

HOT-226: Chief Scientist Report

Chief Scientist: Craig Nosse

R/V Kilo Moana

October 2-6, 2010

Cruise ID: **KM 10-19**

Departed: October 2, 2010 at 0857 (HST)

Returned: October 6, 2010 at 0732

Vessel: **R/V Kilo Moana**

Master of the Vessel: Captain Richard Meyer

Chief Scientist: Craig Nosse

OTG Marine Technicians: Justin Smith and Ben Colello

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 the first day of the cruise for about 2.5 hours.
- 2) Station 2, referred to as Station ALOHA (A Long Term Oligotrophic Habitat Assessment), 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 the 2nd, 3rd, and 4th days of the cruise.
- 3) Station 50, is the site of WHOTS-7 Mooring, approximate position 22° 46.0' N 157° 54.0' W, and was to be occupied on the 4th day of the cruise for at least 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 the 4th day of the cruise for about 3 hours.

Upon arrival to Station Kahe a 1000 lb. weight-test cast to 500 m, one CTD cast to 1000 m, a Hyperpro cast, and a 20 m hand-held Niskin cast were to be conducted at this location on the afternoon of October 2nd. 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 one shallow CTD cast to 200 m, one 1000 m cast (to collect water for the Primary Production Array), and a second 200 m CTD cast. These three casts were 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 October 4th.

Another-free drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on October 4th. The Gas Array was to be recovered on October 5th.

A plankton net was to be towed between 1000-1400, and 2200-0200 for 30 minute intervals on October 3rd and 4th at Station ALOHA.

A hand-held surface net tow was to be conducted at 1300 on October 3rd.

The Hyperpro was to be deployed for half-hour periods near noon time on October 4th, and 5th.

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 of October 5th and around noon time on October 4th and 5th.

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 October 5th.

After recovering the arrays, the ship was to transit to Station 50 to conduct a one-hour 200 m CTD yo-yo cast as well as surface and subsurface instrument intercomparisons. Once operations at Station 50 were complete, the ship was to reposition within Station ALOHA to conduct an AC9/FRRf/LISST cast, and a Hyperpro cast.

Once Station ALOHA 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, meteorological package and a pCO₂ system.

2. SCIENCE PERSONNEL

Participant	Title	Affiliation/HOT Group
Daniela Böttjer	Post-doc	UH/CMORE
Susan Curless	Research Associate	UH/BEACH
Lance Fujieki	Computer Specialist	UH/BEACH
Scott Grant	Research Associate	UH/CMORE
Adriana Harlan	Research Associate	UH/BEACH
Dan Sadler	Research Associate	UH/BEACH
Brett Updyke	Research Associate	UH/BEACH
Donn Viviani	Graduate Student	UH/BEACH
Blake Watkins	Marine Engineer	UH/BEACH
Brenner Wai	Technician	UH/BEACH
Cameron Fumar	Research Associate	UH/PO
Bo Keopaseut	Research Associate	UH/PO
Jefrey Snyder	Marine Technician	UH/PO
Craig Nosse	Research Associate	UH/PO
Ilana Nimz	Volunteer	UH/PO
Jim Foley	Marine Educator	UH/CMORE
Michelle Hsia	Marine Educator	UH/CMORE
Bill Budenholzer	Teacher	Kailua Intermediate
Patti Stover	Teacher	Konawaena High
Daniela del Valle	Post-doc	UH/CMORE
Allison Fong	Graduate Student	UH/CMORE
Jackie Mueller	Graduate Student	UH/CMORE
Sara Thomas	Volunteer	UH/CMORE
Elisha Wood-Charlson	Post-doc	UH/CMORE
Justin Smith	Marine Technician	OTG
Ben Colello	Marine Technician	OTG

3. GENERAL SUMMARY

Operations during the cruise were conducted as planned. One 1000 m CTD cast was completed at Station Kahe. Two near bottom CTD casts, thirteen 1000 m and two 200 m CTD casts were conducted at Station ALOHA. Two 200 m yo-yo CTD casts (one more than originally planned) was completed near the WHOTS mooring (Station 50). One near bottom cast was completed at Station Kaena.

The floating sediment trap array, primary production array, and gas array were all deployed and recovered successfully. The primary productivity array was recovered later than expected in full nighttime conditions because a grappling hook came free from the array during the first recovery attempt and a second attempt was required. All three arrays drifted to the south of the center of ALOHA.

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

One hand held 20 m Niskin cast was conducted at Station Kahe. A 45 m hand held Niskin cast, not originally planned, was conducted at Station 50.

The Hyperpro was deployed three times around noon.

The optical package AC9/FRRf/LISST was deployed three times during the cruise, twice around noon and once in the early morning. The package did not contain the ACS as it was out for repair/calibration.

The ADCP, thermosalinograph, fluorometer, pCO₂ and meteorological system ran without interruption during the cruise. The time/date data stream for the underway data will need to be further examined as it appeared that non-integer data entered the stream at least once during the cruise. The meteorological system continued to have some of the issues brought to the attention of OTG after HOT-223. Electronic spiking affected several of the sensors (Biospherical PAR sensor, the Epply PIR sensor, the Rotronics humidity probe, and the RM Young rain gauge). Separate from the spiking, one of the anemometers had occasions when it reported negative wind directions.

Winds were from the east throughout the cruise at 15-20 knots with occasional gusts to 25 knots. The seas were also from the east, about 6-8 feet throughout the cruise with occasional 10 foot swells.

