

HOT-205: Chief Scientist Report

Chief Scientist: Susan Curless

R/V Kilo Moana

October 9-13th, 2008

Cruise ID: KM0820

Departed: October 9, 2008 at 0900 (HST)

Returned: October 13, 2008 at 0800 (HST)

Vessel: ***R/V Kilo Moana***

Operator: University of Hawaii

Master of the Vessel: Captain Ross Barnes

Chief Scientist: Susan Curless

OTG Electronics/Deck Operations Technicians: Kuhio Vellalos and Tobin Chen

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 the WHOTS Mooring, located at 22° 46'N, 157° 53.83'W and was to be occupied on the 4th day of the cruise for about 1 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 1,300 lb. weight-test cast to 500 m, one CTD cast to 1000 m, one Go-Flo cast to 20 m, and a PRR cast were to be conducted at this location on the afternoon of October 9th. 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 at 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 and one 1000 m cast to collect water for the Primary Production Array. This 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 on October 12th.

Another free-drifting array (Gas Array) was to be deployed for 24 hours for incubation experiments on October 11th. The Gas Array was to be recovered at 0600 on October 12th.

A plankton net was to be towed between near noon and midnight for 30 min intervals on October 10th and October 11th at Station ALOHA.

A trace metal sampler was to be deployed on October 10th to collect a trace metal clean surface seawater sample.

A Profiling Reflectance Radiometer (PRR) was to be deployed for half-hour periods near noon time on October 9th, 11th, and 12th.

Sea Glider #148, operating at Station ALOHA under diminished battery power was to be recovered (weather permitting) at 0700 on October 11th.

Weather permitting, and at Captain's discretion, Sea Glider #147 was to be deployed at 1500 on October 11th.

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 October 12th.

After recovering the arrays, the ship was to transit to Station 50 to conduct a one-hour 200m CTD yo-yo cast after which the ship was to re-position within Station ALOHA to conduct one PRR cast.

After the light cast operation was completed, the ship was to transit to Station 6, Station Kaena where a near-bottom CTD cast (~2500 m) was to be conducted including 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, two anemometers, and the pCO₂ system.

2. SCIENCE PERSONNEL

Cruise Participant	Title	Affiliation
Karin Björkman	Research Specialist	UH/BEACH
Susan Curless	Chief Scientist – Res. Assoc.	UH/BEACH
Lance Fujieki	Computer Specialist	UH/BEACH
Adriana Harlan	Research Associate	UH/BEACH
Binglin Li	Graduate Student	UH/BEACH
Dan Sadler	Research Associate	UH/BEACH
Brett Updyke	Research Associate	UH/BEACH
Sam Wilson	Scientist	UH/CMORE
Jay Wheeler	Research Associate	UH/BEACH
Paul Lethaby	Research Associate	UH/PO
Fernando Santiago-Mandujano	Research Associate	UH/PO
Christin Shacat	Research Associate	UH/PO
Ken Doggett	Research Associate	UH/CMORE
Brooke Hoffman	Volunteer	PO
Neil Abrany	Undergraduate Student	UH/PO
Cameron Fumar	Undergraduate Student	UH/PO
John Bullister	Scientist	PMEL
David Wisegarver	Scientist	PMEL
Lorraine Palmer	Volunteer	BEACH
Kim Weersing	CMORE Educator	UH/CMORE
Kim Hardy	Teacher	CMORE
Denise Boatwright	Teacher	CMORE
Wrayna Fairchild	Teacher	CMORE
Kuhio Vellalos	Marine Technician	OTG
Tobin Chen	Marine Technician	OTG

3. GENERAL SUMMARY

Two additional CTD casts were conducted; one outside the NW side of the circle and one within Station ALOHA to further define an anomalous feature involving the salinity and oxygen profiles. Unfavorable weather conditions on October 11th and safety concerns forced the cancellation of Sea Glider #147 deployment. Most of the other cruise operations were conducted as planned and only minor delays and schedule changes were experienced.

One 500 m weight cast was performed with a 1,300 lb. weight, one 1000 m CTD cast, and one 20 m Go-Flo cast were conducted at Station Kahe (1). Two near-bottom deep casts and fourteen 1000 m CTD casts were conducted at Station ALOHA (2). One 1000m cast was conducted outside the NW side of the Station ALOHA circle. Glider #148 was successfully recovered. One, one hour 200m yo-yo cast was conducted near the WHOTS mooring (Station 50). One near bottom cast was conducted at Station Kaena (6).

During one of the 1000m CTD cast of the 36 hour burst period, the CTD winch chain snapped during the upcast with the package at ~500m. Repairs to the CTD were made within an hour and the cast then continued without problems.

The array of floating sediment traps, the gas array, and the primary production array were deployed and recovered without any major incidents. All arrays drifted to the west. The first deployment of the ASRBB (Autonomous Spectral Radiometer Beacon Buoy) on the sediment trap array for collection of both air and water light data went well and without complication.

Six net tows were completed, three were conducted during the day, and three during the night.

The PRR was deployed three times around noon.

A trace metal sample was taken (ATE) on October 11th.

The ADCP ran without interruption throughout the cruise, however not all plots were being drawn to use as reference for array deployment positions. Configuration of various pre-cruise software upgrades caused these plotting issues, but data collection was not compromised.

The pCO₂ system, thermosalinograph, underway fluorometer, and the ship's two anemometers ran without interruption throughout the cruise. It should be noted that the ship's fluorometer read out value was higher than normally seen at Station ALOHA.

