

Hawaii Ocean Time-series HOT-211 General Cruise Plan

Cruise ID: KOK0903

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

OTG Marine Technicians: Daniel Fitzgerald, Elly Speicher

Marine Center phone number: 842-9813

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Loading: May 22, 2009.

Departure: May 26, 2009 @ 0900

Arrival: May30, 2009 @ 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 WHOTS Mooring, located at 22° 46'N, 157° 53.83'W will be occupied on the 4th day of the cruise for about one hour.
- 4) Two bottom moored sediment trap will be deployed in the northeastern edge of the ALOHA circle (22° 51.75'N, 157° 55.00'W) on the 4th day of the cruise. This operation will take about 6 hours.

1.1 SCIENTIFIC OPERATIONS

<u>Station</u>	<u>Activities</u>
Kahe (sta. 1)	Weight Cast, PRR and Hyperpro casts, CTD cast (1000 m)
ALOHA (sta. 2)	Sediment traps, gas array, net tows, CTD operations, primary productivity measurements, AC9, misc. experiments.
WHOTS mooring station (Sta. 50)	One CTD cast (yo-yo to 200 m).
Sediment trap mooring	Sediment trap mooring deployments
Underway/continuous	ADCP, thermosalinograph, fluorometry, meteorology

2.0. SCIENCE PERSONNEL

Participant	Title	Affiliation/HOT Group
Susan Curless	Research Associate	UH/BEACH
Eric Grabowski	Research Associate	UH/BEACH
Adriana Harlan	Technician	UH/BEACH
Binglin Li	Graduate Student	UH/BEACH
Dan Sadler	Research Associate	UH/BEACH
Brett Updyke	Technician	UH/BEACH
Blake Watkins	Marine Engineer	UH/BEACH
Jay Wheeler	Research Associate	UH/BEACH
Ghizlane Ahrouch	Research Associate	UH/PO
Ian Hawkins	Research Associate	UH/PO
Paul Lethaby	Research Associate	UH/PO
Fernando Santiago-Mandujano	Chief Scientist – Res. Assoc.	UH/PO
Jefrey Snyder	Marine Technician	UH/PO
Bert Wissig	Graduate Student	HPU/PO
Dan Fitzgerald	Marine Technician	OTG
Elly Speicher	Marine Technician	OTG

3.0. SUMMARY SCHEDULE

19 May	Pre-cruise meeting 1030 hrs.
22 May	Ship loading starting at 0900 hrs
26 May	Depart from Snug harbor at 0900 hrs. Science personnel on-board by 0800.
26 May	Station 1 Kahe Pt. operations.
26-30 May	Station ALOHA operations. Station 50 CTD cast. Sediment trap mooring deployments.
30 May	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, PRR and Hydrocast casts (Sect. 4.2.8) will be conducted at this location in the afternoon of May 26. The CTD winch 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. Afterwards, one 200-m, and one 1000-m casts will be conducted before deploying the Primary Productivity 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 small starboard crane and the Sea-Mac winch. 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 60481), 2 strobe lights, and 2 radio transmitters (channel 72, 156.625 MHz). Daily positions of the array shall be transmitted by email directly to the ship (argosfix@satellite-email.com, 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, we will continue with CTD cast operations to prepare water for the Primary Production Array.

4.2.3 Primary production experiment

Samples for the primary productivity experiment will be collected from the rosette (CTD cast 2). Before dawn (sunrise 0547 hrs on May 27), a free drifting incubation array will be deployed from the stern. We request the use of the small starboard crane for this operation and will also use the Sea-Mac winch. The array is equipped with two ARGOS satellite transmitters (platform #'s 03028, 60482, emailing positions to argosfix@satellite-email.com, 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 last 6 hours of the approximately 12-hour time the array will be in the water unless the array drifts outside of the ALOHA circle. If the array drifts out of the circle, the ship should return inside the circle to conduct CTD casts, and the monitoring of the array will be coordinated with the watch leaders (Jay Wheeler, Jeffrey Snyder). The array will be recovered just at sunset (1911 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.

4.2.4. 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 primary productivity 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 (Jay Wheeler, Jeffrey Snyder).

4.2.5. Gas Array deployment

A second free drifting incubation array will be deployed the third day of the cruise at ALOHA station. Samples for the gas array will be collected from CTD cast 9. We request the use of the small starboard crane for the gas array deployment, and will also use the Sea-Mac winch. The array is equipped with two ARGOS satellite transmitters (platform #'s 03028, 60482), emailing positions to argosfix@satellite-email.com, password: argosfix), a strobe light and a radio transmitter (channel 68, 156.425 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.

4.2.6. 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, 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. B. Watkins will be in charge of these operations.

4.2.7 Automated Trace Element Sampler (ATE)

On the 3rd day of the cruise, 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) and Hyperpro.

Around noon on each day a profiling reflectance radiometer will be deployed from the main deck using the small starboard crane. The instrument is hand-lowered and retrieved with assistance from the winch or capstan. After the PRR cast a Hyperpro will be deployed in the same manner as the PRR.

4.2.9. AC9

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 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. The A-frame and capstan will be needed for this operation.

4.3 Floating sediment trap recovery

In the morning of May 29, after the second deep CTD cast has been completed, we shall transit for the recovery of the floating sediment trap array. The starboard 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 50 to conduct one CTD yo-yo cast.

4.4 WHOTS Mooring (Station 50)

One 200-m CTD yo-yo cast will be conducted near the WHOTS mooring on May 29, before the noontime optical casts operations. The cast should be conducted downwind, downcurrent, and at about 200 m from the mooring. The nominal position of the mooring's anchor is 22° 46'N, 157° 53.83'W. After the CTD yo-yo cast is completed, the ship will transit back inside the St. ALOHA circle to complete optical casts. Once those operations are complete the ship shall transit to deploy the sediment trap mooring.

