

# HOT-266: Chief Scientist Report

Chief Scientist: Fernando Santiago-Mandujano

*R/V Kilo Moana*

12-16 October, 2014

Cruise ID: **KM 14-21**

Departed: 12 October at 0900 (HST)

Returned: 16 October at 0730

Vessel: *R/V Kilo Moana*

Master of the Vessel: Captain Gray Drewry

OTG Marine Technicians: Trevor Young, Jeff Koch

## 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 October 12<sup>th</sup> for about 2 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 during October 13<sup>th</sup> to 15<sup>th</sup>.
- 3) Station 50, the site of WHOTS-11 Mooring (anchor position 22° 45.981'N 157° 53.964'W) was to be occupied on October 15<sup>th</sup> 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 October 15<sup>th</sup> for approximately 2 hours.

Upon arrival to Station Kahe a 1300 lb. weight-test cast to 500 m, one CTD cast to 1000 m, a Hyperpro cast, and a hand-held Niskin cast to 25 m were to be conducted on the afternoon of October 12<sup>th</sup>. The single CTD cast was to be conducted to collect a continuous profile 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 *in situ* 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 October 14<sup>th</sup>.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on October 14<sup>th</sup>. The Gas Array was to be recovered on October 15<sup>th</sup>.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on October 13<sup>th</sup> and 14<sup>th</sup> at Station ALOHA.

A hand-held plankton net was to be deployed for 30 minutes on October 14<sup>th</sup>.

The Hyperpro (a profiling unit with one up-looking and one down-looking hyperspectral radiometer, a WET Labs ECO-BB2F triplet, temperature and conductivity sensors), was to be hand-deployed for 30 minute profiles on October 12<sup>th</sup>, 13<sup>th</sup>, and 15<sup>th</sup>.

A package including a Wet Labs AC-S, 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 morning on October 15<sup>th</sup>.

A trace metal free sample was to be collected by the ATE sampler on October 14<sup>th</sup> at Station ALOHA.

After the 36 hour burst period of CTD work at Station ALOHA was accomplished, the ship was to transit to recover the floating Gas Array and the Sediment Trap Array on the morning of October 15<sup>th</sup>.

After recovering the arrays, the ship was to transit to Station 50 to conduct a one-hour 200 m CTD yo-yo 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, underway fluorometer 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
Brenner Wai	Technician	UH
Brie Maillot	Technician	UH
Lance Fujieki	Research Associate	UH
Nancy Young	Volunteer	NOAA
Blake Watkins	Marine Engineer	UH
Christopher Schvarcz	Graduate Student	UH
Oliver Kersten	Graduate Student	HPU
Rick Shema	Volunteer	
Jefrey Snyder	Marine Technician	UH
Fernando Santiago-Mandujano	Research Associate	UH
Robert Walt Deppe	Research Associate	UH
Daniel McCoy	Research Associate	UH
Ken Doggett	Research Associate	UH
Ger van den Engh	Scientist	MarCy – Institute for Marine Cytometry
Jim Foley	Marine Educator	UH
Lori Hoover	Teacher	Kaimuki Middle School
Kimberlee Johnson	Teacher	Kapolei High School
Gerry Clarin	Teacher	Kapolei High School
Trevor Young	Marine Technician	OTG
Jeff Koch	Marine Technician	OTG

### 3. GENERAL SUMMARY

Operations at Station ALOHA were conducted as planned.

One 1000 m CTD cast, and one 25 m hand-held Niskin cast were 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 trawl winch with the 0.681 wire and the A-frame were used for CTD operations. There was no display of winch wire-out and tension in the CTD lab due to problems with the ship's data-logger displayer; however the winch operator was monitoring this information via an independent display located in his control cabin.

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. Four additional zooplankton net tows were conducted (O. Kersten), two during the day, and two during the night.

One hand-held net zooplankton sampling was completed successfully.

The Hyperpro was deployed on October 12<sup>th</sup>, 13<sup>th</sup>, and 15<sup>th</sup>.

The optical package ACS/LISST was deployed four times on October 15<sup>th</sup>.

The ATE was successfully deployed on October 14<sup>th</sup>.

The underway thermosalinograph system and fluorometer ran without interruption during the cruise. The broad band/narrow band Ocean Surveyor ADCP and the Workhorse ADCP were working correctly during the cruise.

The ship's meteorological suite ran without interruption during the cruise.

Winds were easterlies between 15 and 20 kts, with moderate seas.

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

The R/V *Kilo Moana* continues to maintain very good ship support for our work. Captain Drewry and the ship's crew showed flexibility, enthusiasm, concern, and dedication to our scientific mission.

Technical support during this cruise was very good. OTG personnel were available to assist in our work during the cruise.

