

# HOT-265: Chief Scientist Report

Chief Scientist: Fernando Santiago-Mandujano

## R/V *Kilo Moana*

13-17 September, 2014

Cruise ID: **KM 14-19**

Departed: 13 September at 0830 (HST)

Returned: 17 September at 0800

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 September 13<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 September 14<sup>th</sup> to 16<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 September 16<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 September 16<sup>th</sup> for approximately 2 hours.

Upon arrival to Station Kahe a 1300 lb. weight-test cast to 1000 m, one CTD cast to 1000 m, and a hand-held net sampling were to be conducted on the afternoon of September 13<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 September 15<sup>th</sup>.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on September 15<sup>th</sup>. The Gas Array was to be recovered on September 16<sup>th</sup>.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on September 14<sup>th</sup> and 15<sup>th</sup> at Station ALOHA.

A hand-held plankton net was to be deployed for 30 minute intervals two times each on September 14<sup>th</sup> and 15<sup>th</sup>, and once on September 16<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), usually deployed during HOT cruises, was being serviced and was not available during this cruise.

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 early morning on September 16<sup>th</sup>.

A trace metal free sample was to be collected by the ATE sampler on September 15<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 September 16<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.

If time allowed, one profiler float from the University of Washington/MBARI (K. Johnson, D. Swift, S. Riser) was to be recovered from the vicinity of Station ALOHA.

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/HOT Group</b>
Susan Curless	Research Associate	UH
Dan Sadler	Research Associate	UH
Donn Viviani	Graduate Student	UH
Brie Maillot	Technician	UH
Lance Fujieki	Research Associate	UH
Blake Watkins	Marine Engineer	UH
Christopher Schvarcz	Graduate Student	UH
Sam Wilson	Scientist	UH
Oliver Kersten	Graduate Student	HPU
Jefrey Snyder	Marine Technician	UH
Fernando Santiago-Mandujano	Research Associate	UH
Robert Walt Deppe	Research Associate	UH
Daniel McCoy	Research Associate	UH
Patricia Kassis	High School Teacher	Hawaii Preparatory Academy
Kirena Clah	Undergraduate Student	UH
Meagan Putts	Graduate Student	HPU
Roman Battisti	Graduate Student	HPU
Isabell Klawonn	Graduate Student	Stockholm University
Meri Eichnera	Postdoc	University of Gothenburg

Trevor Young  
Jeff Koch

Marine Technician  
Marine Technician

OTG  
OTG

### 3. GENERAL SUMMARY

Operations at Station ALOHA were conducted as planned, with some modifications to accommodate for the recovery of a profiler float. The CTD cast to be conducted on September 16<sup>th</sup> at Station 50 was conducted one day earlier.

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 two cycles completed. One near bottom cast was completed at Station Kaena.

The Caley winch with the 0.322 wire and the A-frame were used for CTD operations. The Caley winch was operated with heave compensation. The tension-meter was reporting large unrealistic tension spikes sporadically during casts.

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.

A total of six hand-held net zooplankton samplings were completed successfully.

The optical package ACS/LISST was deployed two times in the morning of September 16<sup>th</sup>.

The ATE was successfully deployed on September 15<sup>th</sup>.

A profiler float was recovered successfully on September 16<sup>th</sup> nearly 60 nm west from Station ALOHA.

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. The RM Young temperature sensor was just replaced before the cruise, but it was not working properly due to a connection problem which was corrected after the cruise.

Winds were about 5 kt from the northwest early in the cruise, increasing to less than 12 kt from the northeast during the second part of the cruise, with smooth 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)

### September 13, 2014

0830 - All aboard. Early departure from Snug harbor to avoid harbor traffic  
0945 - Safety briefing by the Captain. Science meeting  
1015 - Fire and Abandon ship drills  
1100 - Arrived at Kahe Station  
1125 - Weight cast to 1000 m. Large unrealistic spikes in the Caley winch tension-meter. The spikes appeared sporadically throughout the cast in all the subsequent CTD casts.  
1205 - End of weight cast  
1248 - Start S1C1 CTD cast to 1000 m  
1406 - End of cast  
1421 - Bucket water collection (I. Klawonn, M. Eichnera)  
1433 - End of water collection  
1440 - Transit to ALOHA Station  
2216 - Arrived to ALOHA Station  
2230 - Start sediment traps deployment  
2255 - Deployed sediment traps: 22 44.985°N, 158 3.281°W

