Hawaii Ocean Time-series
HOT-215 Draft Cruise Plan

Cruise ID: KOK0915
Vessel: R/V *Ka'Imikai-O-Kanaloa*, University of Hawaii
Master of the Vessel: Captain Ross Barnes
Chief Scientist: Susan Curless, University of Hawaii
OTG Marine Technicians: Vic Polidoro and Kuhio Vellalos

Marine Center phone number: 842-9813

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 52, is the site of the WHOTS-6 Mooring, located at 22° 39.989'N, 157° 56.961'W will be occupied on the 4th day of the cruise for about one hour.
4) Station 6, referred to as Station Kaena, is located off Kaena Point at 21° 50.8'N, 158° 21.8'W and will be occupied on the 4th day of the cruise for about 3 hours.

1.1 SCIENTIFIC OPERATIONS

Station	Activities
Kahe (sta. 1)	Weight Cast, Hyperpro 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)	One CTD cast (yo-yo to 200 m).
Kaena (sta. 6)	CTD cast (2400 m)
Underway/continuous	ADCP, thermosalinograph, fluorometry, meteorology

2.0. SCIENCE PERSONNEL

Participant	Title	Affiliation/HOT Group
Donn Viviani	Graduate Student	UH/BEACH
Susan Curless	Chief Scientist – Res. Assoc.	UH/BEACH
Lance Fujieki	Computer Specialist	UH/BEACH
Adriana Harlan	Research Associate	UH/BEACH
Binglin Li	Graduate Student	UH/BEACH
Dan Sadler	Research Associate	UH/BEACH
Brett Updyke	Research Associate	UH/BEACH
Blake Watkins	Marine Engineer	UH/BEACH
Sam Wilson	Post-doc Scientist	UH/CMORE
Daniela Bottjer	Post-doc Scientist	UH/BEACH
Fernando Santiago-Mandujano	Research Associate	UH/PO
Paul Lethaby	Research Associate	UH/PO
Jefrey Snyder	Marine Technician	UH/PO
Meg Murphy	Research Associate	UH/PO
Yajuan Lin	Graduate Student	UH
Patrick Drupp	Graduate Student	UH/PO
Sarah Yasui	Undergrad Student Assistant	UH/PO
Amanda Whitmire	Post-doc Scientist	OSU
Angel White	Assistant Professor	OSU
Justin Smith	Marine Technician	OTG
Vic Polidoro	Marine Technician	OTG

3.0. SUMMARY SCHEDULE

15 September	Pre-cruise meeting, MSB 306, 1330 hrs.
22 September	Ship loading starting at 0900 hrs.
23 September	Depart from Snug harbor at 0900 hrs. Science personnel on-board by 0800.
23 September	Station 1 Kahe Pt. operations.
23-26 Setpember	Station ALOHA operations. Station 52 and Kaena CTD casts.
27 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 1000 lb. weight-test cast, one CTD cast to 500 m and a Hyperpro cast (Sect. 4.2.7) will be conducted at this location on September 23rd. 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. After the sediment trap deployment is complete, one 200-m and one 1000-m cast will be conducted before deploying the Primary Productivity array (Sect. 4.2.3). These operations will be followed by a near-bottom CTD cast.

4.2.2. Sediment trap array deployment

Upon arrival to Station ALOHA, the floating sediment traps will be deployed at a location within Station ALOHA, to be determined enroute to ALOHA by local current conditions. The array will be deployed from the stern rail using the small crane and the 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, 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, the ship shall continue with CTD cast operations to prepare water for the Primary Productivity Array.

4.2.3 Primary production experiment

Samples for the primary productivity experiment will be collected from the rosette. Before dawn (sunrise 0621 hrs on September 24th), a free drifting incubation array will be deployed from the stern rail using the small crane and 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 leader. The array will be recovered just at sunset (1826 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 will need the ship's CTD winch and crane for these operations. 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 **(Jefrey Snyder, Fernando Santiago-Mandujano)**.

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 10. The gas array will be deployed from the stern rail using the small crane and 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 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.

