

HOT-273: Chief Scientist Report

Chief Scientist: Susan Curless

R/V *Kilo Moana*

June 18-22, 2015

Cruise ID: **KM15-10**

Departed: June 18, 2015 at 0857 (HST)

Returned: June 22, 2015 at 0805 (HST)

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

Master of the Vessel: Captain Jay Chavez

OTG Marine Technicians: Trevor Young, Steve Tottori, and Scott Reed

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 18th 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 18th, 19th, 20th and 21st.
- 3) Station 50, the site of WHOTS-11 Mooring (anchor position 22° 45.981'N 157° 53.964'W) was to be occupied on June 21st 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 June 21st for approximately 3 hours.

Upon arrival to Station Kahe a ~1300 lb. weight-test cast to 600 m, one CTD cast to 1000 m, and a Hyperpro cast were to be conducted on the afternoon of June 18th. 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 200 m cast to collect water for experiments and one 1000 m cast to collect water for 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, and 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 June 20th.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on June 20th. The Gas Array was to be recovered on June 21st.

An Automated Trace Element (ATE) sampler was to be deployed to a depth of 10 m on June 20th.

Sea glider #146 was to be deployed the afternoon of June 20th.

A plankton net was to be towed three times between 1000-1400, and three times between 2200-0200 for 30 minute intervals on June 19th and 20th at Station ALOHA.

The Hyperpro was to be deployed for a half-hour period near noon time on June 18th, 19th, and 21st.

An optics package including a Wet Labs AC9, 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 June 21st.

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 June 21st.

After recovering the arrays, the ship was to transit to Station ALOHA to conduct an optics cast. Once that operation was 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 to conduct a Hyperpro cast.

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

2. SCIENCE PERSONNEL

Participant	Title	Affiliation
Susan Curless	Research Associate	UH
Dan Sadler	Research Associate	UH
Lance Fujieki	Research Associate	UH
Alexa Nelson	Research Associate	UH
Brenner Wai	Research Associate	UH
Eric Shimabukuro	Research Associate	UH/SCOPE
Tara Clemente	Research Associate	UH/SCOPE
Blake Watkins	Marine Engineer	UH
Natalie Dornan	Undergraduate Student	UH
Chris Schvarcz	Graduate Student	UH
Brie Maillot	Technician	UH
Roman Battisti	Technician	UH
Victoria Campbell	Research Technician	USC/SCOPE
Sarah Hu	Graduate Student	USC/SCOPE
Minda Monteagudo	Graduate Student	UCSB
Jefrey Snyder	Marine Technician	UH
Adela Dumitrascu	Student Assistant	UH
Daniel McCoy	Research Associate	UH
Robert (Walt) Deppe	Research Associate	UH
Chris Jury	Graduate Student	UH
Casey Moss	Undergraduate Student	UH
Greyson Adams	Research Associate	UH/SCOPE
James Burkitt	Research Associate	UH/SCOPE
Steve Tottori	Marine Technician	OTG
Trevor Young	Marine Technician	OTG
Scott Reed	Marine Technician	OTG

3. GENERAL SUMMARY

Operations at Station ALOHA were conducted as planned with the exception of the recovery of the sediment traps which was postponed until after operations at Station ALOHA were complete. The presence of a strong eddy centered to the NW of Station ALOHA provided a strong (~0.8kt) current to the south which caused all of the arrays to drift quickly. The sediment traps drifted 30 miles south of Station ALOHA, making it more efficient to recover them on the way to Station Kaena.

One 1000 m CTD cast was completed at Station Kahe. Two near bottom CTD casts, one 200 m CTD cast 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 CTD cast was completed at Station Kaena.

The Sediment Traps, Primary Production Array, and Gas Array were 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 was successfully deployed on June 20th.

The Hyperpro casts (three cycles each) were successfully conducted three times around the scheduled 1400-1430 time slot on June 18th, 19th, and 21st.

The optical package (ACS/Sea Bird Seacat/LISST) was deployed two times during the cruise, once around noon and once in the early morning on June 21st.

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

Winds during the cruise were from the northeast at ~15-20kts. Seas were calm and a ~3-5ft northeasterly swell was present throughout the cruise.

We arrived at Snug Harbor for off-loading on June 22nd, at 0805 (HST).

