Hawaii Ocean Time-series
HOT-195 General Cruise Plan

Vessel: R/V *Kilo Moana*, University of Hawaii
Master of the Vessel: Captain Richard L. Meyer
Chief Scientist: Paul Lethaby, University of Hawaii
OTG Marine Technicians: Tobin Chen, Tim McGovern

Loading: August 31, 2007, loading of blue HOT deck van, heavy equipment, and HOT gear.
Departure: September 1, 2007 @ 0900
Arrival: September 5, 2007 @ 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 52, is the site of the WHOTS Mooring, located at 22º 40.208'N, 157º 57.001'W will be occupied on the 4th day of the cruise for about 1 hour.
4) 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, gas array, net tows, CTD operations, primary productivity measurements, AC9/FRRf, misc. experiments.
WHOTS mooring station (Sta. 52)	CTD operations, CTD cast (200 m).
Kaena (sta. 6)	CTD cast (2400 m)
Underway/continuous	ADCP, thermosalinograph, fluorometry, *p*CO2, meteorology

2.0. SCIENCE PERSONNEL

Participant	Title	Affiliation/Group
Kate Achilles	CMORE Educator	UH/CMORE
Karin Björkman	Research Associate	UH/BEACH
Tobin Chen	Marine Technician	OTG
Raeanne Cobb-Adams	Undergraduate Student	UH
Susan Curless	Research Associate	UH/BEACH
Lance Fujieki	Computer Specialist	UH/BEACH
Adriana Harlan	Technician	UH/BEACH
Jennifer Hoof	Teacher	UH/CMORE
Paul Lethaby	Chief Scientist – Res. Assoc.	UH/PO
Tim McGovern	Marine Technician	OTG
Misty Miller	Technician	UH/Rappé
Nancy Niklis	Volunteer	UH/PO
Svetlana Port	Volunteer	UH/PO
Dan Sadler	Research Associate	UH/BEACH
Fernando Santiago-Mandujano	Research Associate	UH/PO
Justin Smith	Undergraduate Student	UH/PO
Jefrey Snyder	Marine Technician	UH/PO
Mari Taira	Teacher	UH/CMORE
Lisa Tatsumi	Volunteer	UH/PO
Brett Updyke	Technician	UH/BEACH
Blake Watkins	Marine Engineer	UH/BEACH
Sam Wilson	Scientist	UH/CMORE

3.0. SUMMARY SCHEDULE

23 August	Pre-cruise meeting 1030 hrs.
31 August	Ship loading starting at 0900 hrs
1 September	Depart from Snug harbor at 0900 hrs. Science personnel on-board by 0800.
1 September	Station 1 Kahe Pt. operations.
1-4 September	Station ALOHA operations. Stations 52 and 6 CTD casts.
5 September	Arrive Snug harbor. ETA 0800 hrs, full offload

4.0. OPERATIONAL PLANS

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

A 1000 lb. weight-test cast, one CTD cast to 1000 m, one go-flo cast to approx. 40m and a PRR cast (Sect. 4.2.8) will be conducted at this location in the afternoon of September 1st. The CTD winch and crane will be required for these operations. The go-flo cast will require use of the capstan and A-frame. 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. Afterwards, two 200-m casts will be conducted before deploying the Gas array. These operations will be followed by a near-bottom CTD cast.

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 53 hours before recovery. The array is equipped with 2 ARGOS satellite transmitters (platform #s 01833 and 03028), 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 (argosfix@km.soest.hawaii.edu, password: argosfix), 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 casts 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 one ARGOS satellite transmitter (platform # 08500, emailing positions to argosfix@km.soest.hawaii.edu, password: argosfix), a strobe light and a radio transmitter (channel 69, 156.475 MHz). 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 cast after the deployment of the gas array 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 **(Jefrey Snyder, Susan Curless).**

4.2.5. Primary production experiment

Samples for the primary productivity experiment will be collected from the rosette. Before dawn (sunrise 0615 hrs on September 3rd), 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 one ARGOS satellite transmitter (platform # 60481, emailing positions to argosfix@km.soest.hawaii.edu, password: argosfix), strobe lights and a radio transmitter (channel 68, 156.425 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 (1847 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. Zoo net tows

A plankton net 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 and third days (see schedule) with a total of seven available slots to accommodate cancellations due to sea state or other unforeseen problems. The A-frame and capstan will be needed for this operation. B. Watkins will be in charge of these operations.

4.2.6.1 Kate Achilles net tows

These surface net tows are hand-deployed off the stern for about 15-20 minute periods. One net tow is scheduled for 12:30 on September 3rd. but others may be introduced to the schedule at appropriate time slots. We request that the ship remain stationary during these tows. K. Achilles will be in charge of these net tows.

4.2.7. Profiling Reflectance Radiometer (PRR).

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

4.3 Floating sediment trap recovery

In the morning of September 4th, we shall transit for the recovery of the floating sediment trap array. The A-frame and the Sea-Mac winch will be needed to retrieve the sediment trap array. After the array is recovered, the ship shall transit to ALOHA to conduct a 200m CTD cast.

4.4 WHOTS Mooring (Station 52)

One 200-m CTD cast will be conducted near the WHOTS mooring. This cast should be conducted downwind, downcurrent, and at about 200 m from the mooring. The nominal

position of the mooring is 22º 40.208'N, 157º 57.001'W. The cast will be an approximately one hour yo-yo cast to 200 m. After this cast is completed, the ship shall transit to Station Kaena to conduct one near-bottom CTD cast.

4.5 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 September 4th, 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 OTG electronics technician will be in charge of the ADCP system.

