HOT-271: Chief Scientist Report

Chief Scientist: Dan Sadler
R/V *Kilo Moana*
April 20 - 24, 2015

Cruise ID: **KM15-04**
Departed: April 20, 2015 at 0909 (HST)
Returned: April 24, 2015 at 0733 (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: Steve Tottori and Trevor Young

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 April 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 April 20th, 21st, 22nd and 23rd.
3) Station 50, the site of WHOTS-11 Mooring (anchor position 45.981'N 157° 53.964'W) was to be occupied on April 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 April 23rd for approximately 3 hours.

Upon arrival to Station Kahe, a ~1300 lb. weight-test cast to 1000 m, one CTD cast to 1000 m, and a Hyperpro cast were to be conducted on the afternoon of April 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. 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 April 22nd.

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

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

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

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 April 23rd.

A trace metal free sample was to be collected by the ATE sampler on April 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 April 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.

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, pCO_2 system, and the meteorological package.

2. SCIENCE PERSONNEL

Participant	Title	Affiliation/HOT Group
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
Brie Maillot	Technician	UH
Eric Shimabukuro	Research Associate	UH/SCOPE
Tara Clemente	Research Associate	UH/SCOPE
Blake Watkins	Marine Engineer	UH
Natalie Dornan	Student	UH
Chris Schvartz	Graduate Student	UH
Jefrey Snyder	Marine Technician	UH
Fernando Santiago-Mandujano	Research Associate	UH
Daniel McCoy	Research Associate	UH
Robert (Walt) Deppe	Research Associate	UH
Whitney Ko	PO Volunteer	
Steve Tottori	Marine Technician	OTG
Trevor Young	Marine Technician	OTG

3. GENERAL SUMMARY

Operations during the cruise ran as scheduled. The .680 wire, trawl winch and A-frame were used for CTD operations. Two kinks in the wire developed during the first deep cast required re-terminating the wire and limiting downcast speeds to 40 mpm. The primary conductivity sensor cable was changed for S2C6.

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 five 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 April 20th, 21st and 23rd.

The optical package ACS/LISST was deployed two times during the cruise, once around noon and once in the early morning on April 23rd.

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

The winds throughout most of the cruise were from the east at 18-25 kts A east 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)

April 20, 2015

0900 Depart Snug Harbor
0945 Science Meeting and safety drills
1140 Arrive Station Kahe
1145 Weight Cast to 1000m on 0.680 wire
1245 Weight recovered
1255 Hyperpro cast at 21° 20.555' N, 158° 16.376' W
1332 Hyperpro recovered
1346 S1C1 1000m CTD cast
1507 End cast
NOTE: noise in transmissometer, oxygen and salinity in first 10-30db.
ISUS channel dropped out.
1515 Transit to St. ALOHA
2310 Arrive St. ALOHA
2340 Deployed Sediment Traps at 22° 45.003'N, 158° 3.035'W

April 21, 2015

0153 S2C1 1000m CTD cast
0307 End cast
0415 Deployed Primary Production array at 22° 45.009'N, 158° 1.171'W
0445 S2C2 Deep CTD cast
0642 8m off bottom at 22° 45.009'N, 158° 0.041'W
0833 End cast
NOTE: Two kinks in wire at 10 and 15 feet from rosette. Reterminated. Discussed CTD operations with Captain Drewry and decided to limit wire speed to 40 mpm on descent.
0845 Pumped Tanks
1118 S2C3 1000m CTD cast
1254 End cast
1310 Begin Net Tow
1345 End Tow at 22° 45.001'N, 157° 59.699'W
1350 Start Hyperpro cast at 22° 45.000'N, 157° 59.68'W
1427 Recover Hyperpro1600
1430 Transit towards PP array
1625 S2C5 1000m CTD cast - a few glitches in transmissometer downcast
1809 End of cast
1811 Transit to PP array
1956 S2C6 1000m CTD cast
NOTE: Pump error at surface - recovered and changed cable conductivity sensor
2109 Redeployed S2C6
2225 End cast
2239 Net Tow at 22° 43.52'N, 158° 4.29'W
2307 Net recovered, redeployed at 22° 43.512'N, 158° 3.694'W
2337 Net recovered
2347 S2C7 1000m CTD cast

April 22, 2015

0058 End of cast, transit to pump tanks
0155 S2C8 1000m CTD cast
0307 End of cast
0402 Gas array deployment started
0423 Gas array released at 22° 45.160'N, 158° 3.253'W
0436 S2C9 1000m CTD cast
0611 End of cast
0620 Transit to pump tanks
0752 S2C10 1000m CTD cast
0902 End of cast
1000 Net tow at 22° 45.912'N, 158° 4.371'W
1032 Net tow recovered at 22° 45.632'N, 158° 4.371'W
1042 ATE deployed at 22° 45.633'N, 158° 3.707'W
1109 ATE recovered
1111 S2C11 1000m CTD cast
1229 End of cast
1248 Net tow deployed at 22° 45.663'N, 158° 3.614'W
1316 Net recovered at 22° 45.504'N, 158° 3.183'W
1353 S2C12 1000m CTD cast

1513 End of S2C12
1515 Transit to pump tanks
1649 S2C13 1000m CTD cast
1801 End of cast
1992 S2C14 1000m CTD cast
2105 End of cast
2108 Transit to pump tanks
2202 Net tow at 22° 45.39'N, 158° 0.588'W
2230 End of tow
2250 S2C15 Deep CTD cast

April 23, 2015

0109 7m off bottom at 22° 45.045'N, 157° 59.977'W
0304 End of cast
0320 Optics Cast deployed
0414 Optics Cast recovered at 22° 44.998'N, 158° 0.030'W
0418 Optics Cast deployed
0507 Optics Cast recovered at 22° 44.948'N, 158° 0.070'W
0515 Transit to Gas Array
0709 Hook Gas Array at 22° 38.227'N, 158° 18.408'W
0723 Gas Array on board. Transit to sediment traps
0848 Hook Sediment Traps at 22° 31.867'N, 158° 30.150'W
0905 Sediment Traps on board. Transit to St ALOHA
1148 Optics Cast deployed at 22° 42.96'N, 158° 3.985'W
1235 Optics Cast recovered
1240 Optics Cast deployed at 22° 42.971'N, 158° 3.98'W
1330 Optics Cast recovered
1337 Hyperpro deployed at 22° 42.956'N, 158° 3.993'W
1414 Hyperpro recovered at 22° 42.927'N, 158° 4.009'W
1418 Transit to WHOTS buoy
1514 S50C1 200m CTD yoyo cast
1635 End of cast
1640 Transit to St. Kaena
2209 S6C1 Deep CTD cast

April 24, 2015

0014 End of cast
0020 Transit to Honolulu Harbor
0650 Arrive HH buoy
0733 At Snug Harbor dock

HOT program sub-components:

Investigator	**Project**	**Institution**
Matt Church	Core Biogeochemistry	UH
Dave Karl		
Bob Bidigare		

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 O2/Argon ratios	UH
Ed DeLong Dave Karl Matt Church	SCOPE DNA collection	UH
Daniela Böttjer	EPS production by Crocosphaera and its impact on microbial communities	UH
Angelique White	SCOPE Diazatroph Microscopy	OSU