Hawaii Ocean Time-series
HOT-176 General Cruise Plan

Cruise ID:
Vessel: R/V *Ka'Imikai O Kanaloa*, University of Hawaii
Master of the Vessel: Captain Ross Barnes
Chief Scientist: Fernando Santiago-Mandujano, University of Hawaii
STAG Marine Technicians: Steve Poulos, Dave Gravatt

Loading: December 9, 2005 @ 0900 HST
Departure: December 11, 2005 @ 0900
Arrival: December 16, 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 30 minutes.
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.

In addition dragging operations will be conducted for about 24-hr at Station ALOHA to try to recover the CTD/Rosette package that sank to the bottom when the CTD cable broke during the previous HOT-175 cruise.

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, misc. experiments. Dragging operations to recover lost CTD.
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
Susan Curless	Research Associate	UH/BEACH
Suzanne Defelice	Research Associate	UH/PO
Ken Doggett	Research Associate	UH/BEACH
Lance Fujieki	Computer Specialist	UH/BEACH
Tom Gregory	Research Associate	UH/BEACH
Adriana Harlan	Technician	UH/BEACH
Paul Lethaby	Research Associate	UH/PO
Laurie Menviel	Graduate Student	UH/PO
Dan Sadler	Research Associate	UH/BEACH
Fernando Santiago-Mandujano	Research Associate	UH/ PO
Blake Watkins	Marine Engineer	UH/BEACH

3.0. SUMMARY SCHEDULE

6 December	Pre-cruise meeting
9 December	Ship loading starting at 0900 hrs
11 December	Depart from Snug harbor at 0900 hrs. Science personnel on-board by 0830.
11 December	Station 1 Kahe Pt. operations
12-15 December	Station ALOHA operations. Stations 50, 51 CTD casts; Station Kaena CTD cast
16 December	Arrive back to Snug harbor. ETA 0800 hrs, full offload

4.0. OPERATIONAL PLANS

4.1. Station Kahe (21^{o}20.6'N, 158^{o}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 December 11. 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^{o}45'N, 158^{o}W with 6 nm radius)

4.2.1. Upon arrival to Station ALOHA, the sediment traps will be deployed, followed by two 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 10 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 (Dan Sadler, Tom Gregory)

4.2.5. Primary production experiment

Samples for the primary productivity experiment will be collected from the rosette (cast 11). Just before dawn (sunrise 0704 hrs on December 14), 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

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 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.

4.2.7. Automated Trace Element Sampler (ATE)

On December 13 at 0900, 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.

4.3 Floating sediment trap recovery

On December 14, 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 conduct one more 1000-m CTD cast, after which the ship shall transit to 50 to conduct one 200 m CTD cast.

4.5 WHOTS Mooring (Station 50)

A 200-m CTD cast will be conducted near the WHOTS 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 ALOHA Station to conduct dragging operations to recover the lost CTD.

4.6 Dragging Operations

Dragging operations to recover the lost CTD will be conducted at Station ALOHA for about 24 hours, after which the ship shall transit to Station Kaena to conduct one CTD cast.

4.7 Station Kaena (21^{o} 50.8'N, 158^{o} 21.8'W)

A near-bottom CTD cast (~2500 m) will be conducted at this location in the evening of December 15, after which the ship shall return to Snug harbor.

4.8 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 except pinger and altimeter, deck boxes and computer CTD acquisition systems.
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
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 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 02 deck for one storage van, SEA-MAC winch
8. Space on the 02 deck for one 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. 24-place rosette with 10-l sampling bottles. SeaPoint Fluorometer, Pinger and Altimeter, spare carousel, spare oxygen sensor.

11-16 December, 2005 **HOT 176**

Ship: R/V *Ka'Imikai O Kanaloa* **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	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	ATP, Salts MC (1@5,25,45,75,100,125,150,175)	19
s2c6	1000 m	PE, Salts	9
s2c7	1000 m	HPLC, Chl a, Slides, Salts	22
s2c8	1000 m(BEACH)	O_2, Temp, DIC/Alk, Nuts, LLN, LLP, DOC, Keeling, Quay, Salts	20
s2c9	1000 m	Primary Production, Salts	22
s2c10	1000 m	Open, Salts, CM(150,200,250,300,350,400,450,500,550,750,1000)	14
s2c11	1000 m	Open, Salts	3
s2c12	1000 m	MIT, Salts	14
s2c13	1000 m	PC/PN, Salts	14
s2c14	1000 m	PPO4, Salts	14
s2c15	1000 m	PSi, Salts, MC (1@5,25,45,75,100,125,150,175)	18
s2c16	4740 m (PO-3)	Oxygen, Salts, MC(1@500,770,1000,4000), PUR	24
s2c17	1000 m	ZJ	12
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 *Ka'Imikai O Kanaloa* HOT 176 DATE 11 – 16 December, 2005

TIME	Sun. 12/11	Mon. 12/12	Tue. 12/13	Wed. 12/14	Thu. 12/15	Fri 12/16
0000		Deploy sed traps				Transit Snug
0100		S2C1 Gas 1 (200-m)	Net Tow			
0200			S2C9 PP	Net Tow		
0300		S2C2 Gas 2 (200-m)		Transit sed traps		
0400			S2C10 Open			
0500		Deploy gas array	Deploy PP	Recover traps		
0600		S2C3 PO-1	Transit gas array			
0700			Recover gas array	Transit Sta 51		
0800			S2C11 Open	S51C1 200-m Transit ALOHA		Arrive Snug offload
0900	Depart Snug		ATE	S2C17 ZJ		
1000		Net Tow	Net Tow	Transit Sta 50 S50C1 200-m		
1100	Arrive Kahe	S2C4 PO-2 (Begin 36 hr)	S2C12 MIT	Transit ALOHA		
1200	Weight cast PRR	PRR		PRR		
1300	S1C1	Net Tow	Net Tow	Begin CTD dragging Ops.		
1400	Transit ALOHA	S2C5 ATP	S2C13 PC/PN			
1500					End dragging	
1600			S2C14 PPO4		Transit Kaena	
1700		S2C6 PE	Recover PP			
1800						
1900						
2000		S2C7 HPLC	S2C15 PSi			
2100						
2200		Net Tow	Net Tow		S6C1 Kaena	
2300	Arrive ALOHA	S2C8 BEACH	S2C16 PO-3 (end 36 hours)			

Dec. 14 Sunrise 0704 Sunset 1749

6.0 HOT-176 Watch Schedule

0300-1500

Dan Sadler - Watch Leader
Lance Fujieki
Adriana Harlan
Ken Doggett
Fernando S-Mandujano
Laurie Menviel

1500-0300

Paul Lethaby
Suzanne Defelice
Karin Björkman
Tom Gregory - Watch Leader
Susan Curless

At Large

Blake Watkins

STAG

Steve Poulos
Dave Gravatt