### September 14, 2014

0155 - Start S2C1 CTD cast to 1000 m  
0305 - End of cast  
0310 - Hand held net sampling  
0320 - Hand held net sampling  
0438 - Deployed PP array: 22 45.090°N, 158 1.043°W  
0459 - Start S2C2 CTD deep cast  
0639 - 5 m off the bottom (22 44.992°N, 157 59.993°W)  
0838 - End of cast  
0840 - Transit to pump ship's tanks  
1002 - Start net tow  
1032 - End net tow  
1054 - Start S2C3 CTD cast to 1000 m  
1208 - End of cast  
1315 - Start net tow  
1345 - End net tow  
1358 - Start S2C4 CTD cast to 1000 m  
1513 - End of cast  
1600 - Start hand held net sampling  
1629 - End hand held net  
1655 - Start S2C5 CTD cast to 1000 m  
1812 - End of cast  
1853 - Recovered PP array 22 47.26° N, 158 0.89°W  
1916 - Transit to pump ship's tanks  
2010 - Start S2C6 CTD cast to 1000 m  
2121 - End of cast  
2200 - Start net tow  
2230 - End net tow  
2235 - Start net tow  
2254 - End net tow  
2312 - Start S2C7 CTD cast to 1000 m

## September 15, 2014

0011 - End cast  
0030 - Start net tow  
0100 - End net tow  
0158 - Start S2C8 CTD cast to 1000 m  
0300 - End of cast  
0320 - Hand held net sampling  
0430 - Gas array deployment 22 45.023'N, 158 1.160'W  
0454 - Start S2C9 CTD cast to 1000 m  
0553 - End of cast  
0600 - Transit to pup ship's tanks  
0751 - Start S2C10 CTD cast to 1000 m  
0848 - End of cast  
0955 - Start net tow  
1026 - End net tow  
1032 - ATE sampling  
1102 - End ATE sampling  
1107 - Start S2C11 CTD cast to 1000 m  
1206 - End cast  
1226 - Start net tow  
1256 - End net tow  
1300 - Start net tow  
1330 - End net tow  
1359 - Start S2C12 CTD cast to 1000 m.  
1502 - End of cast  
1510 - Transit to pump ship's tanks  
1655 - Start S2C13 CTD cast to 1000 m  
1810 - End of cast  
1812 - Transit to Sta 50  
1840 - Start S50C1 CTD yo-yo cast to 200 m, 1/4 nm from WHOTS buoy. Two cycles completed  
1936 - End of cast  
1940 - Transit to ALOHA Station  
2010 - Start S2C14 CTD cast to 1000 m  
2115 - End of cast  
2118 - Transit to pump ship's tanks  
2200 - Start net tow  
2230 - End of net tow  
2235 - Start net tow  
2300 - End net tow  
2326 - Start S2C15 CTD cast to near-bottom

## September 16, 2014

0103 - CTD at 4 m off the bottom 22 44.94'N, 158 0.043'W  
0244 - End of cast  
0302 - Start ACS/LISST cast  
0353 - ACS/LISST recovered  
0355 - ACS/LISST re-deployed  
0448 - End of ACS/LISST  
0453 - Hand held net sampling  
0515 - End of hand held net sampling  
0516 - Transit to recover gas array  
0621 - Start gas array recovery 22 48.712'N 158 6.629'W  
0635 - End of recovery  
0640 - Transit to recover sediment traps

0720 - Start sediment traps recovery 22 52.972'N 158 6.495'W  
 0739 - End of recovery  
 0740 - Transit recover profiler float  
 1258 - Profiler float recovered 22 50.133'N, 159 6.427'W  
 1305 - Hand held net sampling  
 1310 - End of hand held net sampling  
 1315 - Transit to Kaena Station  
 1938 - Arrive at Station Kaena, S6C1 –near bottom CTD  
 2139 - End of cast  
 2200 - Transit to Snug Harbor

**September 17, 2014**

0800 - 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
Sara Ferron-Smith, Daniela del Valle	Methane production in sedimenting particles	UH

Justine Shortell, Stuart Donachie	Cultivation of single bacterial cells from the deep sea (Undergraduate Research Opportunities Program)	UH
Rhea Foreman	SCOPE; Low Level Nitrogen method development	UH
Oliver Kersten, Eric Vetter, Erica Goetze	Zooplankton community structure within the surface water column at Station ALOHA	HPU
Isabel Klawonn, Meri Eichnera, Helle Ploug	Trichodesmium analysis	Stockholm University, University of Gothenburg