

**HAWAII OCEAN TIME-SERIES
HOT- 166 General Cruise Plan**

VESSEL: R/V Kaimikai O Kanaloa, University of Hawaii
 MASTER OF THE VESSEL: Ross Barnes
 CHIEF SCIENTIST: Thomas K. Gregory, University of Hawaii
 STAG Deck Technician: Dave Gravatt
 STAG Electronics Technician: Kuhio Vellalos
 Load: Dec. 18, 2004 1300 HST
 Depart: Dec.18, 2004 1800 HST
 Return: Dec. 23, 2004 0800 HST

1.0. SCIENTIFIC OBJECTIVES

The objective of HOT 166 is to maintain collection of hydrographic and biogeochemical data at the Hawaii Ocean Time-series (HOT) stations. The MOSEAN mooring will also be deployed. Three stations will be occupied during the cruise, in the following order.

- 1) 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 days 2-5 days.
- 2) Station 51, the site of the MOSEAN Mooring, is located at 22° 45'N, 158° 6'W and will be occupied on the 2nd day of the cruise for about 10 hours.
- 3) 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

<u>Station</u>	<u>Activities</u>
ALOHA (sta. 2)	Sediment traps, net tows, CTD op's, PRR casts, primary productivity measurements, AC9/FRRf, misc. experiments
MOSEAN mooring station (sta. 51)	Mooring deployment
Kaena Pt. (sta. 6)	CTD cast (2500 m)
Underway/continuous	ADCP, thermosalinograph, fluorometry, meteorology

2.0. SCIENCE PERSONNEL

Bjorkman, Karin	UH/BEACH	Research Specialist
Bullister, John	PMEL/PO	Researcher
Chapman, Kai	HPU/BEACH	Undergraduate Student
Church, Matt	UH/BEACH	Research Oceanographer
Clemente, Tara	UH/BEACH	Research Associate
Fujieki, Lance	UH/BEACH	Computer Specialist
Gravatt, Dave	UH/STAG	Deck Technician
Gregory, Tom (Chief Scientist)	UH/BEACH	Research Associate
Hannides, Cecelia	UH/BEACH	Graduate Student
Kemp, John	WHOI/MOSEAN	Mooring Specialist
Lethaby, Paul	UH/PO	Research Associate
Nakagawa, Kazuhiro	UH/PO	Undergraduate Student
Pequignet, Christine	UH/PO	Volunteer
Sadler, Dan	UH/BEACH	Research Associate
Santiago - Mandujano, Fernando	UH/PO	Research Associate

Shepherd-Jones, Blade	HPU/PO	Undergraduate Student
Spada, Frank	UCSB/MOSEAN	Mooring Technician
Valenciano, Mark	UH/PO	Electronics Technician
Vellalos, Kuhio	UH/STAG	Electronics Technician

3.0. SUMMARY SCHEDULE

18 Dec.	Ship loading starting at 1300 hrs
18 Dec.	Depart from Snug harbor at 1800 hrs. Science personnel on-board by 1730.
19 Dec.	Station 51 operations, MOSEAN mooring deployment
19-22 Dec.	Station ALOHA operations, Station Kaena cast
23 Dec.	Return to Snug harbor. ETA 0800 hrs, full offload

4.0. OPERATIONAL PLANS

4.1. MOSEAN Mooring ($22^{\circ} 45'N$, $158^{\circ} 6'W$)

The MOSEAN Mooring will be deployed followed by a 200 m CTD cast.

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

Station ALOHA will be occupied briefly for a 1000 m CTD cast on the way to the MOSEAN Mooring deployment. After mooring deployment, we will return to Station ALOHA for regular HOT work. After the sediment trap deployment CTD and net tow operations will begin. The first two casts will be to 200 m, followed by net tows then a near-bottom cast and then 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 tow winch and 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 stern using the knuckle crane and the 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 59 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 CTD winch and hydroboom 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 11). Just before dawn, a second free drifting array with incubation samples will be deployed from the stern. We request the use of the knuckle 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 starboard 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 target depth of 150 m. We request the use of the tow winch and A-frame for this operation.

