

Hawaii Ocean Time-series HOT-173 General Cruise Plan

Cruise ID: KM-0515

Vessel: R/V *Kilo Moana*, University of Hawaii

Master of the Vessel: Captain Bryon Wilson

Chief Scientist: Fernando Santiago-Mandujano, University of Hawaii

STAG Marine Technicians: Daniel Fitzgerald and Steve Poulos

Loading: September 6, 2005 @ 0900 HST

Departure: September 8, 2005 @ 0900

Arrival: September 12, 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 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 50, is the site of the WHOTS Mooring, located at 22° 46.1'N, 157° 53.4'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.

In addition, a bottom-moored sediment trap (ST-12) located at 22° 49.72'N, 158° 5.08'W will be retrieved on the 4th day of the cruise, before visiting station 51. Six hours will be scheduled for this operation.

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
ST-12	Recovery of bottom-moored sediment trap
MOSEAN mooring station (Sta. 51)	CTD cast (200 m)
WHOTS mooring station (Sta. 50)	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
Karin Björkman	Research Specialist	UH/BEACH
Carli Bober	Graduate Student	UH/BEACH
Susan Curless	Research Associate	UH/BEACH
Daniel Fitzgerald	Marine Technician	STAG
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	Undergrad Student	UH/BEACH
Adriana Harlan	Technician	UH/BEACH
Chrystal Jameson	Undergrad Student	UH/PO
David Leonard	Volunteer	BEACH
Paul Lethaby	Research Associate	UH/PO
Claire Mahaffey	Postdoctoral Researcher	UH/BEACH
Steve Poulos	Marine Technician	STAG
Alejandro Sanchez	Graduate Student	UH/PO
Dan Sadler	Research Associate	UH/BEACH
Fernando Santiago-Mandujano	Research Associate	UH/ PO
Joseph Shacat	Graduate Student	UH/PO
Steven Tottori	Marine Technician	UH/PO
Blake Watkins	Marine Engineer	UH/BEACH

3.0. SUMMARY SCHEDULE

1 September	Pre-cruise meeting
6 September	Ship loading starting at 0900 hrs
8 September	Depart from Snug harbor at 0900 hrs. Science personnel on-board by 0830.
8 September	Station 1 Kahe Pt. operations
9-11 September	Station ALOHA operations. Moored Sediment trap (ST-12) retrieval, Station 51 CTD cast. Station 50 CTD cast, Station Kaena CTD cast
12 September	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 September 8. 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 a 200 m CTD cast and a net tow, and subsequently by another 200 m CTD cast. A near-bottom CTD cast will be conducted after these operations, followed by the deployment of the Gas array.

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 before 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 (Tom Gregory, Paul Lethaby)

4.2.5. Primary production experiment

Samples for the primary productivity experiment will be collected from the rosette (cast 10). Just before dawn (sunrise 0617 hrs on September 10), 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 (1840 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. CM Plankton net tows

These tows are hand-deployed off the stern for about half-hour periods. We request that the ship remain stationary during these tows.

4.2.7. Automated Trace Element Sampler (ATE)

After the 1000 net tow on September 10, 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 September 11, after the morning AC9/FRRf cast 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 the location of the moored sediment trap ST-12.

4.4 Bottom-Moored sediment trap ST-12 recovery

The moored sediment trap ST-12 will be recovered in the morning of September 11. The mooring is located at 22° 49.72'N, 158° 5.08'W. After arriving to the mooring location, the

acoustic transponders will be used to release the mooring, which should take about 45 min to reach the surface. The main crane and Sea-Mac winch will be needed to retrieve the array. After recovery operations have been completed, 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 51). 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 50 to conduct one 200 m CTD cast.

