

HOT-186: Chief Scientist Report

Chief Scientist: Eric Grabowski

HOT-186 Chief Scientist's Cruise Report
R/V Kilo Moana
October 18-24, 2006

Cruise ID: KM0627

Departed: October 18, 2006 at 0900 (HST)

Returned: October 24, 2006 at 0800

Vessel: R/V Kilo Moana

Operator: University of Hawaii

Master of the Vessel: Captain Bryon Wilson

Chief Scientist: Eric Grabowski

OTG Electronics/Deck Operations Technicians: Gabe Foreman, Steve Tottori

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. Five stations were to be occupied during the cruise, in the following order:

- 1) Station 1, referred to as Station Kahe, is located at $21^{\circ} 20.6'N$, $158^{\circ} 16.4'W$ and was to be occupied on the first day of the cruise 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 $22^{\circ} 45'N$, $158^{\circ}W$. This is the main HOT station and was to be occupied during the 2nd, 3rd, 4th, 5th and 6th days of the cruise.
- 3) Station 51, is the site of the MOSEAN Mooring, located at $22^{\circ} 45'N$, $158^{\circ} 6'W$ and was to be occupied on the 5th day of the cruise for about 2 hours.
- 4) Station 50, is the site of the WHOTS Mooring, located at $22^{\circ} 45.994'N$, $157^{\circ} 53.992'W$ and was to be occupied on the 6th day of the cruise for about 14 hours.
- 5) Station 6, referred to as Station Kaena, is located off Kaena Point at $21^{\circ} 50.8'N$, $158^{\circ} 21.8'W$ and was to be occupied on the 6th day of the cruise for about 2 hours.

Upon arrival to Station Kahe a 400 lb. weight-test cast, one CTD cast to 1000 m, and a PRR cast was to be conducted at this location in the afternoon of October 18. 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, a series of CTD casts were to commence. After the third CTD cast, an array with incubation experiments (gas array) was to be deployed for 24 hours at 0330 on Oct. 19. Following this, CTD casts were to continue until the deployment of the free-drifting sediment trap array at 2330 on Oct. 19. The sediment trap array was to stay in the water for about 52 hours. After the deployment of the sediment traps, the gas array was to be recovered at 0400 on Oct. 20.

After recovery of the gas array the ship was to return to the center of Station ALOHA for a full-depth CTD cast, 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.

One free-drifting array (primary production) was to be deployed for 12 hours for incubation experiments on October 21.

A plankton net was to be towed near noon and midnight for 30-min intervals on October 19, 20 and 21 at Station ALOHA.

A Profiling Reflectance Radiometer (PRR) was to be deployed for half-hour periods near noon time on October 18, 21 and 22.

A package including a Wet Labs AC9, a Chelsea Fast Repetition Rate Fluorometer (FRRf), and a SeaBird Seacat was to be used to profile the upper 200 m at Station ALOHA at noon time on October 21 and 22, and in the early morning on October 22.

An Automated Trace Element Sampler (ATE) was to be deployed once on October 19.

After CTD work at Station ALOHA was accomplished, the ship was to transit to recover the floating sediment trap array on October 22.

After recovering the sediment traps, the ship was to transit to Station 51 to conduct a 200-m CTD cast, and then back to Station ALOHA to conduct light casts (PRR, AC9/FRRf) followed by five more CTD casts. Following the last CTD cast the ship was to transit to Station 51 (WHOTS).

Four CTD casts were to be conducted near the WHOTS mooring. Cast 1 was to consist of three 1000m casts without removing the CTD from the water. Cast 2 was to consist of 200m casts (yoyo) up and down. Cast 3 was to consist of three 1000m casts without removing the CTD from the water. Cast 4 was to consist of 200m casts (yoyo) up and down.

After operations at Station 51 ended, the ship was to transit to Station 6 (Kaena).

A near-bottom CTD cast (~2500 m) was to be conducted at Station 6 including salinity samples for calibration, after which the ship was to transit to back to Snug Harbor.

