

HOT-254: Chief Scientist Report

Chief Scientist: Susan Curless

R/V Kilo Moana

September 10-14, 2013

Cruise ID: **KM1315**

Departed: September 10, 2013 at 0850 (HST)

Returned: September 14, 2013 at 0730 (HST)

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

Master of the Vessel: Captain Rick Meyer

Chief Scientist: Susan Curless, University of Hawaii

OTG Marine Technicians: Trevor Young and Ben Colello

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 September 10th 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 September 11th, 12th, and 13th.
- 3) Station 52, the site of WHOTS-10 Mooring (anchor position 22° 40.12'N 157° 57.01'W) was to be occupied on September 13th 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 September 13th 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 September 10th. 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 September 12th.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on September 12th. The Gas Array was to be recovered on September 13th.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on September 11th and 12th at Station ALOHA.

The Hyperpro was to be deployed from 1400-1430 on September 10th, 11th and 13th. 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 September 13th.

A trace metal free sample was to be collected by the ATE sampler on September 12th.

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 September 13th.

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 and the deployment of an APEX float.

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

Participant	Title	Affiliation
Benedetto Barone	Postdoctoral Researcher	UH
Susan Curlless	Research Associate	UH
Dan Sadler	Research Associate	UH
Stuart Goldberg	Postdoctoral Researcher	UH
Brett Updyke	Research Associate	UH
Adriana Harlan	Research Associate	UH
Lance Fujieki	Research Associate	UH
Blake Watkins	Marine Engineer	UH
Christopher Schvarcz	Graduate Student	UH
Jefrey Snyder	Marine Technician	UH
Fernando Santiago-Mandujano	Research Associate	UH
Joseph Gum	Research Associate	UH
Daniel McCoy	Research Associate	UH
Cianna Beltran	Volunteer	UH
Conor Jerolmon	Undergraduate Student	UH
Trevor Young	Marine Technician	OTG
Ben Colello	Marine Technician	OTG

3. GENERAL SUMMARY

Operations at Station ALOHA were conducted as planned. 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. All arrays drifted to the southwest of their respective deployment sites.

The trawl winch and 0.681 wire were used with the A-Frame for CTD operations.

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 was deployed and recovered successfully three times in the 1400-1430 time slot.

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

The fluorometer, ADCP, thermosalinograph, and the ship's meteorological suite ran without interruption during the cruise.

The $p\text{CO}_2$ system was not operational during the cruise due to valve repairs.

Winds were from the northeast at ~10-15 kts throughout the cruise. Seas were slight with a 5-6 ft northwesterly swell.

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

The R/V *Kilo Moana* provided good ship support for our work. Captain Rick Meyer 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)

September 10, 2013

0850- Depart Snug Harbor
0915- Science Party Briefing with the Captain
0943- Fire and abandon ship drill
1130- Arrive Station Kahe
1146- Weight cast to 500 m
1225- End of weight cast
1246- S1C1 1000 m CTD
1415- End of cast
1420- Hyperpro
1510- End of Hyperpro
1520- Transit to Station ALOHA
2256- Arrive at Station ALOHA, 2 miles west of Center
2320- Sediment Trap Deployment 22° 45.045'N 158° 2.2'W

September 11, 2013

0150- S2C1 1000 m CTD
0304- End of cast
0434- Primary Production Array Deployment begins
0452- Array Released 22° 44.976'N 158° 1.014'W
0512- S2C2 near bottom CTD cast
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0706- 5 m off the bottom 22° 45.010'N 158° 0.047'W
0917- End of cast
0930- Transit to Pump Ship's tanks
1015- Net Tow
1050- End of net tow
1114- S2C3 1000 m CTD cast
1250- End of cast
1345- Hyperpro
1424- End of Hyperpro
1427- S2C4 1000 m CTD
1543- End of cast
1550- Transit to pump ship's tanks
1653- S2C5 1000 m CTD
1720- End of cast
1855- Recover PP Array 22° 44.041'N 158° 1.93'W
1907- End of recovery
1948- S2C6 1000 m CTD
2112- End of cast
2201- Net Tow
2232- Net Tow
2253- End of net tows
2257- S2C7 1000 m CTD

September 12, 2013

0012- End of cast
0017- Transit to pump ship's tanks
0156- S2C8 1000 m CTD
0305- End of cast
0400- Deployment of Gas Array
0425- Array released 22° 44.989'N 158° 1.031'W
0446- S2C9 1000 m CTD
0556- End of cast
0600- Transit to pump ship's tanks
0758- S2C10 1000 m CTD
0909- End of cast
1000- Net Tow
1030- End of net tow
1035- ATE
1105- End of ATE
1110- S2C11 1000 m CTD
1216- End of cast
1231- Net Tow
1305- End of net tow
1353- S2C12 1000 m CTD
1512- End of cast
1521- Transit to pump ship's tanks
1653- S2C13 1000 m CTD
1824- End of cast
1953- S2C14 1000 m CTD
2103- End of cast
2204- Net Tow
2233- End of net tow
2257- S2C15 near bottom CTD

September 14, 2013

0236- End of cast

0257- AC9/FRRf
0344- End of first profile
0349- AC9/FRRf
0439- End of second profile
0457- Transit to Gas Array
0600- Begin Gas Array Recovery 22° 43.76'N 158° 03.63'W
0623- Recovery Complete
0627- Transit to Sediment Traps
0711- Begin Recovery of Traps 22° 40.278'N 158° 5.642'W
0741- Recovery complete, transit to pump ship's tanks
0952- AC9/FRRf
1049- End of first profile
1055- AC9/FRRf
1140- End of second profile
1145- Transit to Station 52
1212- S52C1 200 m yo-yo
1333- End of cast, 4 cycles complete
1337- Transit to Station ALOHA for Hyperpro
1352- Hyperpro
1424- End of Hyperpro
1500- APEX Float deployment 22° 40.679'N 157° 58.881'W
1515- Transit to Station Kaena
1957- Arrive Station Kaena
2002- S6C1 near bottom CTD
2200- End of cast
2206- Transit to Snug Harbor

September 14, 2013

0730- 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
Stu Goldberg	Nutrient and DOC cycling experiment	UH