

# HOT-264: Chief Scientist Report

Chief Scientist: Susan Curless

**R/V *Kilo Moana***

June 29-July 3, 2014

Cruise ID: **KM14-14**

Departed: June 29, 2014 at 0900 (HST)

Returned: July 3, 2014 at 0802 (HST)

Vessel: **R/V *Kilo Moana***, University of Hawaii

Master of the Vessel: Captain Jay Chavez

Chief Scientist: Susan Curless, University of Hawaii

OTG Marine Technicians: Dave Hashisaka and Justin Smith

## 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 June 29th 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 June 30th, July 1st, and 2nd.
- 3) Station 52, the site of WHOTS-10 Mooring (anchor position 22° 40.12'N 157° 57.01'W) was to be occupied on July 2nd 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 2nd 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 June 29th. 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 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 July 1st.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on July 1st. The Gas Array was to be recovered on July 2nd.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on June 30th and July 1st at Station ALOHA.

The Hyperpro was to be deployed around the 1400-1430 time slot on June 29th, 30th and July 2nd. This time slot allows for a better matchup with both the AQUA and S-NPP satellites.

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 July 2nd.

A trace metal free sample was to be collected by the ATE sampler on July 1st.

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 2nd.

After recovering both arrays, the ship was to transit back to Station ALOHA to conduct an ACS/AC9/FRRf/LISST cast. Once the AC9/FRRf 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.

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

## 2. SCIENCE PERSONNEL

<b>Participant</b>	<b>Title</b>	<b>Affiliation</b>
Susan Curless	Research Associate	UH
Dan Sadler	Research Associate	UH
Stuart Goldberg	Postdoctoral Researcher	UH
Lance Fujieki	Research Associate	UH
Brenner Wai	Technician	UH
Blake Watkins	Marine Engineer	UH
Christopher Schvarcz	Graduate Student	UH
Karin Björkman	Research Specialist	UH
Ken Doggett	Research Associate	UH
Grieg Steward	Professor	UH
Jefrey Snyder	Marine Technician	UH
Fernando Santiago-Mandujano	Research Associate	UH
Daniel McCoy	Research Associate	UH
Robert (Walt) Deppe	Research Associate	UH
Crystal Coughlin	Graduate Student	HPU
Estefania Escalante	Undergraduate Student	HPU
Jim Foley	Marine Educator	UH
Weldon Wichman	STARS Participant	Molokai High School
Teresa Duran	STARS Participant	Mililani Middle School
Darienne Dey	STARS Participant	University Lab School
Nick Matthews	MATE Intern	OTG
Justin Smith	Marine Technician	OTG
Dave Hashisaka	Marine Technician	OTG

### 3. GENERAL SUMMARY

Operations during the cruise ran as scheduled. The .681 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, 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 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.

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 June 29th, 30th and July 2nd.

The optical package ACS/AC9/FRRf/LISSST was deployed two times during the cruise, once around noon and once in the early morning on July 2nd. The night time deployment was for only one profile due to time constraints and battery pack issues.

The fluorometer, ADCP, thermosalinograph,  $p\text{CO}_2$  system, and the ship's meteorological suite ran without interruption during the cruise.

The winds were from the east at 10-15kts, with slight seas. An easterly swell of 3-5ft was 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)

#### **June 29th, 2014**

0900- Depart Snug Harbor

0950- Science party briefing with the Captain

1015- End of meeting

1020- Fire and abandon ship drills

1145- Arrive Station Kahe

1200- Weight cast to 500 m

1231- End of weight cast

1249- Hyperpro

1259- Recovered hyperpro due to knots in the line

1305- Re-deployed hyperpro

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1352- End of Hyperpro  
1359- S1C1 1000 m CTD  
1526- End of cast  
1530- 20 m niskin cast  
1540- End of cast  
1545- Transit Station ALOHA  
2350- Arrive Station ALOHA, 3 nm due west of the center  
2358- Begin Sediment trap deployment