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 starboard crane and the DSE winch will be needed for this operation.

4.4 Kaena Point (Station 6)

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

4.5.1 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. The STAG electronics technician will be in charge of the thermosalinograph operation.

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 KOK

HOT 166

DATE 18-23 Dec., 2004

TIME	Sat. 12/18	Sun. 12/19	Mon. 12/20	Tues. 12/21	Wed. 12/22	Thurs. 12/23
0000						
0100			Net tow S2C4 PO-1	Net tow		
0200				S2C11 PP		
0300					AC9/FRRF	
0400					Transit sed traps	
0500		Arrive ALOHA Weight cast		S2C12 Open		
0600		S2C1 Mix		Deploy PP array		
0700		Transit St. 51			Recover sed traps	
0800		Deploy MOSEAN	S2C5 PO-2 (start 36 hrs)	S2C13 PSi		Arrive Snug Full Offload
0900					Transit ALOHA	
1000			Net tow	Net tow		
1100			S2C6 MIT	S2C14 PC/PN		
1200				PRR AC9/FRRf	PRR AC9/FRRf	
1300	Load		Net tow		AC9/FRRf	
1400			S2C7 ATP	S2C15 PPO4		
1500					Transit Kaena	
1600				S2C16 Open		
1700	On Board	S51C1 200 m	S2C8 PE	Recover PPA		
1800	Depart Log Light	Transit ALOHA				
1900		Deploy sed. traps				
2000		S2C2 Open	S2C9 HPLC	S2C17 Open (end 36 hrs)		
2100					S6C1 Kaena	
2200		Net tow	Net tow	Net tow		
2300		S2C3 Open	S2C10 BEACH	S2C18 PO-3	Transit Snug	

Sunrise 0708

Sunset 1753 Dec 21, 2004

HOT-166 Watch Schedule

0300-1500

F. Santiago-Mandujano - Watch Leader

D. Sadler

T. Gregory (Chief Scientist)

L. Fujieki

M. Valenciano

K. Nakagawa

1500-0300

T. Clemente- Watch Leader

K. Chapman

K. Bjorkman

P. Lethaby

C. Pequignet

B. Shepherd-Jones

At-large

C. Hannides

J. Kemp

F. Spada

M. Church

J. Bullister

18 – 23 Dec., 2004
Ship: R/V KOK

HOT 166
CTD CASTS

Cast	Samples	#Bottles	
<u>Station ALOHA</u>			
s2c1	1000 m	Mixing experiment, Salts (3@700, 20@30)	23
s2c2	350 m	extra PC/PN (7), Church (16), Salts	23
s2c3	200 m	Church, Salts	8
s2c4	4800 m (PO-1)	O ₂ , Temp, DOC, DIC/Alk, Nuts, Salts	24
s2c5	1000 m (PO-2)	O ₂ , Temp, Nuts, DIC/Alk, Quay, DOC, Salts	24
s2c6	1000 m	MIT, Salt	14
s2c7	1000 m	ATP, Salts	11
s2c8	1000 m	PE, Church (8), Salts	22
s2c9	1000 m	HPLC, Chl a, Slides, Salts	22
s2c10	1000 m (BEACH)	O ₂ , Temp, DIC/Alk, Nuts, LLN, LLP, DOC, Keeling, Quay, Salts	20
s2c11	1000 m	Primary Productivity, Chl a, FCM, Salts	22
s2c12	1000 m	Salts	4
s2c13	1000 m	PSi, Church (4), Salts	14
s2c14	1000 m	PC/PN, Church (4), Salts	18
s2c15	1000 m	PPO ₄ , Salts	14
s2c16	1000 m	Salts	4
s2c17	1000 m	Open, Salts	4
s2c18	4800 m (PO-3)	O ₂ , Temp, Salts	8
<u>MOSEAN Mooring</u>			
s51c1	200 m	Ne, O ₂	6
<u>Kaena Point</u>			
s6c1	2500 m	Open, Chl a Salts	13