4.7 Thermosalinograph, *p*CO2 system ,and Fluorometer

The ship's thermosalinograph, *p*CO2, 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 and chlorophyll samples will be periodically taken to calibrate the thermosalinograph and fluorometer respectively, throughout the cruise by the science personnel. The OTG electronics technician will be in charge of the thermosalinograph, *p*CO2, and fluorometer operations.

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. Rosette and 24 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 dewer
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 and gas 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. Pertinent MSDS
21. 1 liter Go-Flo bottles plus line
22. Secchi Disc

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. Space on the main deck for one storage van
7. Space on upper deck for two lab vans port side
8. Space on upper deck for incubators
9. Hand-held VHF transceivers
10. Precision depth recorder
11. Shackles, sheaves, hooks and lines
12. Shipboard Acoustic Doppler Current Profiler
13. Thermosalinograph, *p*CO2 system, 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. Small capstan (~ 10 m/min)
22. Underway/on-station data acquisition system for meteorological instruments, ADCP, thermosalinograph, fluorometer, *p*CO2
23. OTG's 24-place rosette, and 24 12-l water sampling bottles (to be used as spare)
24. OTG's Pinger (to be used as spare)
25. OTG's 1000 lb weight.

Ship: R/V *KILO MOANA* HOT 195 CTD CASTS 1-5 September, 2007

Cast		Samples	#Bottles
Kahe Pt.			
s1c1	1000 m	O_2, Temp, DIC/Alk, Nuts, Chl a, LLN, $LLPO_4$, DOC, FCM, Salts, KA	24
Station ALOHA			
s2c1	200 m	Gas Array (4@5, 25, 45)	12
s2c2	200 m	Gas Array (4@75, 100, 125) , MR (2@45)	14
s2c3	4740 m (PO-1)	O_2, O2 (KA), 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	ATP, Quay(100,125,150,200,300), MC(200,300,500,770), MR(2@1000,2@500), Salts	24
s2c6	1000 m	PE, Salts, MC(5,25,45,75,100,125,150,175), Quay(5,25,45,75), Salts	24
s2c7	1000 m	HPLC, Chl a, Slides, Salts	23
s2c8	1000 m (BEACH)	O_2, Temp, DIC/Alk, Nuts, LLN, LLP,DOC, Keeling, Quay, Salts	23
s2c9	1000 m	Primary Production, Salts	22
s2c10	1000 m	Open, MR(1000,800,600,400,200,175,150,125,100,75,45,10), CMORE(5@ 770), Salts	19
s2c11	1000 m	PSi, MC(5,25,45,75,100,125,150,175), KA(5,25,45,75,100,125,150,175), Salts	19
s2c12	1000 m	MIT, CMORE(5@500), Salts	21
s2c13	1000 m	PC/PN,CMORE(5@75, 5@125), Salts	24
s2c14	1000 m	PPO4, Salts	14
s2c15	1000 m	PUR, CMORE(5@1000, 5@200), Salts	24
s2c16	4740 m (PO-3)	Oxygen, Salts, MC(1000,2000,3000,4000), MR(4000,3000,2000,1000,800,600,400,175,125,100,75,10)	24
s2c17	200 m	CMORE(5@25, 5@45), BC(5,25,45,75,100) Salts	15
WHOTS Mooring			
S52c1	200 m [1 hour yo-yo]	Salts	3
Kaena			
S6c1	2400 m	Chl, Salts	13

SHIP R/V *KILO MOANA* HOT 195 Date 1-5 September 2007

TIME	Sat. 9/1	Sun. 9/2	Mon. 9/3	Tue. 9/4	Wed. 9/5
0000		S2C1 Gas 1			
0100		S2C2 Gas 2	Net Tow		
0200			S2C9 PP		
0300				Transit sed traps	
0400		Deploy gas array	S2C10 Open		
0500		S2C3 PO-1	Deploy PP array		
0600			Transit gas array	Recover traps	
0700			Recover gas array	Transit ALOHA	
0800			S2C11 PSi		Arrive Snug offload
0900	Depart Snug			S2C17	
1000		Net Tow	Net Tow		
1100	Arrive Kahe (11:30) Weight cast	S2C4 PO-2 (Begin 36 hr)	S2C12 MIT	PRR	
1200	PRR	Net Tow	PRR KA hand net tow	Transit Stn 52	
1300	S1C1	ATE	Net Tow	S52C1 yo-yo	
1400	Go-flo cast	S2C5 ATP	S2C13 PC/PN	Transit St. Kaena	
1500	Transit ALOHA				
1600					
1700		S2C6 PE	S2C14 PPO4		
1800			Recover PP array		
1900					
2000		S2C7 HPLC	S2C15 PUR		
2100				S6C1	
2200		Net Tow	Net Tow		
2300	Arrive ALOHA Deploy sed traps	S2C8 BEACH	S2C16 PO-3 (end 36 hours)	Transit Snug	

September 3: Sunrise 0615 Sunset 1847

6.0 HOT-195 Watch Schedule

0300-1500

Jefrey Snyder - Watch Leader, *Alt Tag*
Adriana Harlan - *Water Boss*
Lance Fujieki - *Alt Water Boss , Alt Tag*
Blake Watkins - *Tag*
Brett Updyke - *Tag*
Fernando Santiago-Mandujano - *console*
Nancy Niklis

1500-0300

Susan Curless - Watch Leader, *Water Boss*
Karin Björkman - *Alt Water Boss, Alt Tag*
Paul Lethaby - Chief Scientist, *console*
Dan Sadler - *Tag*
Justin Smith - *Tag*
Svetlana Port
Lisa Tatsumi

0900-2100

Sam Wilson

At Large

Misty Miller
Kate Achilles
Raeanne Cobb-Adams
Mari Taira
Jennifer Hoof

OTG

Tobin Chen
Tim McGovern