

## HOT-64: Chief Scientist Report

Chief Scientist: L. TUPAS

Loading: July 26, 1995

Departed: July 28, 1995 at 0900

Returned: August 2, 1995 at 0800

Vessel: R/V Maurice Ewing

Operator: Lamont Doherty Earth Observatory, Columbia University

Chief Scientist: Dr. Louie Tupas

Master: Captain Stan Ziegler

Deck Operations: Mr. Joe Stennet

Electronics Technician: Mr. Paul Osgaard

Computer Technician: Mr. Bill Robinson

### 1. PLANNED SCIENTIFIC OBJECTIVES

The primary objective of the cruise was to maintain the collection of hydrographic and biogeochemical data at the Hawaii Ocean Time-series (HOT) station, also known as Station ALOHA (A Long Term Oligotrophic Habitat Assessment). Free-drifting sediment traps were planned for deployment for approximately 72 hours from the site to measure sedimentation rates of particulate matter. CTD casts at three hour intervals were planned to obtain temperature, salinity, dissolved oxygen, flash fluorescence and beam attenuation profiles. Water samples for analysis of dissolved nutrients, gases, and biomass were to be collected with the CTD casts. Another free-drifting array to conduct a primary production experiment was planned for a 12 hour deployment. Two other stations were planned to be occupied during this cruise; Station Kahe and Station Kaena. An optical plankton counter (OPC) was planned to be towed on the return leg to Snug Harbor. ADCP measurements were not made during this cruise because the shipboard ADCP was not functioning. Water samples for ancillary investigations were to be collected and experiments were to be conducted as time permitted.

### 2. SCIENCE PERSONNEL

Dale Hebel - UH, JGOFS

Luis Tupas - UH, JGOFS

Lance Fujieki - UH, JGOFS

Terrence Houlihan - UH, JGOFS

Don Wright - UH, JGOFS

Angie Thomson - UH, JGOFS

Fernando Santiago-Mandujano - UH, WOCE

Jefrey Snyder - UH, WOCE

Craig Nosse - UH, WOCE

Molly Lucas - UH, WOCE

Jinchun Yuan - UH, WOCE

Daniel Sadler - UH, Carbon Project

Robert Miller - UH, Zooplankton Project

Shevaun Fennell - UH, Trace Metal Project

Kristi Hanson - UH, Pigment Project

Mai Lopez - SIO, OPC/ADCP  
Charles Stump - UW, Gas isotopes  
Tanya Westby - UW, Gas isotopes  
Jack DiTullio - Coll. Charleston, Picoplankton  
Dave Jones - Coll. Charleston, Picoplankton  
Hong Bin Liu - UH, Picoplankton  
Karen Casciotti - UH, Trace gases  
Bruce Monger - UH, Microplankton

### 3. GENERAL SUMMARY

All objectives of the JGOFS and WOCE programs were accomplished. Stations Kahe, Kaena and ALOHA were occupied. All core samples were taken within the 36 hour CTD burst sampling period but several sampling intervals were delayed because of on- going operations on deck. All samples for ancillary projects were taken. The floating sediment trap and the primary production array were successfully deployed and recovered, no samples were lost during the in-situ incubation. Problems were encountered with the CTD winch which did not brake properly during descent. This was a major safety concern because during the retrieval the package would slam onto the deck. A crane was used to lift the package and retrieve the package once it was out of the water. Additionally, the new rosette frame was spinning during deployment which twisted the wire badly and required retermination of the CTD cable after the first cast. The profiling natural fluorescence instrument was lost during its initial deployment. The instrument was apparently dragged under the ship and the cable was cut by the ships propellers. There were no other equipment failures. The optical plankton counter was towed on a series of transects through Station ALOHA. After the transect the ship proceeded to Honolulu still towing the v-fin which was retrieved just before the ship entered Honolulu harbor.

