

HOT-249: Chief Scientist Report

Chief Scientist: Susan Curless

R/V *Kilo Moana*

February 11-15, 2013

Cruise ID: **KM 13-02**

Departed: February 11, 2013 at 0850 (HST)

Returned: February 15, 2013 at 0742 (HST)

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

Master of the Vessel: Captain Rick Meyer

OTG Marine Technicians: Trevor Goodman, Vic Polidoro, and Jennie Mowatt

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 February 11th 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 February 12th, 13th, and 14th.
- 3) Station 50, the site of WHOTS-9 Mooring (anchor position 22° 46.071'N 157° 53.956'W) was to be occupied on February 14th 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 February 14th 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 February 11th. 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 one 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 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 February 13th.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on February 13th. The Gas Array was to be recovered on February 14th.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on February 12th and 13th at Station ALOHA.

The Hyperpro was to be deployed for a half-hour period near noon time on February 11th, 12th and 14th.

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 February 14th.

A trace metal free sample was to be collected by the ATE sampler in the late morning of February 13th.

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 February 14th.

After recovering both arrays, the ship was to transit back to Station ALOHA to conduct an ACS/AC9/FRRf/LISST cast, and a Hyperpro cast. Once the optics profiles were complete, 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 re-position within Station ALOHA for the deployment of the APEX floats.

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, $p\text{CO}_2$ system, underway fluorometer and the meteorological package.

2. SCIENCE PERSONNEL

Participant	Title	Affiliation/HOT Group
Susan Curless	Research Associate	UH/BEACH
Dan Sadler	Research Associate	UH/BEACH
Brett Updyke	Research Associate	UH/BEACH
Adriana Harlan	Research Associate	UH/BEACH
Lance Fujieki	Research Associate	UH/BEACH
Shimi Rii	Graduate Student	UH/BEACH
Blake Watkins	Marine Engineer	UH/BEACH
Christopher Schvarcz	Graduate Student	UH/CMORE
Benedetto Barone	Postdoctoral Researcher	UH/CMORE
Daniela Böttjer	Postdoctoral Researcher	UH/CMORE
Jefrey Snyder	Marine Technician	UH/PO
Fernando Santiago-Mandujano	Research Associate	UH/PO
Cameron Fumar	Research Associate	UH/PO
Daniel McCoy	Data Assistant	UH/PO
Lauren Price	Volunteer	PO
Byron Blomquist	Associate Researcher	UH
Sarah Searson	Research Associate	UH/CMORE
Vic Polidoro	Marine Technician	OTG
Jennie Mowatt	Marine Technician	OTG
Trevor Goodman	Marine Technician	OTG

3. GENERAL SUMMARY

Operations at Station ALOHA were conducted as planned. One small delay in the schedule occurred when a screw on the trawl winch traveling spindle of the level wind came loose and needed to be re-tightened.

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. One near bottom cast was completed at Station Kaena.

The Sediment Traps, Primary Production Array, and Gas Array were all deployed and recovered successfully. All arrays drifted to the northwest of the center of Station ALOHA.

Six net tows for the core HOT zooplankton collection were completed successfully; three during the day, and three during the night.

The Hyperpro was deployed and recovered successfully three times near noon.

The optical package ACS/AC9/FRRf/LISST was deployed two times during the cruise, once around noon and once in the early morning.

The ATE was deployed and recovered successfully. One trace metal sample was collected.

The fluorometer, thermosalinograph, $p\text{CO}_2$ system, and the ship's meteorological suite ran without interruption during the cruise. The broad band/narrow band Ocean Surveyor ADCP was working correctly during the cruise, but the Workhorse ADCP was out of service.

Winds were from the east northeast throughout the cruise at ~15-20 kts on the first day of the cruise decreasing to ~10-15 kts for the remainder of the cruise. Seas were slight ~1-2 ft with a 5 ft easterly swell. The prevailing currents were to the north northwest of the center of Station ALOHA.

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

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

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

5. DAILY REPORT OF ACTIVITIES (HST)

February 11, 2013

0850- Depart Snug Harbor

0920- Science Party Safety Briefing with Captain

0945- Fire and Abandon Ship Drills

1130- Arrive Station Kahe

1145- Weight cast to 500 m

1215- End of weight cast

1228- Hyperpro

1313- End Hyperpro

1320- S2C1 1000 m CTD

1500- End of cast

1505- Transit to Station ALOHA

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2240- Arrive Station ALOHA
2251- Sediment Trap Deployment Begins
2321- Sediment Trap Array Released 22° 45.040'N 158° 2.2038'W