4.5 Sediment trap mooring deployment (22° 51.75'N, 157° 55.00'W)

Two moorings consisting of bottom moored sediment traps will be deployed near this location in the evening of May 29. The ship's crane or Sea-Marc winch with the A-frame will be needed to deploy the mooring's anchor. A triangulation of the moorings will be conducted after the deployment with an acoustic transponder to determine their positions. B. Watkins will be in charge of this operation. After these operations are completed, 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 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 OTG electronics technician will be in charge of the thermosalinograph 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 van with assorted equipment for radioisotope and general use (main deck and O2 deck).
4. Distilled, deionized water and all required chemicals and isotopes
5. Equipment van with assorted equipment (O2 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, Hyperpro, AC-9 and other optical measuring instruments.

13. Oxygen titration system
14. Plankton nets and towing lines
15. Desktop and laptop personal computers
16. Assorted tools
17. All required sampling bottles.
18. Deck incubation system
20. Pertinent MSDS
21. Sediment Traps and their mooring equipment including floats, acoustic releases, anchor, etc.

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

1. A-frame
2. A-frame block assembly
3. CTD 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 60 amps for labvan, 110 VAC 10 amps for equipment van)
5. Radio direction finder
6. Space on the main deck for one lab van
7. Space on upper deck for one equipment van port side, and one lab van starboard side
8. Space on upper deck for incubator
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. Small capstan (~ 10 m/min)
22. Underway/on-station data acquisition system for meteorological instruments, ADCP, thermosalinograph, fluorometer
23. 1000 lb weight.
24. WHOI's 24-place rosette, 24 12-l water sampling bottles (to be used as spare)
25. Quick release for 3000 lb weight
26. DI water
27. Freezers, refrigerators, and -80

HOT-211 Cast Sheet

Cast	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 200 m	CMORE(5@25, 5@45, 5@75)	15
s2c2 1000 m	Primary Production, Salts MB (pb on all depths)	22
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	PC/PN, SW(1@5,25,45,75,100,125,150,175), BL(1@25,45), Salts	24
s2c6 1000 m	PPO ₄ , Salts	16
s2c7 1000 m (BEACH)	O ₂ , Temp, DIC/Alk, Nuts, LLN, LLP,DOC, Keeling, Quay, Salts	23
s2c8 1000 m	PUR, CMORE(5@1000,5@770,5@500), Salts	24
s2c9 1000 m	Gas Array (2@125,100) (3@5,25,45,75)	16
s2c10 1000 m	CMORE(5@125,5@200), Salts	12
s2c11 1000 m	PSi, MC(5,25,45,75,100,125,150,175) BL(3@25 , 3@45), Salts	24
s2c12 1000 m	MIT, BL(1@75,DCM)(3@150)(3@175),Salts	24
s2c13 1000 m	ATP, MC(200,300,500,770), SD (1@5,25,45,75, 100,125,1000), Salts	22
s2c14 1000 m	PE, MC(5,25,45,75,100,125,150,175), Salts	21
s2c15 1000 m	HPLC, Chl a, Slides, Salts	22
s2c16 4740 m (PO-3)	Oxygen, MC(1000,2000,3000,4000), Salts	12
<u>WHOTS Mooring</u>		
S50c1 200 m	BC (1@DCM,70,40,15), BL(3@ [5,45,75,100,125],5@25)	24

SHIP R/V K-O-K**HOT 211****Date 26 – 30 May, 2009**

TIME	Tue. 5/26	Wed. 5/27	Thu. 5/28	Fri. 5/29	Sat. 5/30
0000		S2C1			
0100		S2C2 PP	Net Tow		
0200			S2C9 Gas		
0300				Transit Sed Traps	
0400		Deploy PP array	Deploy Gas Array		
0500		S2C3 PO-1	S2C10 Open	Recover traps	
0600				Transit gas array	
0700			ATE	Recover gas array	
0800			S2C11 PSi	Transit Sta. 50	Arrive Snug offload
0900	Depart Snug			S50C1 WHOTS	
1000		Net Tow	Net Tow	AC9	
1100	Arrive Kahe (11:30) Weight cast	S2C4 PO-2 (Begin 36 hr)	S2C12 MIT	AC9 PRR	
1200	PRR		PRR Hyperpro	Transit mooring Deploy sed traps	
1300	Hyperpro S1C1	Net Tow	AC9 Net Tow		
1400	Transit ALOHA	S2C5 PC/PN	S2C13 ATP		
1500					
1600					
1700		S2C6 PPO4	S2C14 PE		
1800				Transit Snug	
1900		Recover PP array			
2000		S2C7 BEACH	S2C15 HPLC		
2100					
2200		Net Tow	Net Tow		
2300	Arrive ALOHA Deploy sed traps	S2C8 PUR	S2C16 PO-3 (end 36 hours)		

May 27: Sunrise 0547 Sunset 1911

6.0 HOT-211 Watch Schedule

0300-1500

Adriana Harlan - *Water Boss – Alt Tag*

Dan Sadler– *Alt Water Boss, Tag*

Eric Grabowski - *Tag*

Jefrey Snyder - *Watch Leader – Deck Boss*

Fernando Santiago-Mandujano - *Chief Scientist, Console*

Ghizlane Ahrouch – *Alt Tag*

1500-0300

Susan Curless - *Water Boss – Alt Tag*

Jay Wheeler - *Watch Leader - Alt Water Boss - Deck Boss*

Paul Lethaby - *Console*

Ian Hawkins - *Tag*

Bert Wissig - *Tag*

At Large

Blake Watkins

Binglin Li

Brett Updyke

OTG

Dan Fitzgerald

Elly Speicher