### 4. R/V MAURICE EWING, OFFICERS AND CREW, TECHNICAL SUPPORT

The R/V Maurice Ewing provided adequate ship and technical support for our work. There were several difficulties to overcome, such as the need for radiation license transferring to use radioisotopes on the vessel, the large beams on the port and starboard side of the vessel which resulted in all operations being conducted from the stern, the great height between the main deck and the crane on the port side which made communication difficult and the CTD winch which did not break properly which necessitated a revised recovery procedure. There were other difficulties which are outlined in the section below. 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. Personnel were available at any time to assist in our work and made things much easier for us.

### 5. DAILY REPORT OF ACTIVITIES

July 26, 1995; Loading Day 1

Although we were scheduled to mobilize our equipment on July 26th, Snug Harbor called us on July 25 to bring the laboratory vans and other heavy equipment for loading. The reason for this was that the UH Marine Facility's crane was not adequate in scope to lift off or put container vans on the ship. The large beams above the ship's port and starboard gunnels of the back deck were a large obstacle as well as the great height of the upper deck. The laboratory vans and other large equipment were moved from the SNUG Harbor that day. All lighter deck equipment and laboratory equipment were to be loaded the following day.

July 27, 1995; Loading Day 2

All other equipment not loaded the previous day was loaded on this day. The captain of the vessel was most conservative in terms of safety and did not allow us to cross the CTD opening of the ship. All equipment had to be handed across the railings or carried through the gangway. The ship had a new CTD wire which we used. All electrical and electronic connections were made for the CTD and the OPC/v-fin. The OPC was connected to a towing winch to the A-deck. All lab equipment were stowed away and secured. All instruments were tested and appeared functioning. No problems were encountered.

July 28, 1995; Departure and at-sea

All hands arrived on ship at 0830. Ship departed at 0900. Fire and emergency drills conducted at 0945 followed by safety briefing by science officer, first mate and chief engineer. Arrive at Station Kahe at 1200 and conducted a weight cast to be followed by the profiling natural fluorometer (PNF) cast. During the PNF down cast, when the instrument was at a depth of about 130 m, the package swung inboard under the ship. The ship was trying to adjust position but the cable remained beneath the ship. The cable then parted and was apparently cut by the propellers of the ship. The cast was aborted and the 1000 m CTD cast was conducted. An apparent instrumentation failure was noted during the up-cast. When the package was retrieved two problems were noted. The first problem was a kink in the wire which would necessitate retermination of the cable. The second problem was that the package could not be gently lowered unto the deck of the ship. The science officer would look into this problem. The instrument package was inspected and no problems were apparent. The wire was reterminated and a second cast was made at 1615 and completed at 1745. All operations and sampling accomplished by 1800. Transit to Station Kaena. Arrive Station Kaena at 2100. Conduct CTD to near bottom, completed at 2300, slowly started transit to Station ALOHA while sampling.

July 29, 1995; At-sea

Arrive at the center of Station ALOHA at 0400 and commenced sediment trap deployment. Rough sea state. After deployment the ship transited to the center of Station ALOHA and commenced with the 36 hour burst sampling period. Because of the condition of the wire, it was decided that the WOCE deep cast be conducted at the end of the 36 hour sampling period. CTD burst sampling commenced at 0800 with the JGOFS casts. CTD casts maintained at 3 hour intervals. Some problems were encountered with determining the correct wire speed. Some delays with the 3-hour

interval CTD period were encountered because of the high-volume water pump sampling occurring in between the scheduled deployment times. Net tows were conducted in the evening

July 30, 1995; At-sea

CTD casts continued at 3 hour intervals. Go-Flo cast from the stern conducted at 0130, finished at 0300. Primary production array deployment commenced at 0600. CTD casts continued at 3 hour intervals. Zooplankton tow conducted at noon and midnight. High-volume pumping conducted in between CTD casts caused some delay in the schedule. Retrieval of primary production array commenced at 1930. No samples were lost. A delay of 3 hours was caused by the retrieval of the primary production array. CTD casts continued at 3 hour intervals.

