HOT-256: Chief Scientist Report

Chief Scientist: Fernando Santiago-Mandujano

R/V *Kilo Moana*

26-30 October, 2013

Cruise ID: **KM 13-19**
Departed: 26 October at 0850 (HST)
Returned: 30 October at 0730 (HST)
Vessel: **R/V *Kilo Moana***
Master of the Vessel: Captain Gray Drewry
OTG Marine Technicians: Trevor Goodman, 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 October 26th 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 27th, 28th, and 29th.
3) Station 52, the site of WHOTS-10 Mooring (anchor position 22° 40.12'N 157° 57.01'W) was to be occupied on October 29th 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 29th for approximately 2 hours.

Upon arrival to Station Kahe a 1000 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 October 26th. 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 28th.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on October 28th. The Gas Array was to be recovered on October 29th.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on October 27th and October 28th at Station ALOHA.

The Hyperpro was to be deployed for approximately 45 minutes at 1400 on October 26th, 27th, and 29th to collect three profiles during each deployment.

A package including a Wet Labs AC9, a Chelsea Fast Repetition Rate Fluorometer (FRRf), 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 October 29th.

A trace metal free sample was to be collected by the ATE sampler on October 28th 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 29th.

After recovering the arrays, the ship was to transit to Station ALOHA to conduct ACS/AC9/FRRf/LISST casts, after which the ship was to transit to Station 52 to conduct a one-hour 200 m CTD yo-yo cast, and a subsequent Hyperpro cast at 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, pCO_2 system, underway fluorometer and the meteorological package.

2. SCIENCE PERSONNEL

Participant	**Title**	**Affiliation/HOT Group**
Susan Curless	Research Associate	UH/BEACH
Dan Sadler	Research Associate	UH/BEACH
Brett Updyke	Research Associate	UH/BEACH
Adriana Harlan	Research Associate	UH/BEACH
Lance Fujieki	Research Associate	UH/BEACH
Blake Watkins	Marine Engineer	UH/BEACH
Christopher Schvarcz	Graduate Student	UH/CMORE
Sara Thomas	Graduate Student	UH/CMORE
Jefrey Snyder	Marine Technician	UH/PO
Fernando Santiago-Mandujano	Research Associate	UH/PO
Cameron Fumar	Research Associate	UH/PO
Daniel McCoy	Research Associate	UH/PO
Eunjung Kim	Graduate Student	UH/PO
Kari Barber	Undergrad Student	UH/PO
Trevor Goodman	Marine Technician	OTG
Trevor Young	Marine Technician	OTG

3. GENERAL SUMMARY

Operations at Station ALOHA were conducted as planned.

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 52) 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.

The Sediment Traps, Primary Production Array, and Gas Array were all deployed and recovered successfully. A west-northwestward current of nearly ½ kt was present throughout the cruise and the arrays drifted in that direction. The sediment traps drifted 17 nm, the gas array drifted 11 nm, and the primary production array drifted 7 nm.

Six net tows for the core HOT zooplankton collection were completed successfully; three during the day, and three during the night.

Hyperpro casts (3 cycles each) were conducted on October 26th, 27th, and 29th.

The optical package ACS/AC9/FRRf/LISST was deployed four times on October 29th, two back to back deployments in the early morning, and two at around noon.

The ATE was successfully deployed on October 28th.

The underway thermosalinograph system and fluorometer, and the ship's meteorological suite ran without interruption during the cruise. The underway *p*CO2 system was not functional to collect data. The broad band/narrow band Ocean Surveyor ADCP and the Workhorse ADCP were working correctly during the cruise.

Winds were less than 10 kt from the south early in the cruise, turning to easterlies on October 27th and increasing up to 12 kt.

