

Hawaii Ocean Time-series HOT-165 General Cruise Plan

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 Electronics Technician: Daniel Fitzgerald
STAG Deck Technician: Dave Gravatt

Loading: November 24, 2004 @ 1200 HST
Departure: November 26, 2004 @ 0900
Arrival: November 30, 2004 @ 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 50, is the site of the Ocean Reference Station Mooring, located at 22° 45'N, 157° 54'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
ORS mooring station (sta. 50)	CTD casts (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
Matt Church	Research Oceanographer	UH/BEACH
Tara Clemente	Research Associate	UH/BEACH
Daniel Fitzgerald	Marine Technician	UHMC/STAG
Rachel Foster	Scientist	UCSC/BEACH
Lance Fujieki	Computer Specialist	UH/BEACH
Eric Grabowski	Research Associate	UH/BEACH
Marcie Grabowski	Graduate Student	UH/BEACH
Dave Gravatt	Marine Technician	UHMC/STAG
Tom Gregory	Research Associate	UH/BEACH
Paul Lethaby	Research Associate	UH/PO
David Nichols	Volunteer	UH/BEACH
Andrea Rivera	Undergrad. Student	UH/PO
Damion Rosbrugh	Undergrad. Student	UH/ BEACH
Alejandro Sanchez-Barba	Graduate Student	UH/ PO
Fernando Santiago-Mandujano	Research Associate	UH/ PO
Melinda Simmons	Graduate Student	SIO/BEACH
Mark Valenciano	Marine Technician	UH/PO
Carolyn Wells	Undergrad. Student	UH/PO

3.0. SUMMARY SCHEDULE

22 November	Pre-cruise meeting
24 November	Ship loading starting at 1200 hrs
26 November	Depart from Snug harbor at 0900 hrs. Science personnel on-board by 0830.
26 November	Station 1 Kahe Pt. operations
27-29 November	Station ALOHA operations. Station 50 CTD cast. Station Kaena CTD cast
30 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. 4.2.6) will be conducted at this location in the afternoon of November 26. 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 1000-m CTD cast will be conducted, followed a net tow (Sect. 4.2.5), and subsequently by the sediment trap array deployment.

4.2.2. Sediment trap deployment

After the net tow, the sediment trap array will be deployed. The array will be deployed with the starboard crane and the BEACH 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. After deployment the ship shall return to the center of Station ALOHA and commence with the work outlined below.

The array will drift for about 54 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.

4.2.3. 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 for this operation. Water samples for biogeochemical measurements will also be collected on each cast. The second cast at ALOHA station 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, followed by 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.

4.2.4. Primary production experiment

Samples for the primary productivity experiment will be collected from the rosette. Just before dawn (sunrise 0654 hrs on November 28), a free drifting incubation array will be deployed from the starboard side. We request the use of the port crane for this operation. 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 (1746 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.

4.2.5. Plankton net 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. Profiling Reflectance Radiometer (PRR).

Around noon on each day a profiling reflectance radiometer will be deployed using the starboard crane.

4.2.7. 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, and pressure sensors. The package will be deployed to a target depth of 300 m at a constant speed of 10 m/min using the capstan and the A-frame.

4.3 Floating sediment trap recovery

On November 29, after the morning AC9/FRRf cast has been completed, we shall transit for the recovery of the sediment trap array. The ship's starboard crane will be needed to retrieve the sediment trap array. After the array is recovered, the ship shall transit to Station 50 to conduct one CTD cast. Station ALOHA to continue operations. After operations at ALOHA are completed, the ship shall transit to Station 50 to conduct one CTD cast.

4.4 Ocean Reference Station (ORS) Mooring

One 200-m CTD cast will be conducted near the ORS 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, 157° 54'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 November 29, 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 (Hangar and 02 deck) with assorted equipment for radioisotope and general use

4. Distilled, deionized water and all required chemicals and isotopes
5. Storage van with assorted equipment (02 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
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. Starboard side crane
2. A-frame block assembly
3. Winch with conducting wire for CTD
4. Electric power for winches and vans
5. Radio direction finder
6. Empty freezer and refrigerator in science storage room
7. Space on the main deck for one lab van, DSE winch
8. Space on the upper 02 deck for one lab van and one storage van
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