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 entire 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 18, 2015

0857- Depart Snug Harbor

0945- Safety briefing with the Captain

1100- Secure from all drills

1147- Arrive Station Kahe

1150- Weight cast to 600 m

1215- Stop weight cast @520 m to inspect bad spots on wire. Outer part of cable is unwrapping; sections are taped and marked with white paint.

1232- Recover weight

1245- Hyperpro

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1335- S1C1 1000 m cast
1457- End of cast
1459- Transit ALOHA
2254- Arrive Station ALOHA
2320- Sediment Trap Deployment 22°44.890'N 158°3.108'W
2345- S2C1 200 m cast

June 19, 2015

0024- End of cast
0150- S2C2 1000 m CTD
0257- End of cast
0400- Primary Production Array Deployment begins
0413- Array released 22 ° 45.009'N 158° 1.257'W
0448- S2C3 Near bottom CTD
0651- @ 8m off the bottom 22°45.011'N 158°0.021'W
0807- Stop at 2113m on upcast to inspect bad section of wire
0914- End of cast
0917- Transit to pump ship's tanks
1055- S2C4 1000 m CTD
1229- End of cast
1248- Net Tow
1318- End of tow
1335- Hyperpro
1412- End of Hyperpro
1421- S2C5 1000 m CTD
1536- End of cast
1608- Net tow (MM)
1648- End of tow
1654- S2C6 1000 m CTD
1800- End of cast
1913- Recover PP Array 22°36.31'N 158°2.317'W
1920- Array on deck, transit to ALOHA
2003- S2C7 1000 m CTD
2125- End of cast
2202- Net tow
2224- End
2235- Net tow
2303- End
2319- S2C8 1000 m CTD

June 20, 2015

0015- End of cast
0020- Transit to pump tanks
0152- S2C9 1000 m CTD
0258- End of cast
0400- Gas Array Deployment begins
0418- Gas Array Deployed 22°44.995'N 158°1.010'W
0453- S2C10 1000 m CTD
0602- End of cast
0658- Net tow (MM)
0730- End of tow
0748- S2C11 1000 m CTD
0906- End of cast
0911- DC hand net tow
0921- End of tow
0924- Transit to pump ship's tanks
1013- Net tow
1041- End of tow
1050- ATE
1120- End of ATE
1123- S2C12 1000 m CTD
1231- End of cast

1245- Net tow
1315- End of net tow
1343- Deployment of Sea Glider #146, 22°46.228'N 157°54.994'W
1415- S2C13 1000 m CTD
1524- End of cast
1533- Net tow (MM)
1604- End of tow
1607- Transit to pump tanks
1710- S2C14 1000 m CTD
1815- End of cast
1820- Net Tow (MM)
1901- End of cast
1906- DC hand net tow
1910- End of cast
1958- S2C15 1000 m CTD
2115- End of cast
2118- Transit to pump tanks
2200- Net tow
2232- End of tow
2241- DC hand net tow
2248- End of tow
2320- S2C16 near bottom CTD

June 21, 2015

0107- 5 m off the bottom 22°45.026'N 158°0.010'W
0250- End of cast
0311- Optics
0409- Recovered
0412- Optics
0501- Recovered
0506- Transit to Gas Array
0654- Recovery of Gas Array 22°26.238'N 158°3.272'W
0707- Array on board, transit to WHOTS
0915- Arrive WHOTS
0932- S50C1 200 m yo-yo
1053- End of cast, 5 cycles complete
1105- Optics
1154- Recovered
1200- Optics
1248- Recovered
1303- Hyperpro
1338- End of hyperpro
1350- Transit Sediment Traps
1801- Begin Sediment Trap Recovery 22°18.9'N 158°16.3'W
1820- Transit to Station Kaena
2048- Arrive Station Kaena
2054- S6C1 Near bottom CTD
2154- 16 m off the bottom 21°51.018'N 158°16.296'W
2252- End of cast
2300- Transit Snug Harbor

June 22, 2015

0445- Caley Crane weight cast testing
0545- End of testing
0805- Arrive Snug Harbor

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
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 ₂ /Argon ratios	UH
Ed DeLong Dave Karl Matt Church	SCOPE DNA collection	UH
Angelique White	SCOPE Diazotroph Microscopy	OSU
Victoria Campbell Sarah Hu	SCOPE: Protistan biodiversity, trophic activities and biogeochemistry at Station ALOHA	USC
Minda Monteagudo	Foraminifera Proxy Calibration	UCSB
Dave Karl Ed DeLong	SCOPE: Sea Glider Deployment	UH