Winds were from the east between 15-20 knots during the course of the cruise with seas between 4-8ft. Rain squalls could be seen on the horizon and near the ship throughout most of the cruise and rain was experienced on the ship a few times.

We arrived at Snug Harbor for off-loading on October 13th, at 0800 (HST).

4. R/V KILO MOANA, OFFICERS AND CREW, TECHNICAL SUPPORT

The R/V Kilo Moana continues to maintain excellent ship support for our work. The Captain and ship's crew were most helpful and accommodating throughout the cruise. They were very flexible in receiving changes to our operational schedule. Throughout our cruise, the entire crew showed enthusiasm, concern, and dedication to our scientific mission. Captain Ross was very conscientious and helpful in planning appropriate times for the ship to leave station and pump sewage tanks without disrupting science operations.

Technical support during this cruise was excellent. OTG personnel were available at any time to assist in our work and helped keep operations running smoothly.

5. DAILY REPORT OF ACTIVITIES (HST)

October 8th, 2008 – Loading Day

- Cruise equipment and vans were loaded this day.
- CTD wire was re-terminated by Jeffrey Snyder.

October 9th, 2008

0900- Depart Snug Harbor
0945- fire and abandon ship drill followed by science party safety briefing and meeting.
1145- arrive Station Kahe
1204- begin weight cast
1230- end weight cast
1240- PRR
1300- end PRR
1313- S1C1
1439- end S1C1
1445- go-flo cast
1500- transit Station ALOHA
1515- magnetometer deployed
2230- arrive Station ALOHA, magnetometer retrieved
2334- Sediment Trap Array deployed one nautical mile North of the center of Station ALOHA 22°46.121'N 157°59.864'W

October 10th, 2008

0013- S2C1
0127- S2C2
0240- transit to pump ship's tanks
0430- Primary Production Array deployed 0.5nm North of the center of ALOHA 22 45.492'N 157 59.924'W
0504- S2C3-PO deep cast
0831- end of deep cast
0924- transit to pump ship's tanks
1000- net tow
1100- S2C4-PO shallow
1214- end of cast
1220- net tow
1310- hand net tow for CMORE education
1320- ATE
1400- S2C5
1500- transit to pump ship's tanks
1630- S2C6
1752- end cast S2C6

1842- begin recovery of Primary Production array. Ship's bow thruster would not respond from bridge wing control station on approach to the array. Engineering was called and repairs made.

1901- Primary Production Array recovered 22 46.460'N 158 2.922'W

2000- S2C7 BEACH cast

2100- transit to pump ship's tanks

2200- net tow

2315- S2C8

Weather observations at Station ALOHA on Oct 10th were East winds at 14-16kts, with 4-6ft seas under a 2/8 cloud covered sky.

October 11th, 2008

0115- net tow

0200- S2C9

0431- Gas Array deployed 22°46.03'N 158°0.0'W

0459- S2C10

0630- transit to pump ship's tanks

0730- Recovered sea glider #148 at 22° 49.74'N 158° 0.59'W successfully and without injury despite the rough seas. The small boat was used to recover the glider from the water and bring it to the ship where a line through the A-frame was used to bring the glider on board.

0802- S2C11

0903- end of cast

1000- net tow

1059- S2C12

1136- winch chain broke while CTD was at 496 decibars on the up cast. CTD remained actively collecting data while repairs were made. Only two bottles were fired for salinity samples before the chain broke. All other bottles being fired were above 500m.

1226- winch repaired

1258- end of S2C12

1305- PRR

1359- S2C13

1700- S2C14

1815- transit to pump ship's tanks

2000- S2C15

2110- end cast

2215- net tow

2315- S2C16 second deep cast

Weather conditions at Station ALOHA for Oct. 11th were East winds at 14-16 kts, 6-8ft seas and building under a 3/8 cloud covered sky.

October 12th, 2008

0243- end deep cast

0415- recovery of the sediment traps 22 45.95'N 158 9.65'W

0606- recovery of the gas array 22 45.64'N 158 4.91'W

0832- S3C1-NW of the circle to search for an anomalous feature seen in S2C14 and S2C15

0922- end of S3C1- high salinity and low O2 between 400 and 500 decibar as seen in C14

1041- S2C17-again looking for feature, but not seen as strongly at this position.

1200- PRR

1323- S50C1 6 cycles complete at 1457.

1525- transit Kaena Point.

2055- S6C1

2310- end of cast

2315- underway for Snug Harbor

October 13th, 2008

0800- arrive Snug Harbor for full off-load.

HOT program sub-components:

Investigator:

Dave Karl
Roger Lukas
Bob Bidigare
Mike Landry
Mark Abbott/Ricardo Letelier

Project/Institution:

Core Biogeochemistry/UH
Hydrography/UH
HPLC pigments/UH
Zooplankton dynamics/UH
Optical measurements/OSU

Ancillary programs:

Investigator:

Charles Keeling
Paul Quay
Penny Chisholm
Zehr/Church/Montoya

Various CMORE PI's
Mark Brzezinski

Bullister/Wisegarver

Project/Institution:

CO2 dynamics and intercalibration/SIO
DI13C
Prochlorococcus population dynamics/MIT
Diversity and activities of nitrogen-fixing
microorganisms/UH
Microbial RNA/DNA collection/CMORE
Silica production and dissolution rate
measurements/UCSB
CFC and SF6 tracer saturation levels in the water
column/PMEL

Additional programs:

Investigator:

Edward Boyle
Sam Wilson

CMORE Education

Project/Institution:

Trace metals/MIT
Reduced gases in the upper ocean: The cycling
of methane, sulfide and nitrous oxide/CMORE/UH
Teacher at sea program.