### **June 30th, 2014**

0018- Sediment Traps deployed 22° 45.048'N 158° 3.255'W  
0156- S2C1 1000 m CTD  
0300- End of cast  
0400- Begin PP array deployment  
0415- Array deployed 22° 45.00'N 158° 2.174'W  
0444- S2C2 Near bottom CTD cast  
0631- 5m off the bottom 22° 45.02'N 158° 0.078'W  
0831- End of cast  
0840- Transit to pump ship's tanks  
1047- S2C3 1000 m CTD  
1217- End of cast  
1227- Net Tow  
1300- End of tow  
1329- Hyperpro  
1417- Hyperpro recovered  
1520- S2C4 1000 m CTD  
1538- End of cast  
1654- S2C5 1000 m CTD  
1758- End of cast  
1917- Recover Primary Production Array 22° 44.565'N 158° 7.550'W  
1935- End of recovery  
1954- S2C6 1000 m CTD  
2120- End of cast  
2200- Net Tow  
2220- End of tow  
2225- Second Net tow  
2255- End of tow  
2303- S2C7 1000 m CTD

### **July 1, 2014**

0012- End of cast  
0154- S2C8 1000 m CTD  
0300- End of cast  
0310- Transit 1 mile east for Gas Array Deployment Site  
0400- Gas Array Deployment 22° 44.67'N 158° 03.48'W  
0418- End of deployment  
0447- S2C9 1000 m CTD  
0556- End of cast  
0600- Transit to pump ship's tanks  
0758- S2C10 1000 m CTD  
0907- End of cast  
1000- Net Tow  
1030- End of net tow  
1046- ATE  
1118- S2C11 1000 m CTD  
1227- End of cast

1242- Net Tow  
1313- End of net tow  
1350- S2C12 1000 m CTD  
1503- End of cast  
1530- STARS hand net  
1539- End of hand net  
1540- Transit to pump ship's tanks  
1700- S2C13 1000 m CTD  
1804- End of cast  
1958- S2C14 1000 m CTD  
2107- End of cast  
2200- Net Tow  
2230- End of tow  
2253- S2C15 near bottom CTD cast

### **July 2, 2014**

0052- 7 m off the bottom 22° 45.001'N 158° 0.007'W  
0229- End of cast  
0231- Transit to pump ship's tanks  
0327- AC9/FRRf  
0420- End of AC9/FRRf  
0425- Transit to Gas Array  
0540- Gas Array recovered 22° 44.434'N 158° 11.109'W  
0547- Transit to Sediment Traps  
0658- Sediment Trap recovered 22° 38.056'N 158° 14.535'W  
1008- AC9/FRRf  
1048- Recovered  
1051- Re-deployed  
1140- End of AC9/FRRf ops  
1156- S52C1 200 m yo-yo  
1317- End of cast, 4 cycles complete  
1330- Hyperpro  
1420- End of Hyperpro  
1430- Transit to Kaena  
2012- Arrive Station Kaena  
2015- S6C1 near bottom CTD  
2217- End of cast  
2226- Transit to Snug Harbor

### **July 3, 2014**

0702- H Buoy  
0802- Arrive Snug Harbor

**HOT program sub-components:**

<b>Investigator</b>	<b>Project</b>	<b>Institution</b>
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
<b>Ancillary programs:</b>		
Andrew Dickson	CO <sub>2</sub> dynamics and intercalibration	SIO
Paul Quay	DI <sup>13</sup> 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 diurnal variability of O <sub>2</sub> /Argon ratios	UH
Grieg Steward	Water collection for cultures and SEM	UH
Lydia Baker	Water collection for cultures	UH
Paul Bienfang	Collaborative Research: Application of Transcriptomics to Understanding Mechanisms of Stress Response and Toxin Production in Microbes in Tropical Marine Environments.	UH/Stanford/ Rutgers
Jim Foley	STARS –Science Teachers Aboard Research Ships	UH