Hawaii Ocean Time-series
HOT-175 General Cruise Plan

Cruise ID:
Vessel: R/V *Kilo Moana*, University of Hawaii
Master of the Vessel: Captain Rick Myers
Chief Scientist: Fernando Santiago-Mandujano, University of Hawaii
STAG Marine Technicians: Tim GcGovern, Kuhio Vellalos

Loading: November 9, 2005 @ 0900 HST
Departure: November 10, 2005 @ 0900
Arrival: November 14, 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. Five stations will be occupied during the cruise, in the following order:

1) Station 1, referred to as Station Kahe, is located at 21º 20.6'N, 158º 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 22º 45'N, 158ºW. 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 22º 45'N, 158º 6'W will be occupied on the 4th day of the cruise for about 30 minutes.
4) Station 50, is the site of the WHOTS Mooring, located at 22º 46.1'N, 157º 53.4'W will be occupied on the 4th day of the cruise for about 2 hours.
5) Station 6, referred to as Station Kaena, is located off Kaena Point at 21º 50.8'N, 158º 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
MOSEAN mooring station (Sta. 51)	CTD cast (200 m).
WHOTS mooring station (Sta. 50)	CTD cast (200 m). Small boat operation to replace buoy's anemometer, and to recover Glider
Kaena (sta. 6)	CTD cast (2400 m)
Underway/continuous	ADCP, thermosalinograph, fluorometry, meteorology

2.0. SCIENCE PERSONNEL

Participant	Title	Affiliation/HOT Group
Karin Björkman	Research Specialist	UH/BEACH
Marina Brandon	Graduate Student	UH/BEACH
Susan Curless	Research Associate	UH/BEACH
Suzanne Defelice	Research Associate	UH/PO
Ken Doggett	Research Associate	UH/BEACH
Allison Fong	Graduate Student	UH/BEACH
Lance Fujieki	Computer Specialist	UH/BEACH
Eric Grabowski	Research Associate	UH/BEACH
Tom Gregory	Research Associate	UH/BEACH
Cooper Guest	Undergraduate Student	UH/BEACH
Adriana Harlan	Technician	UH/BEACH
Darin Hayakawa	Graduate Student	UH/BEACH
Ian Hewson	Postdoc	UC Santa Cruz/BEACH
Mike Landry	Scientist	UCSD/BEACH
Sam Laney	Graduate Student	OSU/BEACH
Paul Lethaby	Research Associate	UH/PO
Claire Mahaffey	Postdoctoral Researcher	UH/BEACH
Tim McGovern	Marine Technician	STAG
Kristina Mojica	Graduate Student	UH/BEACH
Chris Ostrander	Graduate Student	UH/PO
Rachel Poretsky	Postdoc	U Georgia/BEACH
Fernando Santiago-Mandujano	Research Associate	UH/ PO
Justin Smith	Undergraduate Student	UH/PO
Charles Stump	Technician	U. Washington
Steven Tottori	Marine Technician	UH/PO
Joji Uchikawa	Graduate Student	UH/PO
Kuhio Vellalos	Marine Technician	STAG
Blake Watkins	Marine Engineer	UH/BEACH

3.0. SUMMARY SCHEDULE

3 November	Pre-cruise meeting
9 November	Ship loading starting at 0900 hrs
10 November	Depart from Snug harbor at 0900 hrs. Science personnel on-board by 0830.
10 November	Station 1 Kahe Pt. operations
11-13 November	Station ALOHA operations. Station 50 small boat operations, CTD cast; Station Kaena CTD cast
14 November	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 November 10. 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, the sediment traps will be deployed, followed by four consecutive CTD casts to 200 m, and the deployment of the Gas array. A near-bottom CTD cast will be conduced after these operations.

4.2.2. Sediment trap deployment

Upon arrival to Station ALOHA, 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 Sea-Mac 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 continue with CTD cast operations.

