Hawaii Ocean Time-series
HOT-242 Operational Cruise Plan

Cruise ID: KOK 12-05
Vessel: R/V *Ka'Imikai-O-Kanaloa*, University of Hawaii
Master of the Vessel: Captain Clary Gutzeit
Chief Scientist: Susan Curless, University of Hawaii
OTG Marine Technicians: Trevor Young and Dan Fitzgerald

Marine Center phone number: 842-9813
KOK phone number: 842-9818
KOK Cell number: 722-0839

Loading: May 25, 2012@0900
Departure: May 29, 2012 @0800 (Science personnel on board by 0700).
Arrival: June 2, 2012 @ 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 52, the site of WHOTS-8 Mooring (anchor position: 22°40.1572'N, 157°57.0225'W) will be occupied on the 4th day of the cruise for about one hour.

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, optics casts, misc. experiments.
WHOTS mooring station (Sta. 52)	One CTD cast (yo-yo to 200 m), surface instrument intercomparisons.
Underway/continuous	ADCP, thermosalinograph, fluorometry, meteorology

2.0. SCIENCE PERSONNEL

Participant	Title	Affiliation/HOT Group
Susan Curless	Research Associate	UH/BEACH
Adriana Harlan	Research Associate	UH/BEACH
Dan Sadler	Research Associate	UH/BEACH
Brett Updyke	Research Associate	UH/BEACH
Donn Viviani	Graduate Student	UH/BEACH
Shimi Rii	Graduate Student	UH/BEACH
Blake Watkins	Marine Engineer	UH/BEACH
Sean Jungbluth	Graduate Student	UH/BEACH
Sandra Martinez-Garcia	Postdoctoral Researcher	UH/CMORE
Benedetto Barone	Postdoctoral Researcher	UH/CMORE
Jefrey Snyder	Marine Technician	UH/PO
Cameron Fumar	Research Associate	UH/PO
Fernando Santiago-Mandujano	Research Associate	UH/PO
Joseph Gum	Research Technician	UH/PO
Kim Falinski	Graduate Student	UH/PO
Eric Tong	Graduate Student	UH/PO
Ken Doggett	Research Associate	UH/CMORE
Ger van den Engh	Visiting Scientist	BD Biosciences/CMORE
Trevor Young	Marine Technician	OTG
Dan Fitzgerald	Marine Technician	OTG

3.0. SUMMARY SCHEDULE

21 May	Pre-cruise planning meeting 1330 hrs, MSB 307
25 May	Ship loading at 0900 hrs.
29 May	Depart from Snug harbor at 0800 hrs. **Science personnel on-board by 0700.**
29 May	Station 1 Kahe Pt. operations.
29 May – 1 June	Station ALOHA operations. Station 52 CTD yo-yo cast, Station Kaena
2 June	Arrive back to Snug Harbor. Full offload.

4.0. OPERATIONAL PLANS

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

A 500 lb. weight-test cast, one CTD cast to 1000 m and a Hyperpro cast (Sect. 4.2.7) will be conducted at this location on May 29th. The CTD winch and small North American 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 1000-m CTD 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. 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 1833, 60843), 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 an ACS/AC9/FRRF cast and 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 0547 hrs on May 30th), 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 3028, 60482, emailing positions to argosfix@satellite-email.com, password: argosfix), strobe lights and a radio transmitter (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 (1913 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 Bullister sampling bottles. We will need the ship's CTD winch and crane for these operations. Water samples for biogeochemical measurements will 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 **(Cammy Fumar, Brett Updyke)**.

4.2.5. Gas Array deployment

A second free drifting incubation array will be deployed the third day of the cruise at Station ALOHA. Samples for the gas array will be collected from CTD cast 8. 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 3028, 60482), emailing positions to argosfix@satellite-email.com, password: argosfix), a strobe light and a radio transmitter (156.425 MHz). The ship will **not** need to keep within sight of the array until the time of the recovery, approximately 25 hours after its deployment. Assistance from the Bridge is requested in plotting the drift track of the array. 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 midnight on the second, third, and fourth days (see schedule) for a total of six slots. The A-frame and small capstan will be needed for this operation. B. Watkins will be in charge of these operations.

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. ACS/AC9/FRRf/LISST

An optical package including a Wet Labs AC9 that measures water column spectral absorption and attenuation at nine wavelengths, a Chelsea Fast Repetition Rate Fluorometer (FRRf), a SeaBird Seacat with temperature, conductivity, fluorometer, and pressure sensors, and a LISST particle size and distribution analyzer will be deployed two times during the cruise.