The following instruments were to collect data throughout the cruise: shipboard ADCP, thermosalinograph, and two anemometers.

2. SCIENCE PERSONNEL

BEACH group:

Cruise Participant	Title	Affiliation
Karin Bjorkman	Research Specialist	UH
Susan Curless(Watch Leader)	Research Associate	UH
Ken Doggett	Research Associate	UH
Eric Grabowski	Chief Scientist (Res. Assoc.)	UH
Adriana Harlan	Technician	UH
Claire Mahaffey	Research Specialist	UH
Dan Sadler	Research Associate	UH
Blake Watkins	Marine Engineer	UH
Doug White	Technician	UH

PO group:

Paul Lethaby	Research Associate	UH
Erica Wasner	Volunteer	UH
Fernando Santiago-Mandujano(Watch Leader)	Research Associate	UH
Jefrey Snyder	Marine Technician	UH
John Yeh	Graduate Student	UH

Others:

Elizabeth Hambleton	Technician	UH
Misty Miller	Technician	UH
Matthew Sullivan	Postdoctoral Researcher	MIT
Maureen Coleman	Graduate Student	MIT
Sarah Bagby	Graduate Student	MIT
Yan Mei Shi	Graduate Student	MIT
John Bullister	Scientist	PMEL
Dave Wisegarver	Scientist	PMEL
Maria Calleja Cortès	Graduate Student	IMEDEA

3. GENERAL SUMMARY

Operations during the cruise were conducted without any delays. Nearly all objectives for HOT 186 were successfully completed except for the ATE. Communication problems with the ATE prevented its deployment.

One 1000-m CTD cast was conducted at Station Kahe (1). Two deep casts, fifteen 1000-m CTD casts, two 500-m casts, four 300-m casts, five 200-m casts and two 100-m CTD casts were conducted at Station ALOHA (2). One 300-m CTD cast was conducted near

the MOSEAN moorings (Station 51). Two 300-m (yoyo) CTD casts and two 1000-m CTD casts (up and down 3 times) were conducted near the WHOTS mooring (Station 50). One near-bottom CTD cast was conducted at Station Kaena (6).

The array of floating sediment traps, the gas array, and the primary productivity incubation array were deployed and recovered without incidents. The arrays drifted SSW of ALOHA.

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

C. Mahaffey deployed her hand-held plankton net once.

The AC9/FRRf was deployed at noon four times, and one time at night.

The PRR was deployed four times at noon time.

The Automated Trace-Element Sampler (ATE) was not deployed because of communication errors.

The ADCP ran without interruption throughout the cruise, as well as the thermosalinograph, and the ship's two anemometers. The fluorometer had technical problems until 0525 on October 19.

Winds shifted from NNE at 5 kt to NE at 12 kt to ENE at 22 kt during the course of the cruise.

We arrived at Snug Harbor on October 24 at 0800.

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

The R/V Kilo Moana continues to maintain the excellent ship support for our work. The officers and crew were most helpful and accommodating. They showed enthusiasm and concern for our work and were very flexible in receiving changes in our operational schedule.

Technical support during this cruise was excellent. OTG personnel were available at any time to assist in our work and made things much easier for us.

5. DAILY REPORT OF ACTIVITIES (HST)

October 17, 2006; Loading Day

Equipment loaded during this day, The CTD wire was inspected, re-terminated and the CTD system tested.

October 18, 2006

Departed Snug harbor at 0906.

Safety briefing by the Captain conducted at 1000, followed by a science meeting in which cruise activities were briefly reviewed, and safety issues were addressed.

Fire and abandon ship drills conducted at 1030.

Arrived Station Kahe at 1200, conducted a 400lb weight cast at 1205, PRR at 1245 and a 1020-m CTD cast at 1320.

We got underway to station ALOHA at 1330.

At 1600 the captain conducted a meeting about deployment and recovery of all arrays. In attendance were the Captain, Chief Mate, Eric, Dan, Ken, Doug and Gabe.