4.2.3 Gas Array deployment

Samples for the gas array will be collected from cast 1 and 2. We request the use of the A-frame for the gas array deployment, and will also use the Sea-Mac winch. The array is equipped with 2 ARGOS satellite transmitters, a strobe light and a radio transmitter (channel 69). The ship will not need to keep within sight of the array until the time of the recovery, approximately 24 hours after its deployment. 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 5) 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 (Lance Fujieki, Paul Lethaby)

4.2.5. Primary production experiment

Samples for the primary productivity experiment will be collected from the rosette (cast 11). Just before dawn (sunrise 0643 hrs on November 12), 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 Sea-Mac winch. The array is equipped with 2 ARGOS satellite transmitters, 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 (1749 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 two consecutive half-hour periods at midnight on the second, third, and fourth 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 for about half-hour periods, about once a day during the cruise. We request that the ship remain stationary during these tows.

4.2.7. Automated Trace Element Sampler (ATE)

On November 13 at 1100, 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.

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 trawl winch and A-frame for this operation.

4.3 Floating sediment trap recovery

On November 13, after the second deep cast at Station ALOHA has been completed, we shall transit for the recovery of the floating sediment trap array. The main crane and the Sea-Mac winch will be needed to retrieve the sediment trap array. After the array is recovered, the ship shall transit to Station 51 to conduct a 200-m CTD cast.

4.4 MOSEAN Mooring (Station 51)

A 200-m CTD cast will be conducted near the MOSEAN mooring. 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. After this cast, the ship shall transit to Station ALOHA to continue operations. After operations at ALOHA are completed, the ship shall transit to Station 50 to conduct small boat operations, and one 200 m CTD cast.

4.5 WHOTS Mooring (Station 50)

Upon arrival to the mooring site and if the weather is favorable, a small boat will be deployed to approach the mooring's buoy and replace one of its anemometers which is damaged. Paul Lethaby will be in charge of this operation, with the assistance of one of the STAG's technicians. Also, during this time, Charles Stump will recover a Glider that will be surfacing near this area. We request the use of the ship's small boat and assistance from designated crew for these operations. After these operations are completed, one 200-m CTD cast will be conducted near the mooring. The cast should be conducted downwind, downcurrent, and at about 200 m from the mooring. The nominal position of the mooring is 22º 46.1'N, 157º 53.4'W. After this cast is completed, the ship shall transit to Station Kaena to conduct one CTD cast.

4.6 Station Kaena (21º 50.8'N, 158º 21.8'W)

A near-bottom CTD cast (~2500 m) will be conducted at this location in the evening of November 13, after which the ship shall return to Snug harbor.

4.7 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.

4.8 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. Sea-Mac 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. Acoustic transponders for mooring release
22. Pertinent MSDS

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

1. A-frame and trawl winch
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, Sea-Mac 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
23. Small boat for mooring’s buoy repair operations

10-14 November, 2005 **HOT 175**
Ship: R/V *Kilo Moana* **CTD CASTS**

Cast		Samples	#Bottles
Kahe Pt.			
s1c1	1000 m	O_2, Temp, DIC/Alk, Nuts, Chl a, LLN, $LLPO_4$, DOC, FCM, Salts, SD(PB)5,75,125,250,600,1000	24
Station ALOHA			
s2c1	200 m	Gas Array (7@5, 25, 45), Salts,	21
s2c2	200 m	Gas Array (7@75, 100, 125), Salts,	21
s2c3	100 m	IH/RP (12@25)	12
s2c4	100 m	MC/CM (24@30)	24
s2c5	4740 m (PO-1)	O_2, Temp, DOC, DIC/Alk, Nuts, Salts,	24
s2c6	1000 m (PO-2)	O_2, Temp, Nuts, DIC/Alk, Quay, DOC, Salts,	24
s2c7	1000 m	ATP, Salts, CM (11@30,1@300,1@1000)	24
s2c8	1000 m	PE, Salts, AF (1@100,5), CM (3@25)	17
s2c9	1000 m	HPLC, Chl a, Slides, Salts, AF(1@100,5)	24
s2c10	1000 m(BEACH)	O_2, Temp, DIC/Alk, Nuts, LLN, LLP, DOC, Keeling, Quay, Salts, AF(1@100,5)	22
s2c11	1000 m	Primary Production, Salts, AF(1@100,5)	24
s2c12	1000 m	IH/RP (12@25), AF(1@100,5)	14
s2c13	1000 m	CM (5 tbd), AF (1@100,5), ML (6@45), MC (1@200, 400, 500, 750)	17
s2c14	1000 m	MIT, Salts, AF(1@120, 100, 75,45,5)	19
s2c15	1000 m	PC/PN, Salts, AF(1@100,5), CM(2@25)	18
s2c16	1000 m	PPO4, Salts, IH/RP (10@25)	24
s2c17	1000 m	PSi, Salts, AF(1@100,5), AF(1@175, 150, 125, 100, 75, 45, 25, 5), CM(2@25)	22
s2c18	4740 m (PO-3)	Oxygen, Salts, MC(1@4000,3000,2000,1500) CM(4 tbd) IH/RP (1@2000,1000,500), MR (5 tbd)	24
s2c19	200 m	ZJ/MC (1@175, 150, 125, 100, 75, 45, 25, 5), IH/RP (10@25)	24
s2c20	200 m	PUR, AF (1@100, 75, 45, 25)	18
MOSEAN Mooring			
s51c1	200 m	Salts	3
WHOTS Mooring			
S50c1	200 m	Salts	3
Kaena Point			
s6c1	2500 m	Open, Chl a, Salts	13

