Hawaii Ocean Time-series
HOT-163 General Cruise Plan

Vessel: R/V *Ka'Imikai-O-Kanaloa*, University of Hawaii
Master of the Vessel: Captain Ross Barnes
Chief Scientist: Fernando Santiago-Mandujano, University of Hawaii
STAG Electronics Technician: Daniel Fitzgerald
STAG Deck Technician: Dave Gravatt

Loading: September 26, 2004 @ 0900
Departure: September 27, 2004 @ 0900
Arrival: October 1, 2004 @ 0800

1.0 SCIENTIFIC OBJECTIVES

The objective of the cruise is to maintain a collection of hydrographic and biogeochemical data at the Hawaii Ocean Time-series (HOT) stations. Five stations will 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 will 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° 45'N, 158°W. This is the main HOT station and will be occupied during the 2nd, 3rd, and 4th days of the cruise.
3) Station 50, is the site of the Ocean Reference Station Mooring, located at 22° 45'N, 157° 54'W will be occupied on the 4th day of the cruise for about 30 minutes.
4) Station 51, is the site of the MOSEAN Mooring, located at 22° 45'N, 158° 6'W will be occupied on the 4th day of the cruise for about 30 minutes.
5) Station 6, referred to as Station Kaena, is located off Kaena Point at 21° 50.8'N, 158° 21.8'W will be occupied on the 4th day of the cruise for about 2 hours.

1.1 SCIENTIFIC OPERATIONS

Station	Activities
Kahe (sta. 1)	Weight Cast, PRR cast, CTD cast (1000 m)
ALOHA (sta. 2)	Sediment traps, net tows, CTD operations, primary productivity measurements, AC9/FRRf, misc. experiments
ORS and MOSEAN mooring stations (sta. 50, 51)	CTD casts (200 m)
Kaena (sta. 6)	CTD cast (2400 m)
Underway/continuous	ADCP, thermosalinograph, fluorometry, meteorology

2.0. SCIENCE PERSONNEL

Jamie Becker	Lab Technician	UH/PO/M. Rappe
Carole Berini	Volunteer	PO
Karin Björkman	Research Specialist	UH/BEACH
Tara Clemente	Research Associate	UH/BEACH
Daniel Fitzgerald	Marine Technician	UHMC/STAG
Lance Fujieki	Computer Specialist	UH/BEACH
Eric Grabowski	Research Associate	UH/BEACH
Marcie Grabowski	Graduate Student	UH/BEACH
Dave Gravatt	Marine Technician	UHMC/STAG
Tom Gregory	Research Associate	UH/BEACH
Cecelia Hannides	Graduate Student	UH/BEACH
Maya Iriondo	Graduate Student	UH/ PO
Leena Mahdi	Graduate Student	UH/S. Donachie
Dan Sadler	Research Associate	UH/BEACH
Fernando Santiago-Mandujano	Research Associate	UH/ PO
Jefrey Snyder	Marine Technician	UH/PO

3.0. SUMMARY SCHEDULE

21 September	Pre-cruise meeting
26 September	Ship loading starting at 0900 hrs
27 September	Depart from Snug harbor at 0900 hrs. Science personnel on-board by 0830.
27 September	Station 1 Kahe Pt. operations
28-30 September	Station ALOHA operations. Sediment trap array retrieval. Station 50 and 51 CTD casts. Station Kaena CTD cast
1 October.	Arrive back to Snug harbor. ETA 0800 hrs, full offload

4.0. OPERATIONAL PLANS

4.1. Station Kahe (21^{o}20.6'N, 158^{o}16.4'W)

A 400 lb. weight-test cast, one CTD cast to 1000 m, and a PRR cast (Sect. 4.2.6) will be conducted at this location in the afternoon of September 27. The CTD winch and crane will be required for these operations. After the operations are satisfactorily completed, the ship shall proceed to Station ALOHA.

4.2. Station ALOHA (22^{o}45'N, 158^{o}W with 6 nm radius)

4.2.1. Upon arrival to Station ALOHA, a 1000-m CTD cast will be conducted, followed by the sediment trap array deployment.

4.2.2. Sediment trap deployment

After the 1000-m CTD cast, the sediment trap array will be deployed. The array will be deployed with the starboard crane and the BEACH DSE winch. Power requirement for the winch is 440 VAC, three phase at 10 amps. After deployment we request that the Bridge verify that the radio transmitters are functioning and directionally correct. After deployment the ship shall return to the center of Station ALOHA and commence with the work outlined below.

The array will drift for about 53 hours before recovery. The array is equipped with 2 ARGOS satellite transmitters (platform #s 01325 and 01833), 2 strobe lights, and 2 radio transmitters (channel 74, 156.725 MHz). Daily positions of the array shall be transmitted by email directly to the ship, therefore the ship will not need to keep within site of the array until the time of the recovery. Assistance from the bridge is requested in plotting the drift track of the array. We request the use of the ship's radio direction finder for locating the array before recovery.