Each deployment will consist of two up and two down profiles to a target depth of 200 m at a constant speed of 10 m/min during both the downcast and upcast. An instrument soaking period at just below the surface will be required between the two profiles. The A-frame and capstan will be needed for this operation.

4.2.9. Automated Trace Element Sampler (ATE)

Each day that the ship is occupying Station ALOHA, the ATE will be hand deployed off the back deck to a depth of 10 m to collect at Trace Metal Free Sample. The ATE will be recovered after 30 minutes in the water. The ATE is approximately 1’ tall and 4’’ in diameter, weighting 5 lbs.

If the ship has been stationary at ALOHA for previous cruise activities, it is requested that the ship steams approximately 10-15 minutes up current from current position prior to each ATE deployment to limit contamination of the trace metal sample from the ship’s hull.

4.3. Floating sediment trap recovery

In the morning of June 1st, 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 Gas Array is recovered, the ship shall transit to Station 52 to conduct one 200 m yo-yo cast.

4.4 Station 52 - WHOTS-8 Mooring
(nominal position of mooring = 22°40.1572’N, 157°57.0225’W)

4.4.1 CTD yo-yo cast (subsurface instrument intercomparison)

One 200-m CTD yo-yo cast with at least 6 full cycles will be conducted near the WHOTS mooring on June 1st for subsurface instrument intercomparison. This cast should be conducted downwind, down current, and about 200 m from the mooring.

4.4.2 Surface instrument intercomparison

While on station, the ship’s meteorological system shall be in operation for surface instrument intercomparisons with the WHOTS mooring.

Once the yo-yo cast is completed, the ship shall transit to Station ALOHA to conduct one Hyperpro cast. If the mooring is positioned such that it is within the Station ALOHA circle, this

operation can be performed as close to the WHOTS mooring as safely possible to extend the surface instrument intercomparison.

4.5. APEX Float Recovery

An attempt to recover a University of Washington APEX float will occur on June 1st. This operation will require the use of the ship's small boat. S. Curless and B. Watkins will be in charge of this operation; receiving 15 minute interval location fixes via Iridium satellite phone from Dana Swift (425) 213-0289, swift@ocean.washington.edu
After the float recovery attempt is complete, the ship shall transit back to Snug Harbor.

4.6. Seaglider Operations

Two seagliders (sg148 & sg146) will be diving and profiling in the Station ALOHA area and at times transiting within the circle boundaries of Station ALOHA.

sg146 ARGOS – 90990 sg148 ARGOS - 90992

There is no plan to recover these seagliders on this cruise and the following information is provided on a need basis as the KOK conducts its operations within Station ALOHA. The glider pilot (Steve Poulos) will be monitoring the KOK's position and the free drifting array positions relative to the glider positions throughout the duration of the cruise.

4.7. Acoustic Doppler Current Profiler

The ship's acoustic Doppler current profiler (ADCP) will be in operation during the duration of the cruise. The OTG technicians 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 HOT-PO 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. One 20 ft. laboratory van (#23) with assorted equipment for radioisotope and general use.
4. Distilled, deionized water and all required chemicals and isotopes
5. Large vacuum waste containers
6. Liquid nitrogen dewar
7. Drifting sediment trap array with strobe lights, satellite and radio transmitters, floats, weights
8. Polypropylene line
9. Sediment traps and crosses
10. Drifting primary production array and gas array with light and radio transmitter, floats, weights, polypropylene line, spare buoy, etc.
11. Hyperpro and other optical measuring instruments.
12. Oxygen titration system
13. Plankton nets and towing lines
14. Desktop and laptop personal computers
15. Assorted tools
16. All required sampling bottles
17. Deck incubation system

18. Pertinent MSDS
19. Karl Lab FCM van
20. Large stand up incubator

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 laboratory van **(#23)**
7. Space on upper deck for two 20ft. lab van **(Karl FCM van, and the OTG Rad 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 dbar pressure display in the winch operator area.
26. Retriever Winch
27. Monitor in Rock Lab displaying ship coordinates and GMT.

