

# HOT-272: Chief Scientist Report

Chief Scientist: Dan Sadler  
*R/V Kilo Moana*  
May 22 - 26, 2015

Cruise ID: **KM15-08**

Departed: May 22, 2015 at 0900 (HST)

Returned: May 26, 2015 at 0750 (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 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 May 22th 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 May 22nd, 23<sup>rd</sup>, 24<sup>th</sup> and 25<sup>th</sup>.
- 3) Station 50, the site of WHOTS-11 Mooring (anchor position 45.981°N 157° 53.964'W) was to be occupied on May 25th 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 May 25th 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 May 22nd. 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 200 m CTD cast for incubation experiments and a 1000m 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 May 25th.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on May 23rd. The Gas Array was to be recovered on May 25th.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on May 22nd and 23rd at Station ALOHA.

The Hyperpro was to be deployed around the 1400-1430 time slot on May 22nd, 23rd and 24th. 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 May 25th.

A trace metal free sample was to be collected by the ATE sampler on May 24th.

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 May 25th.

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

## 2. SCIENCE PERSONNEL

<b>Participant</b>	<b>Title</b>	<b>Affiliation</b>
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	Student	UH
Chris Schvarcz	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
Joelle Kubeneck	Undergraduate Student	UH
Camilla Tognacchini	Undergraduate Student	UH
John Casey	Graduate Student	UH
Karin Björkman	Research Specialist	UH
Sara Ferrón-Smith	Post-Doc	UH
Byron Sherwood	Post-Doc	UH
Marianne Acker	Graduate Student	WHOI
Francois Ribalet	Scientist	UW/SCOPE
Avery Tatters	Post-Doc	USC/SCOPE
Jeff Koch	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. A section of the .680 wire began unraveling at 567 m. OTG taped, marked and monitored the area during the cruise.

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. Two yo-yo casts were conducted at Station 50 (WHOTS-11 mooring); 5 cycles (between both casts) were conducted to 200 dbar. These two casts at Station 50 were intended to be only one cast but the package broke the surface after the first cycle and a new cast had to be initiated to continue collecting data. 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 May 22nd, 23rd and 25th.

The optical package ACS/LISST was deployed two times during the cruise, once around noon and once in the early morning on May 25th.

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 north and northeast at 10-15 kts. Seas of 4-6 ft were 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)

May 22, 2015

0900 Depart Snug Harbor  
0945 Fire and Safety Meeting  
1145 Arrive Kahe Station  
1159 Start weight cast to 500m  
1243 Hyperpro cast @ 21° 20.598'N, 158° 16.434'W  
1323 Begin S1C1 CTD cast to 1000m

1448 End S1C1  
1450 Transit Station ALOHA  
1500 SC provided cupcakes to celebrate Walt's birthday. Thank you Susan!  
2220 Arrive Station ALOHA  
2230 Deploying Sediment traps  
2250 Sediment Traps released at 22° 45.013'N, 158° 3.031'W  
2353 Begin S2C1 CTD cast to 200m

May 23, 2015

0023 End S2C1  
0147 Begin S2C2 CTD cast to 1000m  
0301 End S2C1. ISUS removed.  
0410 Start Primary Production Array Deployment  
0443 Release PP Array at 22° 45.02'N, 158° 0.94'W  
0450 Begin S2C2 CTD cast to Bottom  
0707 6m off bottom at 22° 45.012'N, 157° 59.989'W  
0814 Winch stopped at 2113m (wire out) to inspect section of cable with known broken strand  
It was re-taped to keep from interfering with the sheaves.  
0905 End S2C2  
0910 Hand net tow at 22° 44.99'N, 158° 0.02'W  
0915 End net tow. Transit to pump tanks. ISUS re-installed.  
1033 Begin S2C3 CTD cast to 1000m - start of 36 hour burst sampling  
1201 End S2C3  
1215 Net tow at 22° 44.99'N, 158° 0.02'W  
1245 End net tow  
1337 Hyperpro cast at 22° 45.805'N, 157° 59.59'W  
1401 End Hyperpro  
1417 Begin S2C5 CTD cast to 1000m  
1538 End S2C5  
1542 Transit to pump tanks  
1652 Begin S2C6 1000m CTD  
1806 End S2C6  
1905 Recover PP array at 22° 45.503'N, 158° 4.157'W  
1923 End PP recovery  
1928 Transit to pump tanks  
1958 Begin S2C7 1000m CTD  
2112 End S2C7  
2125 Hand net tow  
2205 Begin net tow at 22° 45.155'N, 158° 4.644'W  
2233 End net tow  
2239 Begin net tow at 22° 45.667'N, 158° 4.297'W  
2307 End net tow  
2317 Begin S2C8 1000m CTD

