HOT-280: Chief Scientist Report

Chief Scientist: Susan Curless
R/V *Kilo Moana*
January 11-15, 2016

Cruise ID: **KM16-01**
Departed: January 11, 2016 at 0900 (HST)
Returned: January 15, 2016 at 0800 (HST)
Vessel: **R/V *Kilo Moana***
Master of the Vessel: Captain Jay Chavez
OTG Marine Technicians: Jeff Koch and Sonia Brugger

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 January 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 January 11th, 12th, 13th and 14th.
3) Station 52, the site of WHOTS-12 Mooring (anchor position 22° 40.061' N, 157° 56.9654' W) was to be occupied on January 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 January 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 January 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 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 January 13th.

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

An Automated Trace Element (ATE) sampler was to be deployed to a depth of 10 m on January 13th.

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

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

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 January 14th.

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 January 14th.

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 52 to conduct a one-hour 200 m CTD yo-yo cast. Once operations at Station 52 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, pCO_2 system, and the meteorological package.

2. SCIENCE PERSONNEL

Participant	**Title**	**Affiliation**
Susan Curless	Research Associate	UH
Dan Sadler	Research Associate	UH
Brenner Wai	Research Associate	UH
Blake Watkins	Marine Engineer	UH
Brie Maillot	Technician	UH
Roman Battisti	Technician	UH
Greyson Adams	Research Associate	UH
Jim Burkitt	Research Associate	UH
Eric Shimabukuro	Research Associate	UH
Tara Clemente	Research Associate	UH
Jefrey Snyder	Marine Technician	UH
Daniel McCoy	Research Associate	UH
Robert (Walt) Deppe	Research Associate	UH
Fernando Santiago-Mandujano	Research Associate	UH
Kellen Rosburg	Research Associate	UH
Karin Björkman	Research Specialist	UH
Ken Doggett	Research Associate	UH
Markus Lindh	Postdoctoral Researcher	UH
Sara Ferrón-Smith	Postdoctoral Researcher	UH
Abby Bate	Technician	UH
Timothy Burrell	Postdoctoral Researcher	UH
Justine Flotron	Undergraduate Student	HPU
Alisha Summers	Undergraduate Student	UH
Sonia Brugger	Marine Technician	OTG
Jeff Koch	Marine Technician	OTG

3. GENERAL SUMMARY

Operations during the cruise were conducted as planned with only minor delays to operations on two separate occasions.
The first delay was at Station Kahe when beginning the weight cast there was no tension readout on the winch display. Approximately 45 minutes were spent troubleshooting the problem before an error in the LCI-90 syntex data logging code was found. Once the error was fixed, tension read out was present on all winch displays and operations continued.
The second delay was at Station ALOHA. During the first CTD cast the winch display in the doghouse did not have a working winch speed readout. During the CTD downcast the AB on deck monitored speed in the winch room and called up the speed to the AB in the doghouse. Once the CTD reached the bottom of the cast (1020 dbar), the winch controls were re-set by OTG. After ten minutes into the upcast, the speed readout was once again available in the doghouse. Speed readout was not working on the displays in the labs throughout the cruise. Tension and wire out were the only readings displayed on the monitors in the labs.

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 CTD cast was completed at Station Kaena. The .680 wire and trawl winch were used for CTD operations.

The Sediment Trap array was deployed successfully with the SeaFox pH sensor on the array. Upon recovery it was found that the line had been severed below the SeaFox and the PIT traps, remaining line, and weight were lost.
The 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 January 13th.

The Hyperpro casts (three cycles each) were successfully conducted three times around the scheduled 1400-1430 time slot on January 11th, 12th, and 14th.

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 January 14th.

The fluorometer, ADCP, thermosalinograph, and the ship's meteorological suite ran without interruption during the cruise. The *p*CO2 system has been sent out for calibration and was not on board for this cruise.

Winds during the cruise were from the south at ~5-10kts. Seas were calm and a ~6-8ft northwesterly swell was present during the first two days of the cruise and then decreased to ~2-3ft for the remainder of the cruise.