We arrived at the Snug Harbor for off-loading on October 6th, at 0732 (HST).

One objective for HOT-226 was not met:

- The Sea Glider was not deployed due to weather conditions preventing small boat operations. Discussions were held to explore the possibility of using carbon-fiber poles with a looped line attached to the ends to recover the Sea Glider in the future.

Ship's equipment that was not operational during the cruise:

- Caley CTD system (crane and winch).
- One refrigerator and one freezer in the Science Holding area were not working.

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

The R/V *Kilo Moana* continues to maintain good ship support for our work. The Captain and the ship's crew showed enthusiasm, concern, and dedication to our scientific mission. They made sure to consult and coordinate with the science party for all required ship operations (i.e. pumping of sewage tanks, incinerator burns). If ship operations could not be executed exactly as the science party requested, the Captain was excellent in providing alternatives that would allow for continued safety and completion of science work.

Technical support was good. OTG personnel were available at any time to assist in our work. Furthermore, OTG personnel worked with the science party to explore ways to try and address present and past technical issues such as underway file formatting and the spikes seen in the meteorological system.

5.0 DAILY REPORT OF ACTIVITIES (HST)

02 October 2010

0830 Lines released from pier
0857 "Blue" van on board, departed Snug Harbor
0940 Safety meeting
1010 Abandon Ship and Man Overboard drills
1208 Arrived Kahe Station, weight cast

1255 Hyperpro cast
1322 S1C1
1447 Niskin cast
1500 Began transit to Station ALOHA
2245 Arrived Station ALOHA
2308 Sediment Trap deployment at:
22 43.50 N, 157 58.51 W
2349 S2C1

03 October 2010

0056 S2C2
0308 S2C3
0420 Primary Productivity array deployment at:
22 43.48 N, 157 58.40 W
0506 S2C4 (PO Deep) Reached about 6 m from bottom at:
22 45.01 N, 157 59.99 W
0852 Transit to pump tanks
1010 Net tow
1050 S2C5
1240 Net tow
1320 Surface net tow (STARS group)
1346 S2C6
1511 Transit to pump tanks
1654 S2C7
1912 Recovered Primary Productivity Array at:
22 39.08 N, 157 58.13 W
2004 S2C8
2128 Transit to pump tanks and incinerate trash
2205 Net tow
2313 S2C9

04 October 2010

0105 Net tow
0155 S2C10
0422 Gas Array deployment at:
22 43.16 N, 157 58.21 W
0453 S2C11
0610 Transit to pump tanks
0749 S2C12
1002 Net tow
1055 S2C13
1210 Hyperpro cast
1238 AC9/FRRf
1342 S2C14
1521 Transit to pump tanks
1656 S2C15
1953 S2C16
2116 Transit to incinerate trash

2227 Net tow
2307 S2C17

05 October 2010

0053 S2C17 deep cast reached about 11 m from bottom at:
22 45.01, 157 59.98
0307 AC9/FRRf
0355 Transit to Sediment Traps
0550 Sediment Trap recovery at: 22 29.54, 157 58.95
0630 Transit to Gas Array
0730 Gas array recovery at: 22 34.87, 157 57.07
0947 S50C1
1200 Hyperpro cast
1230 AC9/FRRf
1315 Transit to pump tanks
1405 S50C2
1530 Transit to Station Kaena
2034 S6C1
2140 S6C1 reached about 12 m from bottom at:
21 50.81 N, 158 21.79 W
2307 Transit to Snug Harbor

06 October 2010

0732 Arrive at Snug Harbor starboard side to the pier for equipment off loading
0808 All fast port side to pier for full off load

HOT program sub-components:

Investigator	Project	Institution
Matt Church	Core Biogeochemistry	UH
Roger Lukas	Hydrography	UH
Mike Landry	Zooplankton dynamics	SIO
Ricardo Letelier	Optical measurements	OSU

Ancillary programs:

Charles Keeling	CO ₂ dynamics and intercalibration	SIO
Paul Quay	DI ¹³ C	SIO
Penny Chisholm	Prochlorococcus population dynamics	MIT
Matt Church	Diversity and activities of nitrogen-fixing microorganisms	UH
Various CMORE PI's	Microbial RNA/DNA collection	UH/CMORE

Additional programs:

Dave Karl (via Sam Wilson)	Reduced gases in the upper ocean: The cycling of methane, sulfide and nitrous oxide.	UH/Moore
Dave Karl (via Daniela del Valle)	Radio labeled DMSP assimilation rates and method developing analysis.	UH
Dave Karl (via Jim Foley)	Science Teachers Aboard Research Ships (STARS)	UH
Matt Church (via Donn Viviani, Daniela Böttjer, and Dan Sadler)	Carbon dioxide perturbation experiment.	UH
Matt Church (via Binglin Li)	Comparison of size fractionated chlorophyll methodologies with Station ALOHA water from the upper 200 m	UH
Ed Laws (via Scott Grant)	Nitrogen and phosphate nutrient uptake experiments	UH
Grieg Steward (via Elisha Wood-Charlson and Jackie Mueller)	Viral production at Station ALOHA.	UH/CMORE
Grieg Steward (via Chris Schwarcz)	Collection of 4000 m Station ALOHA water for eukaryote culturing	UH/CMORE
Mike Rappe (via Jana Grote)	Insolation of Station ALOHA archaea from 50 m and 200 m	UH/CMORE