

HOT-267: Chief Scientist Report

Chief Scientist: Dan Sadler
R/V Kilo Moana
November 20 - 24, 2014

Cruise ID: **KM14-25**

Departed: November 20, 2014 at 0909 (HST)

Returned: November 24, 2014 at 0815 (HST)

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

Master of the Vessel: Captain Gray Drewry

Chief Scientist: Dan Sadler, University of Hawaii

OTG Marine Technicians: Jeff Koch 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 November 20th 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 November 20st, 21st and 22nd.
- 3) Station 50, the site of WHOTS-11 Mooring (anchor position 45.981°N 157° 53.964'W) was to be occupied on November 23rd 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 November 23rd 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 November 20th. 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. The STARS program was to conduct a hand held niskin cast. 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 November 22nd.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on November 22nd. The Gas Array was to be recovered on November 23rd.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on November 21st and 22nd at Station ALOHA.

The Hyperpro was to be deployed around the 1400-1430 time slot on November 20th, 21st and 23rd. This time slot allows for a better matchup with both the AQUA and S-NPP satellites.

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A package including a Wet Labs ACS, 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 November 23rd.

A trace metal free sample was to be collected by the ATE sampler on November 22nd.

The STARS program was to conduct a hand held net tow on November 22nd.

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 November 23rd.

After recovering both arrays, the ship was to transit back to Station ALOHA to conduct an ACS/LISST cast. Once the ACS/LISST profile 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 transit back into the ALOHA circle for a Hyperpro cast.

One SBE float from Seabird was to be deployed prior to leaving Station ALOHA on November 23rd.

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/HOT Group
Susan Curless	Research Associate	UH
Dan Sadler	Research Associate	UH
Brenner Wai	Research Associate	UH
Brie Maillot	Technician	UH
Lance Fujieki	Research Associate	UH
Alex Nelson	Research Associate	UH
Roman Battisti	Graduate Student	HPU
Blake Watkins	Marine Engineer	UH
Tara Clemente	Research Associate	UH/SCOPE
Eric Shimabukuro	Research Associate	UH/SCOPE
Eric Grabowski	Research Associate	UH/SCOPE
Daniela Böttjer	Post Doc	UH
Shimi Rii	Graduate Student	UH
Lisa Hall	CMORE Scholar	UH
Christopher Schvarcz	Graduate Student	UH
Jefrey Snyder	Marine Technician	UH
Fernando Santiago-Mandujano	Research Associate	UH
Robert Walt Deppe	Research Associate	UH
Daniel McCoy	Research Associate	UH
Emma Nuss	Graduate Student	UH

Alexa Foster	Undergraduate Student	UH
Jim Foley	Marine Educator	UH/CMORE
Christina Conrad	Teacher	Kapolei HS
Beth Haley	Teacher	Wahiawa MS
Donna Soriano	Teacher	UHWO
Jeff Koch	Marine Technician	OTG
Justin Smith	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 50) 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 November 20th, 21st and 23rd.

The optical package ACS/LISSST was deployed two times during the cruise, once around noon and once in the early morning on November 23rd. The battery pack failed during the second night cast. It was replaced for the daytime casts.

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

The overhead a/c unit in Lab 2 spilled water onto electronic equipment due to a blockage in the containment pan drain. E. Grabowski was able to dry the equipment and use it during the cruise. Captain Drewry had the engineering department service the unit.

The Seabird float was successfully deployed.

The STARS program conducted a hand held niskin cast at station Kahe and a hand held net tow at Station ALOHA.

The winds throughout most of the cruise were from the east at 10-18kts and shifted to south on the last day. A southeasterly swell of 4-8 ft 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 Gray Drewry 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)

November 20, 2014

0900 - Depart Snug Harbor. Held in HH for ship traffic
0945 - Lab 2 A/C water leak (see E. Grabowski incident notes at end of report)
1000 - Safety orientation with Captain
1045 - End of Meeting
1228 - Weight cast in water to 500m
1230 - Fire and abandon ship drill
1302 - Weight cast recovered
1317 - Hyperpro deployed
1353 - Hyperpro recovered
1401 - Begin S1C1 1000m CTD cast
1515 - end of cast
1525 - Hand held niskin cast for STAR program
1540 - Depart Kahe for ALOHA
2320 - Arrived St. ALOHA
2330 - Begin Sediment Trap Deployment 3nm W of center
2350 - Sediment Traps released at 22° 44.988' N, 158° 3.000' W
0000 - Ship re-positioned to 1 nm west of center.

November 21, 2014

0150 - S2C1 1000m CTD
0253 - End of Cast
0401 - Primary Production Array deployment started
0413 - PP array released at 22° 45.007'N, 158° 1.112'W
0454 - Begin S2C2 Near Bottom CTD
0638 - 5m off bottom at 22° 45.02'N, 158° 0.012'W
0837 - End of cast
0840 - Pumped tanks
1003 - Hand net tow
1040 - Hand net recovered
1059 - Begin S2C3 1000m CTD
1221 - End of cast
1238 - net tow deployed at 22° 45.006'N, 157° 59.993'W
1311 - net tow recovered
1330 - hyperpro deployed at 22° 44.987'N, 157° 59.365'W
1409 - hyperpro recovered at 22° 44.979'N, 157° 59.366'W
1418 - start S2C4 1000m CTD
1530 - end CTD cast
1627 - start S2C5 1000m CTD
1736 - end CTD cast
1810 - begin PP array recovery at 22° 45.066'N, 158° 4.142'W
1818 - end of recovery
1835 - transit to pump tanks
2000 - start S2C6 1000m CTD