4.2.3. Water column measurements

Vertical profiles of temperature, conductivity and dissolved oxygen will be made with an instrument package consisting of a Sea-Bird CTD attached to a 24-place rosette with 12 liter sampling bottles. We need the ship’s CTD winch for this operation. Water samples for biogeochemical measurements will also be collected on each cast. The first cast shall be made to the near bottom (approximately 4800 m). Following this cast, a series of 1000-m casts shall be made continuously every 3 hours for a 36-hour period, followed by a second near-bottom cast. It is highly desired that this burst sampling be done without interruption and we request the ship to maintain position within the study area for that period of time, and repositioning to the center of the Station before each cast whenever possible.

4.2.4. Primary production experiment

Samples for the primary productivity experiment will be collected from the rosette. Just before dawn (sunrise 0623 hrs on September 29), a free drifting incubation array will be deployed from the starboard side. We request the use of the port crane for this operation. The array is equipped with strobe lights and a radio transmitter (channel 72, 156.625 MHz). The ship shall keep within site of the array while performing CTD operations for the approximately 12-hour duration the array will be in the water. The array will be recovered just at sunset (1821 hrs). CTD operations shall continue after recovery. All radioactive waste generated by the experiment shall be returned to the University of Hawaii. Only qualified personnel shall handle radioactive material.

4.2.5. Plankton net tows

Plankton nets will be deployed from the stern and shall be towed for half-hour periods. Half-hour periods are scheduled at around noon and midnight on September 28 and 29 (see schedule) with a total of eight available slots to accommodate cancellations due to sea state or other unforeseen problems. The A-frame and capstan will be needed for this operation.

4.2.6. Profiling Reflectance Radiometer (PRR).

Around noon on each day a profiling reflectance radiometer will be deployed using the starboard crane.

4.2.7. AC9/FRRf

The Wet Labs AC9 is an optical instrument that measures water column spectral absorption and attenuation at nine wavelengths. The AC9 package also includes a Fast Repetition Rate Fluorometer (FRRf), and a Sea-Bird Seacat with temperature, conductivity, and pressure sensors. The package will be deployed to a target depth of 300 m at a constant speed of 10 m/min using the capstan and the A-frame.

4.3 Floating sediment trap recovery

On September 30, after the morning Sea-Bird CTD cast has been completed, we shall transit for the recovery of the sediment trap array. The ship's starboard crane will be needed to retrieve the sediment trap array. After the array is recovered, the ship shall transit to Station 50 to continue operations.

4.4 Ocean Reference Station (ORS) Mooring

One 200-m CTD cast will be conducted near the ORS Mooring (Station 50). The cast should be conducted downwind, downcurrent, and at about 200 m from the mooring. The nominal position of the mooring is 22º 45'N, 157º 54’W.

4.5 MOSEAN Mooring

One 200-m CTD cast will be conducted near the MOSEAN Mooring (Station 51). The cast should be conducted downwind, downcurrent, and at about 200 m from the mooring. The nominal position of the mooring is 22º 45'N, 158º 6’W.

4.6 Acoustic Doppler Current Profiler

The ship’s acoustic Doppler current profiler (ADCP) will be in operation during the duration of the cruise. The STAG electronics technician will be in charge of the ADCP system.

4.7 Thermosalinograph and Fluorometer

The ship’s thermosalinograph and fluorometer sampling the uncontaminated seawater supply system will be in operation during the duration of the cruise while the ship is outside of Snug harbor. Salinity samples to calibrate the thermosalinograph will be taken from the intake hose at 4-hour intervals throughout the duration of the cruise by the science personnel. The STAG electronics technician will be in charge of the thermosalinograph operation.

5.0 EQUIPMENT

5.1 The HOT science party shall be bringing the following

1. Seabird CTD system, all sensors, deck boxes and computer CTD acquisition systems.
2. 24-place rosette with 12-l water sampling bottles, all spare parts
3. Two laboratory vans (Hangar and 02 deck) with assorted equipment for radioisotope and general use
4. Distilled, deionized water and all required chemicals and isotopes
5. Storage van with assorted equipment (02 deck)
6. Large vacuum waste container
7. Liquid nitrogen dewers
8. Drifting sediment trap array with strobe lights, satellite and radio transmitters, floats, weights
9. Kevlar line, polypropylene line

10. Sediment traps and crosses
11. Drifting primary production array with light and radio transmitter, floats, weights
12. PRR, AC-9/FRRf and other optical measuring instruments.
13. DSE winch (440 VAC, 3 phase at 10 amps) and Kevlar line
14. Oxygen titration system
15. Plankton nets and towing lines
16. Desktop and laptop personal computers
17. Assorted tools
18. All required sampling bottles.
19. Deck incubation system
20. 400 lb weight.
21. Pertinent MSDS