July 31, 1995; At-sea

Burst sampling continues. WOCE deep cast commenced at 1300. CTD casts continue for special projects at 1800. The CTD cable was again reterminated at 0800 because of several kinks in the wire. Zooplankton tow and large volume pump sampling conducted in between casts.

August 1, 1995; At-sea

CTD worked continues with final cast accomplished at 0330. Departed towards sediment traps at 0400. we were using the last email message which was received on July 30 to locate the traps. No fax or email messages were received afterwards. Sediment trap recovery started at 0830 and completed by 1030. OPC/V-fin deployed and survey of Station ALOHA conducted at 1100. Transit to Station ALOHA at 0600.

August 2, 1995; At-sea and return to Honolulu

V-fin retrieved at 0500. Proceed to Snug Harbor and arrive at 0800. Commenced off loading. All equipment and personnel cleared from ship at 1130.

## 6. ANCILLARY INVESTIGATIONS AND SPECIAL PROJECTS

1. Zooplankton sampling - B. Miller
2. Trace metal water sampling - S. Fennell
3. DIC water sampling - D. Sadler
4. Optical plankton counter - M. Lopez
5. Plant pigment samples - K. Hanson
6. Picoplankton project - J. Ditullio, D. Jones, H. Liu
7. Trace gases - K. Casciotti
8. Microplankton samples - B. Monger
9. Gas Isotopes - C. Stump, T. Westby

## 7. SAMPLES TAKEN FOR OTHER INVESTIGATORS

1. DIC water samples for C.D. Keeling, SIO-UCSD
2. DIC water samples for P. Quay, U. Washington
3. Filtered seawater samples for H. Thierstein, Zurich

4. Seawater samples for G. Luther, U. Delaware
5. Seawater samples for F. Sansone, B. Popp, U. Hawaii
6. Seawater for E. Laws, U. Hawaii
7. Seawater for B. Midson, U. Hawaii

#### 8. SAFETY AND OTHER RELATED ISSUES

The following are safety related issues regarding our operations on the vessel.

1. CTD operations - The CTD winch which was operated on the vessel lacked the proper breaking mechanism. This resulted in our CTD being crashed several times on the deck of the ship which was potentially dangerous to anyone in the vicinity. We resolved the problem by using the ship's crane to take the load off the winch after the package was lifted out of the water. This however, required several more personnel and the operation had to be properly coordinated to avoid injury to personnel. This also increased the time it took to conduct a recovery operation. Fortunately, sea conditions were not too rough and we could take the time necessary for this maneuver. Another problem involves the lack of correct information regarding the winch speed which is important for our work. The CTD winch is greatly lacking in operational quality and is unsuitable for proper CTD operations.

2. Portside operations - We found difficulty in deploying and our retrieving instrumentation from the port side because of the great height between the main deck and the A-deck where the crane is located. Communication between the crane operator and deck operator was almost impossible. Because of this, we lost an instrument during deployment. The instrument was dragged under the ship and the cable was cut by the propellers. Delays in communication were a factor in the loss.

3. Ship to shore communications - It was not apparent to us on-board immediately but we did not have communication with any shore based institution for the last 3 days of our cruise. One of our operations required the transmission of satellite information from the University of Hawaii to the ship. Our shore personnel were unable to send us the information by fax, INMARSAT or even single side-band radio. Even personnel at LDEO were unable to get in touch with the ship. This was a cause for great concern by the principal investigators. Fortunately, we were able to recover our at-sea instrumentation with the minimal information we had on-board ship.

4. Back deck operations - We were unaware of the beams running along and above the port and starboard side railings of the after deck. This forced us to conduct all deployment and recovery operations off the stern which is not desirable. Again sea conditions were calm enough to do our deck operations but rougher sea conditions would have made it unsafe.

Despite the above mentioned difficulties, we were able to accomplish the major objectives of the cruise. We would like to thank the crew and science support personnel who helped us overcome these difficulties. They were very professional and willing to accommodate our needs.