HAWAII OCEAN TIME-SERIES
HOT- 167 General Cruise Plan

VESSEL: R/V Wecoma, Oregon State University
MASTER OF THE VESSEL: Captain Danny Arnsdorf
CHIEF SCIENTIST: Daniel W. Sadler, University of Hawaii
Marine Technician: Daryl Swensen
Load: Jan. 29, 2005 0900 HST
Depart: Jan. 31, 2005 0900 HST
Return: Feb. 4, 2005 0800 HST

1.0. SCIENTIFIC OBJECTIVES

The objective of HOT 167 is to maintain 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, the site of the Ocean Reference Station Mooring, is located at 22° 45'N, 157° 54'W and will be occupied on the 4th day of the cruise for about 30 minutes.
4) Station 51, the site of the MOSEAN Mooring, is located at 22° 45'N, 158° 6'W and 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 and 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 op's, PRR casts, primary productivity measurements, AC9/FRRf, misc. experiments
ORS and MOSEAN mooring stations (sta. 50, 51)	CTD casts (200 m)
Kaena Pt. (sta. 6)	CTD cast (2500 m)
Underway/continuous	ADCP, thermosalinograph, fluorometry, meteorology

2.0. SCIENCE PERSONNEL

Bjorkman, Karin	UH/BEACH	Research Specialist
Clemente, Tara	UH/BEACH	Research Associate
Curless, Susan	UH/BEACH	Research Associate
Dogget, Ken	UH/BEACH	Volunteer
Grabowski, Eric	UH/BEACH	Research Associate
Grabowski, Marcie	UH/BEACH	Graduate Student
Hannides, Cecelia	UH/BEACH	Graduate Student
Lethaby, Paul	UH/PO	Research Associate
Sadler, Dan	UH/BEACH	Chief Scientist
Santiago - Mandujano, Fernando	UH/PO	Research Associate
Shacat, Joseph	UH/PO	Research Associate
Valenciano, Mark	UH/PO	Electronics Technician

Watkins, Blake UH/BEACH Marine Engineer

3.0. SUMMARY SCHEDULE

29 Jan.	Ship loading starting at 0900 hrs
31 Jan.	Depart from Snug harbor at 0900 hrs. Science personnel on-board by 0830.
31 Jan.	Station 1 Kahe Pt. operations
1 Feb. – 3 Feb.	Station ALOHA operations, Stations 50 and 51 casts, Station Kaena cast
4 Feb.	Return to Snug harbor. ETA 0800 hrs, full offload

4.0. OPERATIONAL PLANS

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

Operations at Kahe station include an initial weight cast to 1000 m, followed by a hand-lowered light cast (PRR-600); and CTD cast to 1000 m. After all operations have been completed the ship shall proceed to Sta. ALOHA.

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

Upon arrival at Station ALOHA a 1000 m cast will be executed, followed by deployment of the floating sediment traps. After the trap deployment CTD operations will begin. As usual the first cast will be to near-bottom, followed by the 36 hr, 3 hr interval "burst" sampling. Interspersed in this time frame are PRR and optics casts, primary production cast/array deployment/retrieval, additional plankton net tows, and misc. experiments.

4.2.1. Plankton net tows

A series of plankton net tows will be conducted off the stern. We request the use of the ship's hydro winch and CTD A-frame for these operations. Hour periods are scheduled at around noon and midnight (see day-hour schedule) in excess of the six required in the event of equipment problems and/or rough sea conditions.

4.2.2. Floating Sediment Trap deployment

The floating sediment traps will be deployed at the center of Station ALOHA. The array will be deployed from the starboard side using the ship's main crane and our DSE winch. Power requirement for the winch is 440 VAC, three phase at 10 amps. After deployment we would like to return to the center of Station ALOHA and commence with CTD operations.

The array will drift for approximately 55 hours before recovery. The array is equipped with 2 ARGOS satellite transmitters (platform # 01325 & 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. 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.

4.2.3. Water column measurements

Vertical profiles of temperature, conductivity and dissolved oxygen will be made with an instrument package consisting of a Seabird CTD attached to a 24-place rosette with 12 liter sampling bottles. The ship's trawl winch and stern A-frame will be used 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 casts shall be made continuously every 3 hours for a 36-hour period, after which a second full-depth cast will be conducted. 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, 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 (cast 9). Just before dawn, a second free drifting array with incubation samples will be deployed from the stern. We request the use of the main crane for this operation and will also use the DSE winch. The array is equipped with a strobe light and a radio transmitter (channel 72, 156.625 MHz). The ship shall keep within sight 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 around sunset. CTD operations shall continue after the recovery.

4.2.5. Profiling Reflectance Radiometer (PRR)

Around noon on each day a profiling reflectance radiometer will be deployed from the main deck using the main crane. This instrument is hand-lowered and retrieved with assistance from the capstan or the DSE winch.

4.2.6. 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 Sea-Bird Seacat with temperature, conductivity, pressure and fluorometer sensors and a Chelsea Fast Repetition Rate Fluorometer (FRRf). The package will be deployed to a depth of 250 m at a steady wire speed of 10 m/s during the downcast and upcast. We request the use of the ship's hydro winch and CTD A-frame for these deployments.

4.3. Floating Arrays

After operations at Sta. ALOHA have been completed we shall proceed for the recovery of the sediment trap array. We will retrieve the sediment trap array at daybreak. The main crane and the DSE winch will be needed for this operation.

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.

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.