5.2. We will need the use of the following ship's equipment:

1. Starboard side crane
2. A-frame block assembly
3. Winch with conducting wire for CTD
4. Electric power for winches and vans
5. Radio direction finder
6. Empty freezer and refrigerator in science storage room
7. Space on the main deck for one lab van, DSE winch
8. Space on the upper 02 deck for one lab van and one storage van
9. Hand-held VHF transceivers
10. Precision depth recorder
11. Shackles, sheaves, hooks and lines
12. Shipboard Acoustic Doppler Current Profiler
13. Thermosalinograph and Fluorometer
14. Copy machine
15. Grappling hooks and line
16. Navlink2 PC or equivalent
17. Running fresh water and seawater, hoses
18. Electronic mail system
19. GPS system
20. Uncontaminated seawater supply
21. Capstan
22. Underway/on-station data acquisition system for meteorological instruments, ADCP, thermosalinograph, fluorometer

27 September – 1 October, 2004 **HOT 163**
Ship: R/V KOK **CTD CASTS**

Cast		Samples	#Bottles
Kahe Pt.			
s1c1	1000 m	O_2, Temp, DIC/Alk, Nuts, Chl a, LLN, $LLPO_4$, DOC, FCM, Salts,	24
Station ALOHA			
s2c1	1000 m	Mixing experiment(3@700, 7@30)), Salts	10
s2c2	4800 m (PO-1)	O_2, Temp, DOC, DIC/Alk, Nuts, Salts	24
s2c3	1000 m (PO-2)	O_2, Temp, Nuts, DIC/Alk, Quay, DOC, Salts	24
s2c4	1000 m	MIT, Salts, MG (4@5 dbar)	18
s2c5	1000 m	PPO4, Salt	14
s2c6	1000 m	PC/PN, Salts, EG (5@125), MG (2@5)	21
s2c7	1000 m	PE, Salts, MG (4@5 dbar)	18
s2c8	1000 m (BEACH)	O_2, Temp, DIC/Alk, Nuts, LLN, LLP, DOC, Keeling, Quay, Salts	20
s2c9	1000 m	Primary Productivity, Chl a, FCM, Salts	22
s2c10	1000 m	Salts	4
s2c11	1000 m	PSi, Salts	10
s2c12	1000 m	Salts, MG (4@5 dbar)	8
s2c13	1000 m	ATP, Salts	11
s2c14	1000 m	Salts, MG (4@5 dbar)	8
s2c15	1000 m	HPLC, Chl a, CS, Salts, MG (2@5 dbar)	24
s2c16	4800 m (PO-3)	O_2, Temp, Salts	8
Ocean Reference Station Mooring			
s50c1	200 m	Salts	3
MOSEAN Mooring			
s51c1	200 m	Flow Cam	4
Kaena Point			
s6c1	2500 m	Open, Chl a Salts	13

SHIP R/V *K-O-K* HOT 163DATE 27 September-1 October, 2004

TIME	Mon. 9/27	Tue. 9/28	Wed. 9/29	Thu. 9/30	Fri. 10/1
0000		Net tow			
0100		Deploy sed. traps	Net tow		
0200		S2C2 PO-1	S2C9 PP		
0300				AC-9/FRRf	
0400			Deploy PP array Log PRR Light	Transit sed traps	
0500			S2C10 Open		
0600				Recover sed traps	
0700				Transit Sta. 50	
0800	On Board	S2C3 PO-2 (start 36 hrs)	S2C11 PSi		Arrive Snug Full Offload
0900	Depart Snug Log Licor light			S50C1 (200-m) Transit ALOHA	
1000		Net tow	Net tow		
1100	Arrive Kahe1130	S2C4 MIT	S2C12 Open	PRR AC-9/FRRf	
1200	Weight cast PRR		PRR AC-9/FRRf	AC-9/FRRf	
1300	S1C1 (Kahe)	Net tow	Net tow		
1400	Transit ALOHA	S2C5 P.PO4	S2C13 ATP	S51C1 (200-m) Transit to Sta. 6	
1500					
1600					
1700		S2C6 PC/PN	S2C14 Open		
1800					
1900			Recover PP array End PRR Light		
2000		S2C7 PE	S2C15 HPLC (end 36 hrs)	S6C1 Kaena	
2100					
2200		Net tow	Net tow	Transit Snug	
2300	Arrive ALOHA S2c1 Mix	S2C8 BEACH	S2C16 PO-3		

September 29: Sunrise 0623 Sunset 1821

6.0 HOT-163 Watch Schedule

0300-1500

Tara Clemente - Watch Leader
Dan Sadler
Lance Fujieki
Leena Mahdi
Jamie Becker
Fernando S-Mandujano

1500-0300

Jefrey Snyder - Watch Leader
Maya Iriondo
Karin Björkman
Eric Grabowski
Tom Gregory

At Large

Carole Berini
Marcie Grabowski
Cecelia Hannides

STAG

Daniel Fitzgerald
Dave Gravatt