### 5. DAILY REPORT OF ACTIVITIES (HST)

#### October 12, 2014

0900 - All aboard. Depart from Snug harbor

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0945 - Safety briefing by the captain. Science meeting  
1030 - Fire and Abandon ship drills  
1130 - Arrived at Kahe Station  
1145 - Weight cast to 500 m. Using trawl winch with 0.681 wire. No tension or wire-out display in the CTD lab.  
The winch operator monitors the tension in his cabin.  
1259 - End of weight cast  
1335 - Hyperpro deployed  
1412 - Hyperpro recovered  
1423 - Start S1C1 CTD cast to 1000 m  
1549 - End of cast  
1600 - Hand-held Niskin bottle water collection at 25 m by STARS teachers  
1613 - End of cast. Transit to ALOHA Station

### **October 13, 2014**

0020 - Arrived to ALOHA Station  
0049 - Deployed sediment traps: 22 44.983°N, 158 3.274°W  
0155 - Start S2C1 CTD cast to 1000 m  
0307 - End of cast  
0405 - Deployed PP array: 22 45.018°N, 158 2.188°W  
0455 - Start S2C2 CTD deep cast  
0644 - 4 m off the bottom (22 44.975°N, 158 0.00°W)  
0847 - End of cast  
0850 - Transit to pump ship's tanks  
1005 - Start net tow  
1030 - End net tow  
1050 - Start S2C3 CTD cast to 1000 m  
1220 - End of cast  
1245 - Start net tow  
1315 - End net tow  
1330 - Hyperpro deployed  
1412 - Hyperpro recovered  
1420 - Start S2C4 CTD cast to 1000 m  
1536 - End of cast  
1656 - Start S2C5 CTD cast to 1000 m  
1806 - End of cast  
1857 - Recovered PP array 22 47.539° N, 158 1.048°W  
1920 - Transit to pump ship's tanks  
1959 - Start S2C6 CTD cast to 1000 m  
2118 - End of cast  
2158 - Start net tow  
2230 - End net tow  
2235 - Start net tow  
2258 - End net tow  
2310 - Start S2C7 CTD cast to 1000 m

### **October 14, 2014**

0011 - End cast  
0031 - Start net tow  
0058 - End net tow  
0158 - Start S2C8 CTD cast to 1000 m  
0303 - End of cast  
0418 - Gas array deployment 22 45.009°N, 158 2.206°W  
0455 - Start S2C9 CTD cast to 1000 m  
0607 - End of cast

0615 - Transit to pump ship's tanks  
0754 - Start S2C10 CTD cast to 1000 m  
0905 - End of cast  
1004 - Start net tow  
1034 - End net tow  
1043 - ATE sampling  
1109 - End ATE sampling  
1111 - Start S2C11 CTD cast to 1000 m  
1219 - End cast  
1235 - Start net tow  
1300 - End net tow  
1305 - Start net tow  
1334 - End net tow  
1350 - Start S2C12 CTD cast to 1000 m.  
1508 - End of cast  
1520 - Hand-held net tow for STARS teachers  
1535 - End of net tow  
1540 - Transit to pump ship's tanks  
1656 - Start S2C13 CTD cast to 1000 m  
1816 - End of cast  
1957 - Start S2C14 CTD cast to 1000 m  
2110 - End of cast  
2120 - Transit to pump ship's tanks  
2200 - Start net tow  
2230 - End of net tow  
2234 - Start net tow  
2257 - End net tow  
2322 - Start S2C15 CTD cast to near-bottom

### **October 15, 2014**

0111 - CTD at 7 m off the bottom 22 44.996°N, 157 59.999°W  
0254 - End of cast  
0314 - Start AC9  
0408 - AC9 recovered  
0412 - AC9 re-deployed  
0502 - End of AC9  
0510 - Transit to recover gas array  
0613 - Start gas array recovery 22 44.742°N 157 58.96°W  
0625 - End of recovery  
0630 - Transit to recover sediment traps  
0703 - Start sediment traps recovery 22 51.840°N 157 59.524°W  
0721 - End of recovery  
1000 - Start AC9  
1049 - AC9 recovered  
1053 - AC9 re-deployed  
1145 - AC9 recovered  
1150 - Transit to Sta 50  
1210 - Start S50C1 CTD yo-yo cast to 200 m. Four cycles completed  
1308 - End of cast  
1310 - Transit to ALOHA Station  
1345 - Hyperpro deployed  
1420 - Hyperpro recovered  
1435 - Transit to Kaena Station  
1955 - Start S6C1 CTD cast to near-bottom  
2058 - CTD at 14 m off the bottom 21 50.808°N, 158 21.816°W

2159 - End of cast  
2205 - Transit to Snug Harbor

**October 16, 2014**

0730 - Arrive Snug Harbor, full offload.

**6. 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	SIO
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 in the Oligotrophic Open Ocean, Station ALOHA	C-MORE
Erica Goetze	Temporal stability of copepod populations at Station ALOHA	UH
Sara Ferron-Smith	Determination of net community production from the Diurnal variability of O <sub>2</sub> /Argon ratios	UH
Ken Doggett, Ger van den Engh	Cytometry of Marine Phototrophs	UH MarCy Institute for Marine Cytometry
Rhea Foreman	SCOPE; Low Level Nitrogen method development	UH
Oliver Kersten, Eric Vetter,	Zooplankton community structure within the surface water column at Station ALOHA	HPU

Erica Goetze

Daniela Bottjer

Jim Foley

Extracellular polysaccharide production by *Crocospheara*

Science Teachers Aboard Research Ships (STARS)

C-MORE

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