26-30 November, 2004
Ship: R/V KOK

HOT 165
CTD CASTS

Cast	Depth	Samples	#Bottles
<u>Kahe Pt.</u>			
s1c1	1000 m	O ₂ , Temp, DIC/Alk, Nuts, Chl a, LLN, LLPO ₄ , DOC, FCM, Salts,	24
<u>Station ALOHA</u>			
s2c1	1000 m	Mixing experiment(3@700, 20@30)), Salts	23
s2c2	4740 m (PO-1)	O ₂ , Temp, DOC, DIC/Alk, Nuts, Salts	24
s2c3	1000 m (PO-2)	O ₂ , Temp, Nuts, DIC/Alk, Quay, DOC, Salts	24
s2c4	1000 m	MIT, MG, MC, RF(1-100m,1-85m,1-25m,1-5m), Salts	24
s2c5	1000 m	ATP, RF(1-100m), Salts	12
s2c6	1000 m	PE, MC, RF(1-100m), Salts	23
s2c7	1000 m	HPLC, Chl a, CS, RF(1-100m), Salts	23
s2c8	1000 m (BEACH)	O ₂ , Temp, DIC/Alk, Nuts, LLN, LLP, DOC, Keeling, Quay, RF(1-100m,1-85m,1-25m,1-5m) Salts	24
s2c9	1000 m	Primary Production, RF(1-100m), Salts	23
s2c10	1000 m	Salts, RF(1-100m)	5
s2c11	1000 m	PSi, MC, RF(1-100m,3-85m,3-25m,3-5m), Salts,	24
s2c12	1000 m	PC/PN, MG, MC, Salts	24
s2c13	1000 m	PPO ₄ , RF(1-100m)	15
s2c14	1000 m	Salts,	4
s2c15	4800 m	Salts, RF(1-100m, 4-85m, 4-25m, 4-5m)	17
s2c16	200 m (PO-deep2)	Oxygen, Salts	8
<u>Ocean Reference Station Mooring</u>			
s50c1	200 m	Salts, MG(6-5m)	6
<u>Kaena Point</u>			
s6c1	2500 m	Open, Chl a Salts	13

SHIP R/V K-O-K

HOT 165

DATE 26-30 November, 2004

TIME	Fri. 11/26	Sat. 11/27	Sun. 11/28	Mon. 11/29	Tue. 11/30
0000		Net Tow			
0100		Deploy sed. traps	Net tow		
0200		S2C2 PO-1	S2C9 PP		
0300				AC-9/FRRf	
0400				Transit sed traps	
0500			S2C10 Open		
0600			Deploy PP array		
0700				Recover sed traps	
0800	On Board	S2C3 PO-2 (start 36 hrs)	S2C11 PSi	Transit Sta. 50	Arrive Snug Full Offload
0900	Depart Snug Log Licor/PRR light			S50C1 (200 m)	End Licor/PRR Light
1000		Net tow	Net tow	Transit ALOHA	
1100	Arrive Kahe	S2C4 MIT	S2C12 PC/PN	PRR AC-9/FRRf	
1200	Weight cast PRR		PRR AC-9/FRRf	AC-9/FRRf	
1300	S1C1 (Kahe)	Net tow	Net tow	Transit Kaena	
1400	Transit ALOHA	S2C5 ATP	S2C13 P.PO4		
1500					
1600			S2C14 Open		
1700		S2C6 PE	Recover PP array		
1800					
1900					
2000		S2C7 HPLC	S2C15 Open (end 36 hrs)	S6C1 Kaena	
2100					
2200		Net tow	Net tow	Transit Snug	
2300	Arrive ALOHA S2c1 Mix	S2C8 BEACH	S2C16 PO-3		

November 28: Sunrise 0654 Sunset 1746

6.0 HOT-165 Watch Schedule

0300-1500

Tom Gregory - Watch Leader
Eric Grabowski
Lance Fujieki
Andrea Rivera
Fernando S-Mandujano
Alejandro Sanchez

1500-0300

Paul Lethaby - Watch Leader
Mark Valenciano
Damion Rosbrugh
Karin Björkman
Tara Clemente
Dave Nichols

At Large

Matt Church
Marcie Grabowski
Melinda Simmons
Rachel Foster
Carolyn Wells

STAG

Daniel Fitzgerald
Dave Gravatt