SHIP R/V *Kilo Moana* HOT 175 DATE 10 – 14 November, 2005

TIME	Thur. 11/10	Fri 11/11	Sat. 11/12	Sun. 11/13	Mon 11/14
0000		Deploy floating sed traps			Transit Snug
0100		S2C1 Gas 1 (200-m)	Net Tow (2X)		
0200		S2C2 Gas 2 (200-m)	S2C11 PP	Net Tow (2X)	
0300		S2C3 IH/RP		AC9/FRRF	
0400		S2C4 CM/MC	S2C12 Open	Transit sed traps	
0500		Deploy gas array CM Tow	Deploy PP array		
0600		S2C5 PO-1	Transit gas array	Recover sed traps	
0700			Recover gas array	Transit Sta 51 S51C1 200-m	
0800			S2C13 Open	Transit ALOHA	Arrive Snug offload
0900	Depart Snug		ATE	S2C19 ZJ	
1000		Net Tow	Net Tow	Net Tow	
1100	Arrive Kahe	S2C6 PO-2 (Begin 36 hour)	S2C14 MIT	PRR AC9/FRRF	
1200	Weight cast PRR	PRR		AC9/FRRF	
1300	S1C1	AC9/FRRF	Net Tow	S2C20 PUR	
1400	Transit ALOHA	S2C7 ATP	S2C15 PC/PN	Transit St. 50	
1500				Small boat ops. at St. 50	
1600			S2C16 PPO4	S50C1 200-m	
1700		S2C8 PE	Recover PP array	Transit Kaena	
1800					
1900					
2000		S2C9 HPLC	S2C17 PSi		
2100					
2200		Net Tow (2X)	Net Tow (2X)	S6C1 Kaena	
2300	Arrive ALOHA	S2C10 BEACH	S2C18 PO-3 (end 36 hours)		

Nov. 12 Sunrise 0643 Sunset 1749

6.0 HOT-175 Bunk assignment/Watch Schedule

0300-1500

01-08U / Lance Fujieki - Watch Leader
01-12U / Adriana Harlan
01-04U / Ken Doggett
01-18L / Eric Grabowski
02-02 / Fernando S-Mandujano
01-02U / Justin Smith
01-16L / Steven Tottori

1500-0300

01-16U / Paul Lethaby - Watch Leader
01-09U / Suzanne Defelice
01-18U / Joji Uchikawa
01-12L / Karin Björkman
01-08L / Tom Gregory
01-14L / Susan Curless
01-11U / Kristina Mojica
02-02 / Cooper Guest

2200-1000

01-15L / Blake Watkins

At Large

01-14U / Claire Mahaffey
01-11L / Allison Fong
01-10U / Ian Hewson
01-09L / Rachel Poretsky
01-10L / Mike Landry
01-15U / Chris Ostrander
01-13L / Sam Laney
01-03U / Marina Brandon
01-13U / Darin Hayakawa
02-06U / Charles Stump

STAG

01-04L / Tim McGovern
01-02L / Kuhio Vellalos