We arrived at Snug Harbor for off-loading on January 15th, at 0800 (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)

January 11, 2016
0900- Depart Snug
1005- Safety Briefing with the Captain
1027- Fire and Abandon Ship Drills
1108- End of drills
1135- Arrive Station Kahe
1150- Weight Cast delay - no tension readout
1234- Error in Syntex code found and fixed
1238- Tension readout working
1241- Weight cast to 500m.
1314- End of cast
1330- Hyperpro
1405- End of Hyperpro
1408- S1C1 1000m CTD cast
1438- Slow speed to look at damaged section of wire
1537- End of cast
1540- Transit Station ALOHA
1550- Drifter deployment #1 21° 21.46'N 158° 16.679'W
1552- Drifter deployment #2 21° 21.516'N 158° 16.682'W
1554- Drifter deployment #3 21° 21.07'N 158° 16.689'W
2317- Arrive ALOHA, 3nm west of center, begin sediment trap deployment
2344- Sediment Trap Deployment complete 22° 44.992'N 158° 3.254'W

January 12, 2016
0151- S2C1 1000m CTD
0202- slow winch speed - no speed display in the doghouse, speed being told to winch operator in dog house by AB in winch room, OTG troubleshooting
0232- Bottom of cast, OTG re-set winch controls, speed readout still not working.
0241- Up cast starts, display still not working.
0250- Display working
0315- End of cast
0411- Deploy PP array 22° 44.94'N 158° 1.06'W
0431- Array released
0457- S2C2 near bottom CTD
0651- 5m off the bottom
0856- End of cast
0900- Transit to pump ship's tanks
1034- S2C3 1000m CTD
1202- End of cast
1238- Net Tow
1315- End of cast
1330- Hyperpro
1405- End of Hyperpro
1410- S2C4 1000m CTD
1520- End of cast 4
1659- S2C5 1000m CTD
1812- End of cast
1815- Transit to recover the PP array
1848- Begin Recovery of the Primary Production Array 22° 45.049'N 158° 1.015'W
1903- End of recovery
1955- S2C6 1000m CTD
2117- End of cast
2220- Net Tow
2246- End of net tow
2250- Net Tow
2316- End of net tow
2323- S2C7 1000m CTD

January 13, 2016
0035- End of cast

0040- ISUS data was bad on cast 7, will re-seat connector before cast 8
0159- S2C8 1000m CTD
0303- End of cast
0405- Deploy Gas Array 22° 44.984'N 158° 1.082'W
0419- End of deployment
0451- S2C9 1000m CTD
0556- End of cast
0600- Transit to pump ship's tanks
0752- S2C10 1000m CTD
0859- End of cast
1005- Net Tow
1032- End of tow
1047- ATE
1118- End of ATE
1126- S2C11 1000m CTD
1227- End of cast
1238- Net Tow
1310- End of tow
1345- S2C12 1000 m CTD
1509- End of cast
1515- Transit to pump ship's tanks
1655- S2C13 1000 m CTD
1806- End of cast
1957- S2C14 1000 m CTD
2119- End of cast
2158- Net Tow
2225- End of tow
2230- ISUS removed
2358- S2C15 near bottom CTD, conducted 0.3nm North of center to avoid Gas Array

January 14, 2016
0052- 8m off the bottom 22° 45.131'N 157° 59.978'W
0250- End of cast
0308- Optics cast
0401- End of cast
0405- Optic cast
0455- End of cast
0707- Gas Array recovery 22° 43.016'N 158° 1.922'W
0718- End of recovery, transit to sediment traps
0800- Sediment trap Recovery 22° 40.152'N 158° 1.570'W
0815- Transit to WHOTS
0845- S52C1 200 m yo-yo
1009- End of cast, 4 cycles complete
1015- Transit to pump ship's tanks
1058- Optics cast
1147- End of cast
1150- Optics cast
1240- End of cast
1335- Hyperpro
1420- End of Hyperpro
1425- Transit Station Kaena
1946- Arrive at Station Kaena
1950- S6C1 near bottom CTD
2215- End of cast
2219- Transit Snug Harbor

January 15, 2016
0800- Arrive Snug Harbor for full offload

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
Erica Goetze	Temporal stability of copepod populations at Station ALOHA	UH
Sara Ferrón-Smith	Determination of net community production from the diurnal variability of O2/Argon ratios	UH
Ed DeLong	SCOPE: DNA collection	UH
Angelique White	SCOPE: Diazatroph Microscopy	OSU
Virginia Armbrust	SCOPE: Seaflow Underway Flow Cytometer	UW
Victoria Futch	SLDMB float deployement	UH
Ken Doggett and Karin Björkman	3H Leucine and 14C Bicarbonate uptake by bacterioplankton	UH
Markus Lindh	Determination of colonization and extinction rates among bacterioplankton assemblages	UH
Sara Ferrón-Smith, Abby Bate, and Tim Burrell	Gross primary production measurements using 18O method, and ETS measurements of bacterial respiration	UH