

Chief Scientist: F.SANTIAGO-MANDUJANO

HOT-157 Chief Scientist's Cruise Report

R/V Kilo Moana

March 18-22, 2004

Cruise ID: KM0408

Departed: March 18, 2004 at 1000 (HST)

Returned: March 22, 2004 at 0730

Vessel: R/V Kilo Moana

Operator: University of Hawaii

Master of the Vessel: Captain Grey Drewry

Chief Scientist: Fernando Santiago-Mandujano

STAG Electronics Technician: Steve Poulos

STAG Deck Operations: Dave Gravatt

1. SCIENTIFIC OBJECTIVES

The objective of this cruise was to maintain a collection of hydrographic and biogeochemical data at the Hawaii Ocean Time-series (HOT) stations. Two 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 March 18 for about 5 hours.

2) Station 2: ALOHA (A Long Term Oligotrophic Habitat Assessment) is defined as a circle with a 6 nautical mile radius centered at 22 45'N, 158W. This is the main HOT Station and was to be occupied for 3 days from March 19 to March 21.

Two CTD casts were to be conducted at Station 1. The first one to test oxygen sensors by Sea-Bird Electronics Inc. personnel, the second to collect continuous profiles of various physical and chemical parameters. Water samples were to be collected at discrete depths for biogeochemical measurements.

Upon arrival at Station ALOHA, a net tow was to be conducted, followed by the deployment of a free-drifting sediment trap array. After deployment, a full-depth CTD cast was to be conducted, followed by CTD casts at strict 3 hour intervals for at least 36 hours for continuous and discrete data collection, followed by a full-depth CTD cast conducted by Sea-Bird personnel to conduct oxygen sensor experiments.

One free-drifting array was to be deployed for 12 hours for incubation experiments on March 20.

A plankton net was to be deployed near noon and midnight on March 19 and 20 at Station ALOHA.

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

sediment traps, the ship was to return to Sta. ALOHA to continue light cast operations, and to conduct another full-depth CTD cast by Sea-Bird personnel.

After finishing operations at station ALOHA, the ship was to transit back to Snug Harbor.

A Profiling Reflectance Radiometer (PRR) was to be deployed for half-hour periods near noon time on March 18, 20 and 21.

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 300 m at Sta. ALOHA for one-hour periods on March 20 and 21.

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

## 2. SCIENCE PERSONNEL

### JGOFS group:

|                            |                     |      |
|----------------------------|---------------------|------|
| Karin Bjorkman             | Research Specialist | UH   |
| Tara Clemente              | Research Associate  | UH   |
| Allan Devol                | Scientist           | UW   |
| Lance Fujieki              | Computer Specialist | UH   |
| Eric Grabowski             | Research Associate  | UH   |
| Marcie Grabowski           | Graduate Student    | UH   |
| Tom Gregory (Watch Leader) | Research Associate  | UH   |
| Michael Rappe              | Scientist           | UH   |
| Cecelia Sheridan           | Graduate Student    | UH   |
| Benjamin Van Mooy          | Post-Doc            | WHOI |
| Blake Watkins              | Marine Engineer     | UH   |

### PO group:

|                                  |                               |          |
|----------------------------------|-------------------------------|----------|
| Daniel Fitzgerald (Watch Leader) | Research Associate            | UH       |
| Bruce Howe                       | Scientist                     | UW       |
| Maya Iriondo                     | Graduate Student              | UH       |
| Marissa Kinnear Daniels          | Undergraduate Student         | UH       |
| Roger Lukas                      | Scientist                     | UH       |
| Darius Miller                    | Engineer                      | Sea-Bird |
| David Murphy                     | Engineer                      | Sea-Bird |
| Xavier Murard                    | Research Associate            | UH       |
| Fernando Santiago-Mandujano      | Chief Scientist (Res. Assoc.) | UH       |
| Mark Valenciano                  | Electronics Technician        | UH       |

## 3. GENERAL SUMMARY

Operations were conducted as planned the first three days of the cruise, with delays in CTD operations caused by the increasingly rough weather. The CTD wire developed kinks during three casts and required retermination.

The light casts planned for the last day of the cruise were cancelled because the ship had to return to Honolulu harbor to disembark one of the cruise members (Tom Gregory) who had to attend a family emergency. The

two Sea-Bird casts planned for the last day were combined into one cast, which was conducted SW of Honolulu.

Twelve 1000-m CTD casts and one deep cast (~4740 m) were conducted at Station ALOHA. Two 1000-m CTD casts were conducted at station Kahe, one of them was for Sea-Bird. One deep CTD cast was conducted by Sea-Bird personnel SW of Honolulu.

The array of floating sediment traps and the primary productivity incubation array were deployed, and recovered without incidents despite the rough weather. Both arrays drifted east.

C. Sheridan completed successfully 6 plankton net tows.

The PRR and AC9/FRRf were deployed as planned, except during the last day of the cruise.

The ADCP and thermosalinograph ran without interruption throughout the cruise, as well as the fluorometer, and the ship's two anemometers.

Winds were from the north at 15-20 kt early in the cruise, increasing to more than 30 kt the last day, changing direction to NE. The swell at ALOHA was about 6-8 ft the second day of the cruise, increasing to more than 15 ft the last day at ALOHA. Scattered showers were present during the cruise.

