

# HOT-109: Chief Scientist Report

Chief Scientist: C. NOSSE

## HOT-109 Chief Scientist's Cruise Report

R/V Ka'imikai O Kanaloa

7-10 November 1999

Departed: November 7, 1999 at 1000 (HST)

Returned: November 10, 1999 at 1715 (HST)

Vessel: R/V Ka'imikai O Kanaloa

Operator: University of Hawai'i

Master of the Vessel: Captain Robert Hayes

Chief Scientist: Craig Nosse

STAG Electronics Technician: Steve Poulos

STAG Deck Technician: Dave Gravett

### 1.0. 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. 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 November 7 for about 4 hours. 2) Station 2 (ALOHA) 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 for 3 days from November 8 to November 10.

A single CTD cast was to be conducted at Station 1 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 free-drifting sediment trap array was to be deployed for about 50 hours to measure sedimentation rates of particulate matter. After a near-bottom (4700 m) CTD cast, CTD casts at strict 3 hour intervals were to be conducted continuously for at least 36 hours for continuous and discrete data collection. The ship was to be requested to remain on station during this sampling period. Another free-drifting array was to be deployed for 12 hours for a primary production experiment on November 9. Plankton net tows were to be made near noon and midnight while at Station ALOHA. A Tethered Spectral Radiometric Buoy (TSRB) was to be deployed around noon of each day at Station ALOHA and three deployments of a Challenger in situ pump were planned.

After operations at Station ALOHA were accomplished, the ship was to transit to recover the sediment trap array. Once the sediment traps were recovered, the ship was to transit back to Snug Harbor. The following instruments were to collect data throughout the cruise: a shipboard ADCP, a thermosalinograph and a chlorophyll fluorometer.

### 2.0. SCIENCE PERSONNEL

Colleen Allen - UH Research Associate (JGOFS - Zooplankton)

Claudia Benitez-Nelson - UH Postdoctoral Researcher (JGOFS)  
Karin Bjorkman - UH Research Associate (JGOFS)  
Michelle Eich - UH Graduate Student (WOCE)  
Lance Fujieki - UH Computer Specialist (JGOFS)  
Dale Hebel\*\* - UH Scientist (JGOFS)  
Sara Kerr - UH Technician (JGOFS)  
Ursula Magaard - UH Research Associate (JGOFS)  
Craig Nosse\* - UH Research Associate (WOCE)  
Dan Sadler\*\* - UH Research Associate (JGOFS)  
Mark Valenciano - UH Electronics Technician (WOCE)  
Don Wright - UH Research Associate (WOCE)

\* = Chief Scientist

\*\* = Watch Leader

### 3.0. GENERAL SUMMARY

All of the primary JGOFS and WOCE objectives were accomplished and all samples for ancillary projects were taken with the exception of Brian Popp's N2O experiment.

A 36-hour burst sampling period was completed at Station ALOHA which involved thirteen 1000 m casts. Near-bottom deep casts were conducted prior to the commencement of the 36-hour period and after its completion. A 1000 m cast was also conducted at Station Kahe.

One 8-bottle Go-Flo cast was made to obtain seawater for the primary productivity array, which was deployed and recovered without incident. The array of floating sediment traps was also deployed and recovered without incident. The sediment traps had drifted a few miles west from the center of Station ALOHA. Both C. Allen and C. Benitez-Nelson successfully completed 6 sets of plankton net tows (3 during the day, 3 at night) and the JGOFS group made 3 successful TSRB deployments. Three deployments of a Challenger in situ pump were also completed.

Sea conditions were somewhat rough during the transit out to Station ALOHA. The transit encountered 20 knot winds and an 8-10 foot swell from the north. Conditions improved during the remainder of the cruise with the seas diminishing to 4-6 feet and the wind dropping to about 15 knots.

In regards to the underway systems; the ADCP had some initial startup problems and was not recording data properly during the first few hours of the cruise. The thermosalinograph had to be shut down when the ship was transiting out to Station ALOHA as the large swells were heaving the bow out of the water with such magnitude that air was being drawn into the continuous seawater system. S. Poulos noticed large variation in the underway fluorometer data corresponding to large rolls in the ship.

We arrived at Snug Harbor on November 10 at 1715 (HST). A partial unloading took place upon arrival. Time sensitive biogeochemical samples as well as some back deck gear were unloaded. The remaining equipment were left on-board for the HALE - ALOHA mooring deployment cruise which immediately followed HOT-109 on the morning of November 11.

### 4.0. R/V KA'IMIKAI O KANALOA, OFFICERS, CREW, TECHNICAL SUPPORT

After four months of service to the HOT program, R/V Ka'imikai O Kanaloa continues to progress in providing our operations with a functional and well run platform to conduct our work. The captain and crew are always readily available to assist us through both technical advice as well as an accommodating demeanor. Many of the crew (i.e. W. Hinau, M. Hodge and L. Worrell) have sailed on numerous HOT cruises over the years and the knowledge they have gained of how our program functions provides a wealth of assistance.