The ship arrived to Station ALOHA at 2230. One 200-m CTD cast was conducted to collect water for the gas array experiment.

October 19, 2006

One more 200-m CTD cast was conducted at Station ALOHA to collect water for the gas array experiment. A 100-m CTD cast followed to collect water for the mixing experiment.

Afterwards, the gas array was deployed at 0318.

At 0345 a 200-m CTD cast was conducted for the mixing experiment. Following, the ISUS was installed in the rosette and connected to the CTD for the rest of the CTD cast operations.

Two 500-m CTD casts were conducted for the MIT group at 0630 and 0830.

The ATE was cancelled due to a communication error.

One net tow was conducted at 1000 by Blake Watkins.

A hand held net was deployed at 1045 by Claire Mahaffey to capture Trichodesmium.

One 1000-m CTD cast occurred at 1100.

A PRR cast was conducted at 1215 for the MIT group.

One 1000-m CTD cast occurred at 1430 followed by three 200-m CTD casts.

The sediment trap array was deployed at 2330.

Weather conditions observed at 1200; winds from the NNE at 5 knots, seas 8-10ft, cloud cover around 5/8.

Trichodesmium surface slick observed.

October 20, 2006

The gas array was recovered at 0300. The array drifted about 10nm SW from the center of Station ALOHA.

The near-bottom PO/CTD cast started at 0500.

The first 1000-m CTD cast of the 36hr burst period started at 1110 and four more casts followed that day. The ISUS was reinstalled in the rosette and connected before the first CTD cast of the 36hr period.

Three net tows occurred at 0030, 1000 and 2200 by Blake Watkins.
Weather conditions at 1400; winds from the NE at 12 knots, seas 6-8ft and cloud cover 7/8.

October 21, 2006

Seven 1000-m CTD casts were conducted this day and the 36-hr CTD burst period ended with a second deep cast that started at 2300.
The primary productivity array was deployed at 0530 and recovered at 1840. The primary productivity array drifted 5nm S from ALOHA.
One PRR cast was conducted at 1210.
At 1245 one AC-9/FRRf cast was conducted.
Two net tows were conducted at 0100 and 1000 by Blake Watkins.
Weather conditions at 1400; winds from the NE at 10 knots, seas 6-8ft and cloud cover 6/8.

October 22, 2006

One AC-9/FRRf cast was conducted at 0300.
The sediment trap array was recovered at 0655 after drifting around 20nm SW from ALOHA.
One 300-m CTD cast was conducted near the MOSEAN mooring at 0900.
One PRR cast was conducted at Station ALOHA around 1200.
Two AC-9/FRRf casts were conducted at 1245 and 1345.
One 1000-m CTD cast and three 300-m CTD casts occurred on this day.
Weather conditions at 1400; winds from the ENE at 22 knots, seas 8-12ft and cloud cover 2/8.

October 23, 2006

One 300-m CTD cast occurred at 0000.
At 0215, 3 consecutive 1000-m CTD casts were conducted at the WHOTS mooring.
Following at 0500 a 300-m yoyo CTD cast was conducted at the WHOTS mooring.
At 0900 3 consecutive 1000-m CTD casts were conducted at the WHOTS mooring.
One AC9/FRRf cast was conducted at 1215.
At 1300 a 300-m yoyo CTD cast was conducted at the WHOTS mooring.
One near-bottom cast was conducted at Station Kaena (Sta 6)
Weather conditions at 1400; winds from the ENE at 22 knots, seas 8-10ft and cloud cover 7/8.

October 24, 2006

Arrived at Snug Harbor at 0800. 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

Project/Institution:

CO2 dynamics and intercalibration/SIO
DI13C and O isotopes/UW
Prochlorococcus population dynamics/MIT
Diversity and activities of nitrogen-fixing
microorganisms/UH

Additional programs

Investigator:

DeLong/Chisholm
Mike Rappe

John Bullister

Project/Institution:

Plankton Metagenomics
Marine bacterioplankton community
structure/UH
Dissolved Chlorofluorocarbons