in the central NPSG	UH