4.5 WHOTS Mooring (Station 50)

One 200-m CTD cast will be conducted near the WHOTS 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° 46.1'N, 157° 53.4'W. After this cast is 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 September 11, 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. 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

8-12 Sept., 2005
 Ship: R/V *Kilo Moana*

HOT 173
CTD CASTS

Cast	Samples	#Bottles
<u>Kahe Pt.</u>		
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
<u>Station ALOHA</u>		
s2c1 200 m	Gas Array (7@5, 25, 45), Salts,	21
s2c2 200 m	Gas Array (7@75, 100, 125), Salts,	21
s2c3 4740 m (PO-1)	O ₂ , Temp, DOC, DIC/Alk, Nuts, Salts,	24
s2c4 1000 m (PO-2)	O ₂ , Temp, Nuts, DIC/Alk, Quay, DOC, Salts,	24
s2c5 1000 m	MIT, Salts,	14
s2c6 1000 m	ATP, Salts,	15
s2c7 1000 m	PE, Salts,	14
s2c8 1000 m	HPLC, Chl a, Slides, Salts	22
s2c9 1000 m (BEACH)	O ₂ , Temp, DIC/Alk, Nuts, LLN, LLP, DOC, Keeling, Quay, Salts	20
s2c10 1000 m	Primary Production, Salts	22
s2c11 1000 m	Salts	3
s2c12 1000 m	Salts	3
s2c13 1000 m	PSi, Salts	10
s2c14 1000 m	PC/PN, Salts	14
s2c15 1000 m	PPO ₄ , Salts	14
s2c16 4740 m (PO-3)	Oxygen, Salts	8
s2c17 200 m	CM, AF, Salts	24
<u>MOSEAN Mooring</u>		
s51c1 200 m	Salts	3
<u>WHOTS Mooring</u>		
S50c1 200 m	Salts	3
<u>Kaena Point</u>		
s6c1 2500 m	Open, Chl a, Salts	13

SHIP R/V *Kilo Moana*

HOT 173

DATE 8 – 12 September, 2005

TIME	Thur. 9/8	Fri 9/9	Sat. 9/10	Sun. 9/11	Mon 9/12
0000		Deploy floating sed traps		AC9/FRRF	Transit Snug
0100		S2C1 Gas 1 (200-m)	CM tow	S2C17 200-m Transit sed traps	
0200		S2C2 Gas 2 (200-m)	S2C10 PP		
0300		S2C3 PO-1		Recover sed traps CM Tow	
0400			S2C11 Open	Transit ST-12	
0500			Deploy PP array	Recover ST-12	
0600			Transit gas array		
0700		Deploy gas array CM Tow	Recover gas array		
0800		S2C4 PO-2 (Begin 36 hour)	S2C12 Open		Arrive Snug offload
0900	Depart Snug				
1000			ATE		
1100		S2C5 MIT	S2C13 Psi	Transit St 51	
1200	Arrive Kahe Weight cast		PRR AC9/FRRF	S51C1 200-m PRR	
1300	PRR S1C1	CM Tow	CM Tow	AC9/FRRF	
1400	Transit ALOHA	S2C6 ATP	S2C14 PC/PN	AC9/FRRF	
1500				Transit St. 50	
1600			S2C15 PPO4	S50C1 200-m Transit Kaena	
1700		S2C7 PE	Transit PP array		
1800			Recover PP array		
1900					
2000		S2C8 HPLC	S2C16 PO-3 (end 36 hours)		
2100					
2200				S6C1 Kaena	
2300	Arrive ALOHA	S2C9 BEACH			

Sept. 10: Sunrise 0617 Sunset 1840

6.0 HOT-173 Bunk assignment/Watch Schedule

0300-1500

01-12U / Tom Gregory - Watch Leader
01-08U / Adriana Harlan
01-14U / Lance Fujieki
01-16U / Eric Grabowski
01-18U / Cooper Guest
02-02 / Fernando S-Mandujano
01-02U / Alejandro Sanchez
01-13L / Steven Tottori

1500-0300

01-14L / Paul Lethaby - Watch Leader
01-16/L / Joseph Shacat
01-09L / Chrystal Jameson
01-08L / Karin Björkman
01-12L / Dan Sadler
01-10L / Susan Curless
01-18L / Dave Leonard

2200-1000

01-15L / Blake Watkins

At Large

01-11L / Claire Mahaffey
01-10U / Allison Fong
01-09U / Carli Bober

STAG

01-04L / Daniel Fitzgerald
01-02L / Steve Poulos