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0024 End S2C8  
0031 Transit to pump tanks  
0152 Begin S2C9 1000m CTD  
0252 End S2C9  
0407 Deploying Gas Array

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0421 Gas Array released at 22° 45.056'N, 158° 1.128'W  
0446 Begin S2C10 1000m CTD  
0600 End S2C10  
0746 Begin S2C11 1000m CTD  
0855 End S2C11  
0905 Hand net tow at 22° 44.991'N, 157° 59.999'W  
0909 Net recovered  
1005 Net tow deployed at 22° 48.87'N, 157° 58.70'W  
1042 Net recovered  
1049 ATE deployed at 22° 49.29'N, 157° 58.34'W  
1117 ATE recovered  
2117 Begin S2C12 1000m CTD cast  
1228 End S2C12  
1235 Net tow at 22° 49.49'N, 157° 58.12'W  
1310 Net recovered, transit to pump tanks  
1353 Begin S2C13  
1512 End S2C13  
1651 Begin S2C14 1000m CTD cast  
1755 End S2C14  
1800 Transit to pump tanks  
1954 Begin S2C15  
NOTE: Stopped at 567m on downcast to check for apparent damage in the wire. Wire was unraveling in two sections. OTG marked with white tape and white paint  
2022 Resumed downcast  
2111 End S2C15  
2115 Hand net tow  
2122 End net tow  
2200 Begin net tow - ISUS removed  
2232 End net tow  
2256 Begin S2C16 CTD cast to Bottom  
2318 Stopped at 567m to put tape on unraveling sections of wire  
2321 Resumed downcast

May 25, 2015

0055 7m off bottom at 22° 45.005'N, 158° 0.013'W  
0255 End S2C16  
0308 AC9 deployed at 22° 45.007'N, 158° 0.013'W  
0358 AC9 recovered  
0402 AC9 re-deployed  
0451 AC9 recovered  
0455 Transit to Gas Array  
0553 Begin recovery of Gas Array at 22° 44.754'N, 158° 9.911'W  
0620 Gas Array recovered, transit to Sediment Traps  
0709 Recovering Sediment Traps at 22° 52.880'N, 158° 14.536'W  
0911 Arrive at WHOTS mooring  
1005 AC9 deployed at 22° 45.45'N, 157° 54.98'W  
1100 AC9 recovered  
1105 AC9 re-deployed  
1156 AC9 recovered  
1203 Begin S50C1 CTD yoyo cast to 200m

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1217 Cycle 1 - CTD surfaced, pumps turned off  
 1234 End S50C1  
 1234 Begin S50C2  
 1236 Cycle 2  
 1251 Cycle 3  
 1305 Cycle 4  
 1319 Cycle 5 - firing bottles  
 1338 End S50C2  
 1354 Hyperpro deployed at 22° 44.41'N, 157° 54.91'W  
 1430 End Hyperpro  
 1445 Transit to Station Kaena  
 2003 Arrive Station Kaena  
 2007 Begin S6C1 CTD cast to 2400m  
 2230 End of cast  
 2235 Transit to Honolulu Harbor  
 0630 Arrive "H" buoy  
 0750 Secure at Snug Harbor

**HOT program sub-components:**

<b>Investigator</b>	<b>Project</b>	<b>Institution</b>
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
<b>Ancillary programs:</b>		
Andrew Dickson	CO <sub>2</sub> dynamics and inter-calibration	SIO
Paul Quay	DI <sup>13</sup> 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 <sub>2</sub> /Argon ratios	UH
Ed DeLong Dave Karl Matt Church	SCOPE DNA collection	UH
Angelique White	SCOPE Diazotroph Microscopy	OSU
Byron Sherwood	Dynamics of microbial degradation of marine DOM	UH
Virginia Armbrust	Seaflow Underway Flow Cytometer	UW
John Casey	PIE: Size Fractionated PP and Phosphate Uptake	UH
David Caron Avery Tatters	Protistan biodiversity, trophic activities and biogeochemistry at Station ALOHA	USC
Becky Briggs	Nutrient QC sample collection for S-LAB	UH
Dan Repeta Marianne Acker	Natural C <sup>14</sup> Abundance	WHOI
Sam Wilson	Nitrogen Fixation method development sampling	UH
Sara Ferrón-Smith	O <sup>18</sup> MIMS; Methane Production from DOM methlyphosphonates	UH