February 12, 2013

0148- S2C1 1000 m CTD
0315- End of cast
0415- Primary Production Array Deployment begins
0439- Primary Production Array Released 22° 44.972'N 158° 0.032'W
0502- S2C2 near bottom CTD
0845- Level wind on trawl winch problem with screw, repair begins
0910- Repairs complete, continue with CTD cast
0942- End of Cast
0945- Transit to pump ship's tanks
1035- Net Tow
1115- End of net tow
1145- S2C3 1000 m CTD
1309- End of cast
1317- Hyperpro
1424- S2C4 1000 m CTD
1542- End of cast
1558- Transit to pump ship's tanks
1659- S2C5 1000 m CTD
1804- End of cast
1840- Recovery of the Primary Production Array 22° 48.634'N 158° 0.609'W
1910- End of recovery
1955- S2C6 1000 m CTD
2114- End of cast
2200- Net Tow
2230- Second Net Tow
2308- S2C7 1000 m CTD

February 13, 2013

0030- End of cast
0158- S2C8 1000 m CTD
0304- End of cast
0345- Gas Array Deployment 22° 35.04'N 158° 01.99'W
0405- Array deployment complete
0444- S2C9 1000 m CTD
0550- End of cast
0746- S2C10 1000 m CTD
0856- End of cast
0906- Transit to pump ship's tanks
1000- Net Tow
1033- End of tow
1050- ATE
1116- End of ATE
1118- S2C11 1000 m CTD
1227- End of cast
1238- Net tow
1309- End of tow
1341- S2C12 1000 m CTD
1516- End of cast
1655- S2C13 1000 m CTD
1805- End of cast
1820- Transit to pump ship's tanks

1953- S2C14 1000 m CTD
2058- End of cast
2202- Net Tow
2236- End of net tow
2306- S2C15 near bottom CTD cast

February 14, 2013

0051- 10 m off the bottom
0232- End of cast
0305- AC9/FRRf started, but delayed to switch winches
0330- AC9/FRRf deployed
0500- End of Optics cast
0504- Transit to Gas Array
0618- Arrive at Gas Array
0636- Gas Array Recovered 22° 51.598'N 158° 7.183'W
0640- Transit to Sediment Traps
0745- Arrive at Sediment Traps
0809- Traps Recovered 22° 57.306'N 158° 2.009'W
0811- Transit Station ALOHA
1000- AC9/FRRf
1145- End of cast
1200- Hyperpro
1249- Hyperpro on board
1305- S50C1 200 m yo-yo cast
1433- End of cast, 5 cycles complete
1525- APEX floats deployed 22° 46.013'N 157° 53.96'W
1530- Transit to Station Kaena
2048- Arrive Station Kaena
2057- S6C1 near bottom CTD
2257- End of cast
2305- Transit Snug Harbor

February 15, 2013

0648- Pass H buoy
0742- Secure to Pier 45 Snug Harbor

HOT program sub-components:

Investigator	Project	Institution
Matt Church	Core Biogeochemistry	UH
Dave Karl		
Bob Bidigare		
Roger Lukas	Hydrography	UH
Mike Landry	Zooplankton dynamics	SIO
Ricardo Letelier	Optical measurements	OSU
Ancillary programs:		
Charles Keeling	CO ₂ dynamics and intercalibration	SIO
Paul Quay	DI ¹³ C	SIO
Matt Church	Diversity and activities of nitrogen-fixing microorganisms	UH
Additional programs:		
Dave Karl (via Sam Wilson)	Reduced gases in the upper ocean: The cycling of methane, sulfide and nitrous oxide	UH/Moore
Matt Church (via Donn Viviani)	Bacterial production and EOC at Station ALOHA	UH
Matt Church (via Shimi Rii)	Investigation of temporal changes in picoeukaryote diversity at Station ALOHA	UH
Henrieta Dulaiova and Ken Buesseler	Japanese radionuclide release sampling	UH
Adina Paytan	O ¹⁸ natural abundance	UCSC
Dave Karl (via Mariona Segura-Noguera)	Sample collection for dissolved inorganic and organic nitrogen determination	UH
Grieg Steward (via Christopher Schvarcz)	Viral Dynamics at Station ALOHA and surface water collection for virus and phytoplankton culturing	UH
Erica Goetze	Temporal stability of copepod populations at Station ALOHA	UH
Dave Karl (via Benedetto Barone)	Collection of flow cytometry quality control samples	UH
Lloyd Hihara and Stuart Donachie (via Jan Kealoha)	Characterizing microbiologically induced corrosion in seawater/biodiesel mixtures	UH
John Zehr (via Brandon Carter)	UCYN-A2/3 variant search	UCSC
Ken Johnson, Steve Riser and Dana Swift	APEX profiling instrument deployments	UW/MBARI
Dave Karl (via Sam Wilson)	Role of nitrite in N ₂ O production	UH
Barry Huebert and Byron Blomquist	Field testing of an underway dimethylsulfide analyzer	UH
Scott Turn	Evaluation of second generation biofuels	HNEI/UH
Nicholas Fisher (via Daniel Madigan and Brian Popp)	Tracking transport of Fukushima-derived radionuclides by pelagic species	Stanford/UH
Dave Karl (via Sandra Martinez-Garcia and Daniela Del Valle)	LNSW water collection for method testing	UH