

Hawaii Ocean Time-series HOT-170 General Cruise Plan

Vessel: R/V *Kilo Moana*, University of Hawaii
Master of the Vessel: Captain Carl Christensen
Chief Scientist: Fernando Santiago-Mandujano, University of Hawaii
STAG Marine Technicians: Kuhio Vellalos and Gabe Foreman

Loading: June 10, 2005 @ 0900 HST
Departure: June 13, 2005 @ 0900
Arrival: June 17, 2005 @ 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. Four 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 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.
- 4) 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

<u>Station</u>	<u>Activities</u>
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
MOSEAN mooring station (Sta. 51)	CTD cast (200 m)
Kaena (sta. 6)	CTD cast (2400 m)
Underway/continuous	ADCP, thermosalinograph, fluorometry, meteorology

2.0 SCIENCE PERSONNEL

Participant	Title	Affiliation/HOT Group
Lucas Beversdorf	Graduate Student	UH/BEACH
Karin Björkman	Research Specialist	UH/BEACH
Susan Curless	Research Associate	UH/BEACH

Pollyanna Fisher	Undergraduate Student	UH/PO
Allison Fong	Graduate Student	UH/BEACH
Gabe Foreman	Marine Technician	STAG
Courtney Fritz	Graduate Student	UH
Lance Fujieki	Computer Specialist	UH/BEACH
Eric Grabowski	Research Associate	UH/BEACH
Marcie Grabowski	Graduate Student	UH/BEACH
Cecelia Hannides	Graduate Student	UH/BEACH
Adrianna Harlan	Technician	UH/BEACH
Dale Hebel	Scientist	UH
Paul Lethaby	Research Associate	UH/PO
Anna Liem	High School Teacher	Punahou/BEACH
Claire Mahaffey	Postdoctoral Researcher	UH/BEACH
Laurie Menviel	Graduate Student	UH/PO
Lena Mobin	Undergraduate Student	UH
Robert Rember	Scientist	U. Alaska/BEACH
Fernando Santiago-Mandujano	Research Associate	UH/ PO
Joseph Shacat	Graduate Student	UH/PO
Joji Uchikawa	Graduate Student	UH/PO
Mark Valenciano	Marine Technician	UH/PO
Kuhio Vellalos	Marine Technician	STAG
Blake Watkins	Marine Engineer	UH/BEACH
Jonathan Watkins	Graduate Student	Jackson State U./BEACH

3.0. SUMMARY SCHEDULE

7 June	Pre-cruise meeting
10 June	Ship loading starting at 0900 hrs
13 June	Depart from Snug harbor at 0900 hrs. Science personnel on-board by 0830.
13 June	Station 1 Kahe Pt. operations
14-16 June	Station ALOHA operations. Station 51 CTD cast. Station Kaena CTD cast
17 June	Arrive back to Snug harbor. ETA 0800 hrs, full offload

4.0. OPERATIONAL PLANS

4.1. Station Kahe (21°20.6'N, 158°16.4'W)

A 400 lb. weight-test cast, one CTD cast to 1000 m, and a PRR cast (Sect. 4.2.7) will be conducted at this location in the afternoon of June 13. 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°45'N, 158°W with 6 nm radius)

4.2.1. Upon arrival to Station ALOHA, a 200 m CTD cast will be conducted, followed a net tow (Sect. 4.2.6), and subsequently by another 200 m CTD cast and the sediment trap array deployment.

4.2.2. Sediment trap deployment

After the net tow and the 200 m CTD cast, the floating sediment traps will be deployed at a location within Station ALOHA, which will be determined by local current conditions to be determined enroute to ALOHA. The array will be deployed from the stern using the A-frame and our 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.

The array will drift for about 52 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.

After deployment of the sediment trap array, the ship shall return to the center of Station ALOHA to deploy the gas array.