4.2.6.1 Hand net tows

The hand held surface net tows will be deployed off the stern for about 15-20 minutes at various times during the cruise. The ships deck equipment is not needed for this operation. We request that the ship remain stationary during these tows. Binglin Li, Sam Wilson, and Angel White will all be conducting these tows.

4.2.7. Hyperpro

The Hyperpro is a profiling unit with one up-looking and one down-looking hyperspectral radiometer, a WET Labs ECO-BB2F triplet (measuring Chlorophyll-a fluorescence and backscattering in the blue and red wavelengths), temperature and conductivity sensors. This instrument also incorporates a ship mounted surface radiometer. Around noon on the first, third and fourth days, the Hyperpro will be deployed from the stern rail using the small crane. The instrument is hand-lowered and retrieved with assistance from the winch.

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

4.3 Floating sediment trap recovery

In the morning of September 26th, after the AC9/FRRf cast has been completed, we shall transit for the recovery of the floating sediment trap array. The small 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 recover the Gas Array. After the array is recovered, the ship shall transit to Station ALOHA to conduct one Hyperpro cast, and two AC9/FRRf casts, after which the ship shall transit to Station 52 to conduct one CTD cast.

4.4 WHOTS-6 Mooring (Station 52)

One 200-m CTD yo-yo cast with at least 6 full cycles will be conducted near the WHOTS mooring on September 26th. This cast should be conducted downwind, downcurrent, and about 200 m from the mooring. The nominal position of the mooring is 22°39.989’N, 157°56.961’W.

After these operations are completed, the ship will transit back inside the St. ALOHA circle to complete optical casts.

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 August 20th, 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, 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 technicians 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 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 dewar
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. Hyperpro 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
19. Pertinent MSDS

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

1. A-frame
2. A-frame block assembly
3. Crane and winch with conducting wire for CTD
4. Electric power for winches (440 VAC, 3 phase, 60 Amp breaker) and vans (208 VAC single phase at 60 amps for lab van, 110 VAC 10 amps for equipment van)
5. Radio direction finder
6. Space in the main deck hanger for one storage van
7. Space on upper deck for one lab van and the tool van
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 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. OTG's 24-place rosette, and 24 12-l water sampling bottles (to be used as spare)
24. 500 lb weight.
25. Remote CTD decibar pressure display in the winch operator cabin.
26. Large Sea-Mac winch (Mod. 1025 EHS). 60 Amp Hubbel plug/connector (440 VAC, 3 phase, 60 Amp breaker)
27. Monitor in Rock Lab displaying ship coordinates and GMT.

Ship: R/V *Ka'Imikai-O-Kanaloa* HOT 215 CTD CASTS September 23-27, 2009

Cast		Samples	#Bottles
Kahe Pt.			
s1c1	1000 m	O_2, Temp, DIC/Alk, Nuts, Chl a, LLN, $LLPO_4$, DOC, FCM, Salts	24
Station ALOHA			
s2c1	200 m	CMORE(5@25, 5@45, 5@75), MS(pbCMORE),SW(4@5),DB(5@5)	24
s2c2	1000 m	Primary Production, MB(pb on all depths), Salts	22
s2c3	500m	YL(5@25,100,150,500), DV(2@25)	22
s2c4	4740 m (PO-1)	O_2, Temp, DOC, DIC/Alk, Nuts, Salts	24
s2c5	1000 m (PO-2)	O_2, Temp, Nuts, DIC/Alk, DOC, Salts	24
s2c6	1000 m	PC/PN, YL(1@25,100,150), Salts	16
s2c7	1000 m	PPO4, BL(2@25, 2@45), YL(1@25,150,pb100), Salts	20
s2c8	1000 m (BEACH)	O_2, Temp, DIC/Alk, Nuts, LLN, LLP,DOC, Keeling, Quay, YL(pb@25,100,150), Salts	23
s2c9	1000 m	PUR, CMORE(5@1000,5@770,5@500), MS(pbCMORE), YL(pb@25,100,150), Salts	24
s2c10	1000 m	Gas Array (2@5,25,45,75,100,125), MB(1@175,150,125,100,75,45,25,5), SW (2@5m), YL(pb@25,100,150), Salts	24
s2c11	1000 m	CMORE(5@125,5@200), MS(pbCMORE),YL(1@25,100,150), Salts PO Salinity Standard (6@1000)	21
s2c12	1000 m	PSi, MC(5,25,45,75,100,125,150,175), Salts SW(1@15,35,55,65,85,110), SW(pbMC), YL(pb@25,100,150)	24
s2c13	1000 m	MIT, BL(2@75, 2@125), YL(1@25, pb(100,150), Salts	22
s2c14	1000 m	ATP, SW(1@200,300,400,500, 600,700,800,900,1000), MC(200,300,500,770), YL(pb@25,100,150), Salts	24
s2c15	1000 m	PE, MC(5,25,45,75,100,125,150,175), SW(pb MC), YL(pb@25,100,150), Salts	22
s2c16	1000 m	HPLC, Chl a, Slides, YL(pb@25,100,150), Salts SD(pb@5,25,45,75,100,125,1000)	22
s2c17	4740 m (PO-3)	Oxygen, MC(1000,2000,3000,4000), SW(1@5,15,25,35,45,55,75,100,125,150), Salts	22
WHOTS Mooring			
S50c1	200 m yo-yo	BL(3@ 5,25,45,75,100,125,150,175)	24
Kaena			
S6c1	2400 m	Chl, Salts	13