We arrived back at Snug Harbor on March 22 at 0730. Full off-load took place immediately.

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

The R/V Kilo Moana continues to maintain good ship support for our work. Despite the bad weather we were able to conduct the deployment and recovery of drifting arrays, and the net tows without incidents. The CTD operations were affected by the deteriorating weather, causing noisy data due to the increasing ship's roll and pitch, kinks in the CTD wire that required retermination three times during the cruise, and damages to four of our Niskin bottles when the package hit the ship during one of the recoveries.

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. STAG personnel were available at any time to assist in our work and made things much easier for us.

#### 5. DAILY REPORT OF ACTIVITIES (HST)

March 17, 2004; Loading Day

Equipment loaded on this day starting at 0900. CTD wire was re-terminated and CTD system tested.

March 18, 2004

The ship departed from Snug harbor at 1000. Safety and science meetings conducted at 1045. Safety issues were addressed by the captain, and the cruise activities were briefly reviewed by the chief scientist. Fire and abandon ship drills were conducted at 1630.

Arrived to Kahe Station at 1230 and a weight cast (400 lb) to 1000 m was conducted. This was followed by a PRR cast.

A 1000-m CTD cast was conducted by Sea-Bird personnel between 1400 and 1520, followed by our regular 1000-m CTD cast at 1550, after which the ship headed towards Station ALOHA at 1715.

Winds were from NW at 15 kt.

March 19, 2004

Arrived at Station ALOHA at 0020, and proceeded to conduct a net tow, followed by the sediment traps deployment. The deep CTD/PO cast started at 0220 and ended at 0600 without any problems. This cast was followed by the shallow CTD/PO cast at 0800, which marked the beginning of the 36-hr CTD burst period. A total of six 1000-m CTD casts were conducted this day.

Cast 3 was delayed 30 min due to problems keeping the appropriate tension in the CTD winch tension mechanism. The section of wire that could have been affected was inspected before the cast.

The CTD hit the deck's rail during recovery of cast 6. The top caps of four Niskin bottles were damaged. The Rosette frame and CTD were inspected and no damage was detected.

Two net tows were conducted between 1000 and 1400 on March 19. Three net tows were conducted at night.

Winds increased between 15 and 20 kt from N, NW. The northern swell also increased to about 6-8 ft. Sporadic rain.

March 20, 2004

Six 1000-m CTD casts were conducted during this day. Increasing winds and swell affected CTD operations. Kinks in the CTD wire developed near the package during casts 10, 12 and 13, and required cutting of the affected portion of the wire and retermination.

The morning AC-9/FRRf cast was delayed one hour to 0500 because the ship had to go out of the circle to pump waste water tanks. The primary productivity array was deployed immediately after at 0615. Consequently cast 9 had to be moved from 0500 to 0630.

The PRR was deployed near noon, followed by the AC-9/FRRf profile.

The primary production array was retrieved at 1950 under rough conditions. The array drifted 14 km east of the center of ALOHA Sta.

Due to a family emergency of one of the science members (Tom Gregory), we decided to reduce the number of operations at ALOHA and take him back to Honolulu.

Cast 14 was cancelled, and the HPLC samples planned to be collected during this cast were taken during cast 13.

The sediment trap array was recovered at 2130 under rough weather, the array drifted 32 km east from the center of ALOHA Sta.

The light casts planned for the last day of the cruise were cancelled.

Two net tows were conducted near noon and one at night.

Winds increasing to 20-25 kt from N, NW, and large northern swell of more than 15 ft. Occasional rain.

March 21, 2004

Arrived to Honolulu harbor at 0730 and disembarked T. Gregory using a small boat.

The ship headed SW to 20 43'N, 158 15.2'W to conduct a deep CTD cast by Sea-Bird personnel. The cast started at 1220 and ended at 1700, after which the ship headed back to Honolulu.

Winds were from NE at more than 30 kt.

March 22, 2004

Arrived at Snug Harbor at 0730. Full off-load took place immediately.

Sub component programs:

| Investigator:<br>----- | Project/Institution:<br>----- |
|------------------------|-------------------------------|
| Bob Bidigare           | HPLC pigments/UH              |
| Mike Landry            | Zooplankton dynamics/UH       |
| John Dore              | CO2 dynamics/UH               |

Ancillary programs:

| Investigator:<br>-----       | Project/Institution:<br>-----           |
|------------------------------|---|
| Charles Keeling              | CO2 dynamics and intercalibration/SIO   |
| Mark Abbott/Ricardo Letelier | Optical measurements/OSU                |
| Paul Quay                    | DI13C and O isotopes/UW                 |
| Penny Chisholm               | Prochlorococcus population dynamics/MIT |

Ancillary research during this cruise

| Investigator:<br>-----     | Project/Institution:<br>-----  |
|----------------------------|--|
| David Murphy/Darius Miller | Oxygen sensors pressure-temperature response/Sea-Bird Electronics Inc. |

Allan Devol/Benjamin Van Mooy      Phosphate uptake by marine microorganisms/  
UW,WHOI

Michael Rappe                              Marine bacterioplankton community structure/UH