4.2.3 Gas Array

Samples for the gas array will be collected from cast 1 and 2. We request the use of the A-frame for this operation and will also use the DSE winch. The array is equipped with a strobe light and a radio transmitter (frequency to be provided). The ship shall keep within sight of the array while performing CTD operations for the approximately 24 hour duration the array will be in the water. CTD operations shall continue after the recovery.

4.2.4. 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 and crane for this operation. Water samples for biogeochemical measurements will also be collected on each cast. The first cast after the deployment of the gas array (cast 3) shall be made to the near bottom (approximately 4740 m). Following this cast, a series of 1000-m casts shall be made continuously every 3 hours for a 36-hour period, ending with 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.

Whenever pumping of the ship's tanks is needed, it must be conducted outside the circle that defines station ALOHA (Sect. 1.0). To avoid disruptions in the schedule, this operation should be coordinated with the chief scientist or the watch leaders (Susan Curless, Paul Lethaby)

4.2.5. Primary production experiment

Samples for the primary productivity experiment will be collected from the rosette (cast 9). Just before dawn (sunrise 0547 hrs on June 15), a second free drifting incubation array will be deployed from the stern. We request the use of the A-frame for this operation and will also use the DSE winch. 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 (1918 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.

4.2.6. Plankton net tows

Two types of net tows will be conducted during the cruise

4.2.6.1. Zoo net tows

These are our standard HOT zooplankton 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 the second and third days (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.

4.2.6.2. CM net tows

These tows are hand-deployed off the stern. We request that the ship remain stationary during these tows.

4.2.7. Automated Trace Element Sampler (ATE)

After the 1000 net tow on June 14, the ATE will be hand deployed off the back deck to a depth of 10 m. The ATE will be recovered after 30 minutes in the water. The ATE is approximately 1' tall and 4'' in diameter, weighting 5 lbs.

4.2.8. Profiling Reflectance Radiometer (PRR).

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

4.2.9. 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, fluorometer, and pressure sensors. The package will be deployed to a target depth of 250 m at a constant speed of 10 m/min during the downcast and upcast. We request the use of the ship's winch and A-frame for this operation.

4.3 Floating sediment trap recovery

On June 16, after the morning AC9/FRRf cast has been completed, we shall transit for the recovery of the sediment trap array. The main crane and the DSE winch will be needed to

retrieve the sediment trap array. After the array is recovered, the ship shall transit to Station 51 to conduct one 200 m CTD cast.

4.4 MOSEAN Mooring (Station 51)

One 200-m CTD cast will be conducted near the MOSEAN 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 22° 45'N, 158° 6'W. After this cast is completed, the ship shall transit to Station ALOHA to continue operations. After operations at ALOHA are completed, the ship shall transit to Station Kaena to conduct one CTD cast.

4.5 Station Kaena (21° 50.8'N, 158° 21.8'W)

A near-bottom CTD cast (~2500 m) will be conducted at this location in the evening of June 16, after which the ship shall return to Snug harbor.

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 with assorted equipment for radioisotope and general use
4. Distilled, deionized water and all required chemicals and isotopes
5. Storage van with assorted equipment (main 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, polypro. Line, spare buoy, etc.
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. A-frame
2. A-frame block assembly
3. Appleton crane and winch with conducting wire for CTD
4. Electric power for winches (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)
5. Radio direction finder
6. Empty freezer and refrigerator in wet lab
7. Space on the main deck for one storage van, DSE winch
8. Space on the upper deck for two lab vans
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

13-17 June, 2005
 Ship: R/V *Kilo Moana*
 Cast

HOT 170
CTD CASTS
 Samples

#Bottles

Kahe Pt.