4.6 Kaena Point (Station 6)

The final station will be station 6, Kaena Point (21^{o}50.8'N, 158^{o}21.8'W), on the return transit. Here a near-bottom (~2500 m) CTD cast will be conducted before returning to Snug Harbor.

4.6 Thermosalinograph and Fluorometer

The ship's thermosalinograph and fluorometer sampling the uncontaminated seawater supply system will be in operation during the entire cruise. Salinity samples to calibrate the thermosalinograph will be taken from the intake hose at 4 hour intervals by science personnel.

5.0 EQUIPMENT

5.1 The HOT science party shall bring the following:

1. Sea-Bird 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 with assorted laboratory equipment for radioisotope and sample processing work.
4. All required sampling bottles
5. Type I and Type II water and all required chemicals and isotopes
6. Storage van with assorted equipment.
7. Large vacuum waste container
8. Liquid nitrogen dewars
9. Drifting sediment trap array with strobe lights, satellite and radio transmitters, floats, weights, spar buoy
10. Drifting primary productivity array with strobe light, radio transmitter, floats, weights, polypro. line, spar buoy etc.
11. Plankton nets
12. Dissolved oxygen measurement system
13. Desktop and laptop personal computers
14. PRR, AC-9 & other optical measuring instruments
15. Pertinent MSDS
16. DSE winch

5.2 We will need from the ship the following:

1. A-Frame
2. A-frame block assembly
3. Knuckle crane
4. CTD winch
5. Electric power for winch (440 VAC three phase at 10 amps) and vans (208 VAC single phase at 30 amps for labvan, 110 VAC 10 amps for equipment van)
6. Radio direction finder
7. Empty freezer and refrigerator in wet lab
8. Space on the main deck for one labvan and space on the 03 deck for one equipment van
9. Hand-held VHF transceivers
10. Precision depth recorder
11. Shackles, hooks and lines
12. Shipboard Acoustic Doppler Current Profiler
13. Underway/on-station data acquisition system for meteorological instruments, ADCP, thermosalinograph, fluorometer
14. Grappling hooks and line
15. Running fresh water and seawater hoses
16. Electronic mail system
17. GPS system
18. Navlink2 PC or equivalent
19. Uncontaminated seawater supply

SHIP R/V Wecoma HOT 167 DATE 31 Jan. – 4 Feb. 2005

TIME	Fri. 10/29	Sat. 10/30	Sun. 10/31	Mon. 11/1	Tues 11/2
0000		Arrive ALOHA. S2C1 Mix			
0100		Net tow Deploy sed traps	Net tow		
0200		S2C2 PO-1	S2C9 PP		
0300				AC9/FRRF	
0400				Transit sed traps	
0500			S2C10 Open		
0600			Deploy PP array		
0700				Recover sed traps	
0800	On Board	S2C3 PO-2 (start 36 hrs)	S2C11 PC/PN	Transit St. 50	Arrive Snug Full Offload
0900	Depart Snug Log light			S50C1 (200 m) Transit ALOHA	
1000		Net tow	Net tow		
1100		S2C4 MIT	S2C12 PSi	PRR AC9/FRRf	
1200	Arrive Kahe Weight cast		PRR AC9/FRRf	AC9/FRRf	
1300	PRR S1C1 (Kahe)	Net tow	Net tow	Transit St. 51	
1400	Transit ALOHA	S2C5 ATP	S2C13 PPO4	S51C1 (200 m)	
1500				Transit Kaena	
1600					
1700		S2C6 PE	S2C14 Open		
1800			Recover PP array		
1900					
2000		S2C7 HPLC	S2C15 Open		
2100				S6C1 (Kaena)	
2200		Net tow	Net tow		
2300		S2C8 BEACH	S2C16 PO-3 (end 36 hrs)	Transit Snug	

Sunrise 0711 **Sunset 1821 Feb. 2, 2005**

HOT-167 Watch Schedule

0300-1500
F. Santiago-Mandujano - Watch Leader
D. Sadler
E. Grabowski
B. Watkins
M. Valenciano

1500-0300
K. Bjorkman - Watch Leader
P. Lethaby
J. Shacat
T. Clemente
S. Curless

0900-2100
K. Doggett

At-large
C. Hannides
M. Grabowski

31 Jan. – 4 Feb., 2005 **HOT 167**
Ship: R/V Wecoma **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, Salts (3@700, 20@30)	23
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, Marcie (6 @ 5m)	20
s2c5	1000 m	ATP, Salts	11
s2c6	1000 m	PE, Salts, DOC (3 @ 100)	17
s2c7	1000 m	HPLC, Chl a, Slides, Salts	22
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, Matt (5, 25, 45, 75, 100, 125, 150, 175)	12
s2c11	1000 m	PC/PN, Salts	14
s2c12	1000 m	PSi, Salts, Marcie (2 @ 5, 25, 45, 75, 100, 125)	17
s2c13	1000 m	PPO4, Salts, Matt (5, 45, 75, 125)	18
s2c14	1000 m	Salts	4
s2c15	1000 m	Salts, Matt (5, 25, 45, 75, 100, 125, 150, 175)	12
s2c16	4800 m (PO-3)	O_2, Temp, Salts, DOC (3 @ 4000)	14
Ocean Reference Station Mooring			
s50c1	200 m	Salts	3
MOSEAN Mooring			
s51c1	200 m	Marcie (6 @ 5)	6
Kaena Point			
s6c1	2500 m	Open, Chl a Salts	13