2114 - end CTD cast
2200 - net tow at 22° 45.011'N, 157° 59.947'W
2227 - end net tow
2230 - net tow
2259 - end net tow
2303 - start S2C7 1000m CTD

November 22, 2014

0012 - end CTD cast
0100 - transit to pump tanks
0155 - start S2C8 1000m CTD
0257 - end CTD cast
0403 - begin deployment of Gas Array at 22° 44.982'N, 158° 1.104'W
0456 - begin S2C9 1000m CTD
0550 - end CTD cast
0751 - begin S2C10 1000m CTD
0901 - end CTD cast
0958 - net tow at 22° 45.011'N, 157° 59.952'W
1029 - end net tow
1038 - ATE deployed at 22° 44.947'N, 157° 59.347'W
1057 - ATE recovered
1102 - begin S2C11 1000m CTD
1212 - end of CTD
1228 - net tow at 22° 44.886'N, 157° 59.304'W
1256 - net tow recovered
1315 - teacher hand-net tow
1334 - hand-net recovered
1351 - start S2C12 1000m CTD
1514 - end cast
1530 - transit pump tanks
1655 - start S2C13 1000m CTD
1808 - end cast
1958 - start S2C14 1000m CTD
2111 - end cast
2118 - transit to pump tanks
2202 - net tow at 22° 46.647'N, 158° 1.096'W
2215 - removed ISUS from rosette
2230 - end net tow
2258 v start S2C15 near bottom CTD cast

November 23, 2014

0051 - 5m off bottom at 22° 45.004'N, 158° 0.0078'W
0244 - end cast
0300 - deploy AC9 optics packaged at 22° 44.981'N, 158° 0.014'W
0351 - AC9 recovered
0355 - AC9 redeployed
0422 - AC9 recovered. Light not flashing
0450 - transit to gas array
0605 - recovering gas array at 22° 45.183'N, 158° 5.566'W
0615 - gas array recovered

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0620 - transit to sediment trap array
 0745 - recovering sediment traps at 22° 40.801'N, 158° 11.30'W
 0815 - transit WHOTS mooring
 1000 - start AC9/optics cast at 22° 47.07'N, 157° 55.83'W
 1050 - begin second AC9 cast cycle
 1142 - AC9 recovered
 1207 - start S50C1 250m yo-yo CTD
 1318 - end cast
 1335 - hyperpro cast at 22° 47.008'N, 157° 55.648'W
 1408 - hyperpro recovered
 1509 - Sea-Bird float deployed at 22° 46.04'N, 157° 56.35'W
 1515 - transit to Station Kaena
 2047 – arrived Station Kaena
 2048 – start S6C1 near bottom CTD cast at 21° 50.8'N, 158° 21.8'W
 2256 – end of cast
 2301 – underway to Honolulu Harbor

November 24, 2014

0640 – H buoy
 0737 – arrive Snug Harbor, STB side-to for loading generator
 0748 – flipped ship to PORT side-to
 0815 – tied up and begin 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
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
Jim Foley	STARS –Science Teachers Aboard Research Ships	UH
Ed DeLong Dave Karl Matt Church	SCOPE DNA collection	UH
Daniela Böttjer	EPS production by Crocosphaera and its impact on microbial communities	UH
Shimi Rii	Characterization of Trichodesmium-diatom association in the North Pacific Subtropical Gyre	UH
Oscar Sosa	Seawater sample request	UH/MIT
Stuart Donachie	Seawater for cultivation of deep-sea bacteria	UH
Joel Reiter	Seabird float deployment	Seabird

A/C Water Leak Report:

On the morning of November 20th, 2014 the Kilo Moana departed for station ALOHA. I was set up in the back of lab 2 on the lower bench, thought of as the “dry area.” Before we left the harbor I went into the galley to grab a drink after which time I returned back to my station in lab 2. As I was in the galley the ship exited the harbor and listed side to side. As this happened water started dumping all over the bench where I was stationed. At the time, I had a mac book pro, x2 Panasonic HPX-170 video cameras, and a GoProHero4. Luckily Jim Folley and Shimi Rii were in the front part of lab 2 as the water started falling out of the trap located above the bench. They both responded quickly to remove my gear from that area. As I returned to the lab Shimi was drying off my mac book pro and Jim was drying off my cameras. After removing all visible water I placed all wet equipment in an action packer with a 10lb bag of rice. I waited until the following day to turn on any equipment. Since my primary mission of this expedition was to film I was forced to turn on my computer and one HPX-170 video camera (the camera that did not take as much water as the other). The computer seemed to survive the water, as it did not give me any problems throughout the cruise. The HPX-170 camera also did not appear to sustain any damage. The other HPX-170 video camera I left in the rice for the remainder of the cruise and still have not turned it on, as water was still visible around some of the camera’s buttons. I plan to wait at least an additional week before turning on this camera to check its functionality. The GoProHero4 was also OK since it was in its water housing at the time.

This was all reported to the ship’s captain at a debriefing after I got all of the equipment in the rice. He reported at the time that 2-weeks prior they had a similar problem of a water trap gushing water in another lab but this was never reported to him so he was not aware of the situation. I believe they looked through the service records and found that the water trap above the bench in the back of lab 2 where my equipment was located had not been cleaned out in 2-years, increasing the likelihood of an overflow.

-Eric Grabowski
November 25th, 2014