s1c1	1000 m	O ₂ , Temp, DIC/Alk, Nuts, Chl a, LLN, LLPO ₄ , DOC, FCM, Salts,	24
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Station ALOHA

s2c1	200 m	O ₂ Array (3@5, 25, 45, 75, 100, 125), DH 6@50	24
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s2c2	200m	N ₂ Array (4@5, 25, 45, 75, 100, 125), Salts	24
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s2c3	4740 m (PO-1)	O ₂ , Temp, DOC, DIC/Alk, Nuts, Salts	24
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s2c4	1000 m (PO-2)	O ₂ , Temp, Nuts, DIC/Alk, Quay, DOC, Salts	24
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s2c5	1000 m	ATP, Salts, CM 5 depths tbd, JW 3@30, 1@700	24
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s2c6	1000 m	PE, Salts, AF 6@25	20
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s2c7	1000 m	HPLC, Chl a, Slides, Salts	22
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s2c8	1000 m (BEACH)	O ₂ , Temp, DIC/Alk, Nuts, LLN, LLP, DOC, Keeling, Quay, Salts	20
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s2c9	1000 m	Primary Production, Salts	22
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s2c10	1000 m	Salts	4
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s2c11	1000 m	PSi, Salts, AF 1@5, 25, 45, 75, 100, 125, 150, 175, CM 3 depths tbd	21
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s2c12	1000 m	MIT, Salts, AF 5, 45, 75, 120	18
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s2c13	1000 m	PC/PN, DH 8@1000, Salts	22
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s2c14	1000 m	PPO ₄ , Salts	14
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s2c15	1000 m	Salts, AF 1@5, 25, 45, 75, 100, 125, 150, 175, CM 3 depths tbd	15
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s2c16	4740 m (PO-deep2)	Oxygen, Salts, CM 12 @ 10m	20
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MOSEAN Mooring

s51c1	200 m	SC 5@30, Salts	8
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Kaena Point

s6c1	2500 m	Open, Chl a Salts	13
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TIME	Mon. 6/13	Tues. 6/14	Wed 6/15	Thurs. 6/16	Fri. 6/17
0000		S2C1 O2	Zoo net tow		Transit Snug
0100		Zoo net tow S2C2 N2	Recover gas array		
0200		Deploy sed traps	S2C9 PP		
0300				AC9/FRRF	
0400		Deploy gas array	S2C10 open	Transit sed traps	
0500		S2C3 PO-1	Deploy PP array		
0600			CM tow	CM net tow Recover sed traps	
0700				Transit St 51	
0800			S2C11 PSi		Arrive Snug offload
0900	Depart Snug				
1000		Zoo net tow ATE	Zoo net tow	S51C1 Zoo net tow	
1100		S2C4 PO-2 (Begin 36 hour)	S2C12 MIT	Transit ALOHA	
1200	Arrive Kahe Weight cast		PRR AC9/FRRF	PRR	
1300	PRR S1C1	Zoo net tow	Zoo net tow	AC9/FRRF	
1400	Transit ALOHA	S2C5 ATP	S2C13 PC/PN	AC9/FRRF	
1500				Transit Kaena	
1600					
1700		S2C6 PE	S2C14 PPO4		
1800			Zoo net tow		
1900			Recover PP array		
2000		S2C7 HPLC	S2C15 Open		
2100			Zoo net tow		
2200		Zoo net tow	Zoo net tow	S6C1 Kaena	
2300	Arrive ALOHA	S2C8 BEACH	S2C16 PO-3 (end 36 hours)		

June 15: Sunrise 0547 Sunset 1918

6.0 HOT-170 Bunk assignment/Watch Schedule

0300-1500

Susan Curless - Watch Leader

Adrianna Harlan

Lance Fujieki

Lucas Beversdorf

Anna Liem

Jonathan Watkins

Fernando S-Mandujano

Mark Valenciano

Joji Uchikawa

1500-0300

Paul Lethaby - Watch Leader

Joseph Shacat

Laurie Menviel

Karin Björkman

Marcie Grabowski

Eric Grabowski

0000-1200

Blake Watkins

At Large

Cecelia Hannides

Allison Fong

Claire Mahaffey

Dale Hebel

Courtney Fritz

Lena Mobin

Pollyanna Fisher

Rob Rember

STAG

Kuhio Vellalos

Gabe Foreman