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 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 26, 2013
0850- All aboard. Depart Snug Harbor
0945- Safety briefing with the Captain and Chief Scientist
1045- Fire and abandon ship drills
1205- Arrive at Station Kahe, weight cast to 1000 m
1325- Hyperpro cast (3 cycles)
1405- End of Hyperpro
1410- S1C1, 1000 m CTD cast.
1534- End of cast.
1543- Transit to Station ALOHA
2259- Arrive at Station ALOHA
2330- Deployed Sediment Traps (22° 45'N, 158° 2.026'W)

October 27, 2013
0145- S2C1 1000 m CTD cast.
0256- End of cast.
0437- Deployed PP Array 22° 45.006'N, 158° 1.040'W
0454- S2C2 PO Deep Cast.
0630- At 4 m off the bottom (22° 44.977'N, 157° 59.958'W)

0902- End of cast.
0925- Transit to pump ship's tanks
1015- Net Tow starts
1050- End net tow
1120- S2C3 1000 m CTD PO Shallow
1300- End of cast.
1335- Hyperpro cast (3 cycles)
1416- End Hyperpro
1420- S2C4 1000 m CTD.
1542- End of cast.
1650- S2C5 1000 m CTD.
1806- End of cast.
1857- Recover PP array 22° 48.54'N 158° 6.022'W
1951- S2C6 1000 m CTD
2112- End of cast.
2200- Net Tow starts
2232- End net tow
2235- Net Tow starts
2301- End net tow
2309- S2C7 1000 m CTD.

October 28, 2013
0016- End of cast.
0020- Transit to pump ship’s tanks
0156- S2C8 1000 m CTD.
0305- End of cast.
0430- Gas Array Deployment 22° 45.004'N 158° 1.008'W
0453- S2C9 1000 m CTD
0605- End of cast.
0750- S2C10 1000 m CTD
0914- End of cast.
0915- Transit to pump ship’s tanks
1015- Net tow start
1045- End Net tow
1055- S2C11 1000 m CTD
1210- End of cast.
1220- Net Tow start
1255- End Net Tow
1300- Start ATE sample
1328- End ATE sample
1350- S2C12 1000 m CTD. Large algae bloom (tricho) observed during cast
1419- End of cast.
1540- Transit to pump ship's tanks
1651- S2C13 1000 m CTD
1806- End of cast.
1815- Transit to pump ship's tanks
1952- S2C14 1000 m CTD
2107- End of Cast.
2201- Net Tow
2226- End of net tow
2255- S2C15 PO 2nd deep cast

October 29, 2013
0052- At 5 m off the bottom 22° 45.017'N 158° 0.037’W

0237- End of Cast.
0257- AC9/FRRf
0500- End first cast
0510- Transit to recover arrays
0610- Gas Array recovery 22° 50.51'N 158° 10.80'W
0630- Transit to recover sediment traps
0720- Sediment Trap Recovery 22° 56.624'N 158° 15.363'W
0750- Transit to ALOHA Station
1016- AC9/FRRf
1156- End cast
1204- S52C1 200 m yo-yo cast
1330- End of cast, 4 cycles completed
1400- Hyperpro cast (3 cycles)
1445- End cast
1520- Transit to Station Kaena
1954- Arrive at Station Kaena, S6C1 –near bottom CTD
2159- End of cast
2203- Transit to Snug Harbor

October 30, 2013
0700- Arrive H buoy
0730- Arrive Snug Harbor, full offload.

6. 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:		
Mark Brzezinski	Water collection for Si isotope inter-calibration Project	UCSB
Stuart Goldberg	Ammonium and Nitrate addition experiments	UH
Danielle Hull	DOP bioavailability study	UH
Andrew Dickson	CO_2 dynamics and intercalibration	SIO
Paul Quay	$DI^{13}C$	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
Sara Thomas	Chemolithoautotroph experiment	UH
Anela Choy	Diet analysis of top predatory pelagic fishes in the central NPSG	UH
Christopher Schvarcz	Viral Dynamics in the Oligotrophic Open Ocean, Station ALOHA	C-MORE
Scott Grant	Bacteria retention using a new filter type experiment	UH