MC=Matt Church, **SW**=Sam Wilson, **BL**=Binglin Li, **MB=**Mark Brzezinski, **YL=** Yajuan Lin, **SD**= Solange Duhamel, **DB=** Daniela Bottjer, **MS=** Mike Sieracki

SHIP: R/V *Ka'Imikai-O-Kanaloa* HOT 215 Date: September 23-27, 2009

TIME	Wed. 9/23	Thur. 9/24	Fri. 9/25	Sat. 9/26	Sun. 9/27
0000		S2C1			
0100		S2C2 PP	Net Tow		
0200			S2C10 Gas		
0300		S2C3		AC9/FRRF	
0400		Deploy PP Array	Deploy Gas Array	Transit sed traps	
0500		S2C4 PO-1	S2C11 Open		
0600				Recover traps Transit gas array	
0700				Recover gas array	
0800			S2C12 PSi	Transit St. ALOHA	Arrive Snug
0900	Depart Snug				
1000		Net Tow	Net Tow	AC9/FRRF	
1100	Kahe Weight cast	S2C5 PO-2 (Begin 36 hr)	S2C13 MIT	AC9/FRRF	
1200	Hyperpro	Net Tow	Hyperpro AC9/FRRF	Hyperpro	
1300	S1C1			Transit St. 52	
1400	Transit ALOHA	S2C6 PC/PN	S2C14 ATP	S52C1 WHOTS	
1500					
1600				Transit St. Kaena	
1700		S2C7 PPO4	S2C15 PE		
1800		Recover PP array			
1900					
2000		S2C8 BEACH	S2C16 HPLC		
2100				S6C1	
2200		Net Tow	Net Tow		
2300	Arrive ALOHA Deploy sed traps	S2C9 PUR	S2C17 PO-3 (end 36 hours)	Transit Snug	

September 24: Sunrise 0621, Sunset 1826

6.0 HOT-215 Watch Schedule

0300-1500

Adriana Harlan **-** *Water Boss*
Lance Fujieki – *Alt Tag*
Daniela Bottjer
Paul Lethaby – *Console*
Jefrey Snyder – Watch Leader - *Tag- Deck Boss*
Patrick Drupp– *Tag*

1500-0300

Susan Curless **- Chief Scientist** - *Water Boss*
Donn Viviani – *Tag*
Fernando Santiago-Mandujano **-** Watch Leader - *Console*
Meg Murphy – *Tag*
Sarah Yasui

0900-2100

Dan Sadler – *Alt Tag*

At Large

Binglin Li
Blake Watkins
Sam Wilson
Brett Updyke
Yajuan Lin
Amanda Whitmire
Angel White

OTG

Vic Polidoro
Justin Smith