Ship: R/V *Ka'Imikai-O-Kanaloa* HOT 242 CTD CASTS Date: May 29 - June 2, 2012

Cast		Samples	#Bottles
Kahe Pt.			
s1c1	1000 m	O_2, Temp, DIC/Alk, Nuts, Chl a, LLN, LLP, DOC, FCM, Salts	24
Station ALOHA			
s2c1	1000 m	Primary Production, DV(pb PP depths), SMG(pb PP depths), KD(pb PP depths), SR(pb PP depths), Salts	22
s2c2	4740 m (PO-1)	O_2, Temp, DOC, DIC/Alk, Nuts, Salts	24
s2c3	1000 m (PO-2)	O_2, Temp, DOC, DIC/Alk, Nuts, Salts	24
s2c4	1000 m	PC/PN, DV(1@25), SMG(5@10) Salts	20
s2c5	1000 m	PPO4, SR(1@5,25,45,75,100,125,150,175), Salts	22
s2c6	1000 m	MC(1@5,25,45,75,100,125,150,175), SW(pb MC), Salts	11
s2c7	1000 m	PUR, Salts	11
s2c8	1000 m	Gas Array(2@5,25,45,75,100,125), Salts	14
s2c9	1000 m	AP(6@5), Salts MSN(1@5,25,35,45,60,75,85,90,100,110,115,125,130,150,165,175)	24
s2c10	1000 m	PSi, MC(1@5,25,45,75,100,125,150,175), SMG(pb MC depths, 1@200), Salts	19
s2c11	1000 m	SR(1@5,25,45,75,100,125,150,175), DV(1@100), Salts	12
s2c12	1000 m	ATP, MC(1@200,300,500,770), SMG(1@O2min, pb SW), SW(1@200,300,400,500, 600,700,800,900,1000), Salts	24
s2c13	1000 m (BEACH)	O_2, Temp, DIC/Alk, Nuts, LLN, LLP, DOC, Keeling, Quay, Salts MSN(pb nutrient depths)	23
s2c14	1000 m	HPLC, Chl a, Slides, BB(1@MLD,DCM), Salts	24
s2c15	4740 m (PO-3)	Oxygen, MC(1@1000,2000,3000,4000), Salts	12
WHOTS Mooring			
s52c1	200 m yo-yo	SR(1@5,25,45,75,100,125,150,175), SMG(1@5,25), SW(4@25), DV(1@25)	15
Kaena			
s6c1	2400 m	Chl, Salts	13

MC=Matt Church, **SW**=Sam Wilson, **DV=**Donn Viviani, **SMG=**Sandra Martinez-Garcia, **SR**=Shimi Rii
BB=Bob Bidigare, **KD=**Ken Doggett, **AP=**Adina Paytan, **MSN=**Mariona Segura-Noguera

Ship: R/V *Ka'Imikai-O-Kanaloa* HOT 242 Date: May 29- June 2, 2012

TIME	Tues. 5/29	Wed. 5/30	Thurs. 5/31	Fri. 6/1	Sat. 6/2
0000		Arrive ALOHA	Net Tow		
0100		Deploy sed traps S2C1 PP			
0200		AC9/FRRF	S2C8 Gas	Transit sed traps	
0300					
0400		Deploy PP Array	Deploy Gas Array		
0500		S2C2 PO-1	S2C9 Open	Recover traps	
0600				Transit gas array	
0700				Recover gas array	
0800	Depart Snug		S2C10 PSi	Transit St. 52	Arrive Snug
0900				ATE S52C1 WHOTS	
1000	Arrive Kahe (11:00)	Net Tow ATE	Net Tow ATE	Hyperpro	
1100	Weight cast	S2C3 PO-2 (Begin 36 hr)	S2C11 Open	Transit APEX float	
1200	Hyperpro S1C1 Kahe	Hyperpro AC9/FRRF	Net Tow		
1300					
1400	Transit ALOHA	S2C4 PC/PN	S2C12 ATP		
1500					
1600				Recover APEX	
1700		S2C5 PPO4	S2C13 BEACH	Transit to Snug	
1800					
1900		Recover PP array			
2000		S2C6 OPEN	S2C14 HPLC		
2100					
2200		Net Tow	Net Tow		
2300		S2C7 PUR	S2C15 PO-3 (end 36 hours)		

May 30th: Sunrise 0547, Sunset 1913

6.0 HOT-242 Watch Schedule

0300-1500

Adriana Harlan **–** *Water Boss*
Dan Sadler – *Alt. Tag*
Sean Jungbluth – *Tag*
Benedetto Barone – *Alt. Tag*
Eric Tong – *Alt. Tag*
Cammy Fumar– Watch Leader **-***Console*
Jefrey Snyder – *Tag*

1500-0300

Susan Curless– Chief Scientist – *Water Boss*
Brett Updyke – Watch Leader **-** *Tag*
Joseph Gum – *Console*
Kim Falinski – *Alt. Tag*
Fernando Santiago-Mandujano **-** *Tag*

At Large

Blake Watkins
Donn Viviani
Sandra Martinez-Garcia
Shimi Rii
Ken Doggett
Ger van den Engh

OTG

Trevor Young
Dan Fitzgerald