Valuable support was provided by the Shipboard Technical Assistance Group (STAG) through their expertise in shipboard computer and underway systems as well as deck operations. The skill and knowledge which D. Gravett's employs during his operation of deck equipment (cranes, winches, etc.) allows for safe, efficient and successful over the side work required by our program.

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

November 5, 1999; Loading Day

A full on-load was required as HOT equipment and supplies were off-loaded from R/V Ka'imikai O Kanaloa after HOT-108 to provide space for another science group which used the ship in late October. Loading operations began at approximately 0800 and were finished by about 1400. A new CTD cable termination was made on loading day.

November 7, 1999

All hands were aboard at 0840. The ship's departure was delayed until 1000 due to a large amount of ship traffic in Honolulu Harbor. Arrived at Station Kahe at about 1215. A 1000 m weight cast was conducted at 1235 followed by a TSRB deployment.

The Profiling Reflectance Radiometer (PRR) usually deployed with the TSRB was not used as it was sent to the manufacturer for maintenance. It was noticed at 1300 that the ADCP was not recording data properly. This problem was fixed by S. Poulos. A 1000 m CTD cast was conducted at 1410.

At 1515, the transit to Station ALOHA was begun and a large (about 8-10 ft.) north swell was encountered. The swell caused the bow to heave significantly out of the water such that the intake to the ship's continuous water system was bringing in air. This forced a shutdown of the thermosalinograph at 1840.

November 8, 1999

The ship arrived at Station ALOHA at 0045. Upon arrival, two plankton net tows were conducted off the stern by C. Allen and C. Benitez-Nelson. Following the tows, the floating sediment trap array was successfully deployed. The WOCE deep cast began at 0310. During the downcast, one of the conductivity sensors for the CTD experienced an offset problem. The problem could not be remedied and the sensor had to be removed after the third cast (s2c3) at Station ALOHA. The 36-hour CTD burst sampling began slightly behind schedule at 0835 with the WOCE shallow cast. Following this cast, the burst sampling was back on schedule and remained as such until the end of the 36 hours.

The TSRB was deployed near local noon and 2 more sets of net tows were

made (a set before and after local noon and 1 set before midnight). An attempt was made to detect the IES located at Station ALOHA using an over the side transducer at 1600 but no IES signal could be heard. The in situ Challenger pump was deployed by C. Benitez-Nelson at 1800.

Winds were northeasterly at about 15-20 knots with 4-6 ft. seas.

November 9, 1999

The 36-hour CTD burst sampling continued as scheduled. A set of net tows was conducted just after midnight. The 8-bottle Go-Flo cast to collect water for the primary productivity array began just after 0300 and the array was deployed just before 0630. The TSRB was deployed again near local noon and two sets of net tows were once again conducted before and after local noon. The Challenger in situ pump was deployed at 1500. The primary productivity array was recovered at 1815 and the 36-hour CTD burst sampling period was completed at 2100. After the burst sampling was completed, the ship transited out of the Station ALOHA circle to pump the holding tanks. Upon returning to Station ALOHA, a second deep cast was conducted at 2300.

Winds appeared to become more northerly and diminished below 15 knots while seas remained at about 4-6 ft.

November 10, 1999

After the completion of the second deep cast, the ship transited towards the floating sediment trap array and awaited first light to begin recovery operations. The array had drifted a few miles to the west of the center of Station ALOHA. At daybreak, recovery operations began and the array was on-board at 0650. The ship then began the transit back to Snug Harbor and arrived at approximately 1715. Seas had diminished to 3-4 feet during the transit.

Upon arrival to Snug Harbor, some equipment from the back deck as well as some time-sensitive biogeochemical samples were off-loaded. The remaining equipment and supplies were to stay aboard to be used for the mooring deployment cruise (HALE ALOHA - 7A) which followed the next morning.

#### 6.0. SUB-COMPONENT PROGRAMS AND SPECIAL PROJECTS

B. Bidigare (UH)	HPLC Pigments
M. Landry (UH)	Zooplankton dynamics/grazing
K. Bjorkman (UH)	Phosphorous experiments
C. Benitez-Nelson (UH)	Natural abundance of $^{32}\text{P}$
S. Kerr (UH)	$\text{NH}_4$ measurements

#### 7.0. SAMPLES TAKEN FOR OTHER INVESTIGATORS

C. Keeling (SIO)	$\text{CO}_2$ dynamics and intercalibration
J. Porter (UH)	Sun and aerosol measurements
P. Quay (UW)	DIC and $^{13}\text{C}$